legislation that imposed limits on opioid prescriptions in 2016, while 18 states followed in 2017 and another 5 in 2018. Figure A.I pictures the treated states on a map and Table A.II translates this into county observations.

To measure opioid supply side drivers at the county level, we use the data on the number of primary physicians per capita and collect data on direct or indirect payments or other transfers of value made from pharmaceutical and medical device manufactures and their distributors to physicians, non-physician practitioners, and teaching hospitals. Data on physician opioid related payments come from the Centers for Medicare & Medicaid Services Open Payments database, and it covers August 2013 to December 2019.[14] To compute opioid-related physician payments by the manufacturers, we follow Fernandez and Zejcirovic (2018) and Hadland et al. (2019): we identify opioid related payments through the National Drug Code (NDC) directory published by the U.S. Food and Drug Administration (FDA), which includes information on the substance names included in drugs.[15] We then use the substance names to identify opioid drugs following the Anatomical Therapeutic Chemical (ATC) Classification System of the WHO (ATC code N02A).[16] If a payment occurred for multiple drugs, we split the amount paid by the number of drugs promoted. We consider all payments made to physicians and teaching hospitals related to the identified opioid drugs. We identify the county of the physician or teaching hospital based on unique city and state combinations. If this is not possible, we use the Zipcode and assign the county based on the zipcode centeroid. Last, we aggregate by county and year. Counties without payments related to opioid payments are set to 0, as the coverage is US wide and no information is therefore equivalent to no payments.

4 Results

4.1 Opiod abuse and home values

4.1.1 Correlation between home values and prescription rates

We first document the correlation between home values and opioid abuse, as proxied by prescription rates. We exploit within county variation as well as within state-year variation. Figure 1 presents county-level heat maps of 5-year lagged county prescription rates and 5-year percentage change in home values for the year 2018, the last year in our sample with most observations. The maps show that counties in the bottom quintile of percent-

[14] Source: https://www.cms.gov/OpenPayments/Data/Dataset-Downloads

[15] https://www.fda.gov/drugs/drug-approvals-and-databases/national-drug-code-directory

[16] https://www.whocc.no/atc_ddd_index/?code=n02a

age change in home values overall correspond to the counties with the highest prescription rates, suggesting a negative correlation in the cross-section between prescription rates and 5-year percentage change in home value.

[Insert Figure 1]

We further examine this relationship by estimating the following specification:

$$PCHomeValue_{c,t-x\ to\ t} = \alpha + \beta PrescriptionRate_{c,t-x} + \gamma Controls_{c,t-x} + \theta_c + \tau_t + \epsilon_{ct} \quad (1)$$

The dependent variable $PCHomeValue_{c,t-x\ to\ t}$ in equation 1 is the log percentage change of average county c home values, ($log(HV_t/HV_{t-x}) * 100$) over $X = \{1, 2, 3, 4, 5\}$ years. $PrescriptionRate_{c,t-x}$ captures county c prescription rate at $t - x$. We also include a vector of time-varying county-level controls $Controls_{c,t-x}$, measured with a lag at time $t - x$. Following Ouimet et al. (2021), county-level controls measured at $t - x$ include: Male population ratio, white population ratio, black population ratio, American-Indian population ratio, Hispanic population ratio, age 20-64 ratio, age over 65 ratio, migration Inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio, neoplasm mortality, and number of physicians per county. We include county fixed effects θ_c, and control for general macro-economic conditions by including year fixed effects τ_t. In addition, in a separate specification, we use state-year fixed effects $\zeta_{s,t}$ instead of θ_c and τ_t to control for time-varying local market conditions.

Figure 2 shows the results of estimating Equation 1. Panel A includes county fixed effects θ_c, and year fixed effects τ_t, whereas we use state-year fixed effects $\zeta_{s,t}$ in Panel B.

We find that home values and prescription rates are negatively correlated in the short run. This negative association is persistent and stronger in the long run. The estimated coefficients for the correlation between prescription rates and changes in average home value are monotonically decreasing over 1 to 5 years. The correlation between prescription rates and 1 year percentage change in home values is estimated at -0.011, while the correlation with 5-years changes is -0.033, when exploiting within county variation. A one standard deviation increase in prescription rates translates in 1.35 percentage points reduction in home value growth rates, which is equivalent to 25.2% of the 5-year average percentage home value increase (5.36%). Point estimates obtained from within state-year variation are at -0.002 for 1-year change in home value and -0.008 for 5-year change in home value. Taking a one standard deviation change of prescription rates over 5 years translates into a 0.33 percentage points decrease in home values over the same period.

[Insert Figure 2 about here]

4.1.2 Adoption of opioid-limiting state laws: difference-in-differences estimates

In this section we exploit variation in opioid usage induced by the staggered adoption of state laws limiting prescriptions to estimate the impact of opioid abuse on home values.

We start by examining the link between the passage of the laws and actual opioid prescription rates to establish the effectiveness of the law changes. We implement a difference-in-differences framework to compare changes in county opioid prescription rates in years before and after the passage of the law (*the treatment*) in *treated* versus *control* counties. We run a regression with lead and lag dummies relative to the year of the passage of the law to establish the path of total county prescription rates, and changes in home values and delinquent mortgages, before and after the law.

The literature on staggered differences-in-differences design (e.g. Callaway and Sant'Anna, 2021; Sun and Abraham, 2021) highlights that running a staggered regression only with lead and lags are potentially problematic. First, weights across treatment cohorts can be non-intuitive and at worst negative, as they are proportional to group sizes as well as the variance of the treatment dummy in each pair. Second, already treated units act as controls for newly treated units, which is particularly problematic for trend break effects rather than unit shifts. We follow the Sun and Abraham (2021) approach to estimate cohort-specific average treatment effect on the treated ($CATT(e,\ell)$), ℓ periods from initial treatment for cohort first treated at time e. Our baseline specification to estimate the impact of the passage of the laws on opioid prescriptions across time and states therefore is:

$$PrescriptionRate_{c,t} = \alpha + \sum_{e \in \{16,17,18\}} \sum_{l=-5,\neq -1}^{2} \delta_{e,l} \mathbf{1}\{E_i = e\} D_{ct}^{\ell} + \gamma Controls_{c,t-1} + \theta_c + \tau_t + \epsilon_{c,t} \tag{2}$$

The dependent variable $PrescriptionRate_{c,t}$ is defined as county prescription rates in year t. τ_t and θ_c are time and unit fixed-effects, representing calendar year and county fixed effects. $D_{i,t}^{\ell}$ are relative period indicators, that are equal to one for a county calendar year observation, where the time relative to the passage of the law statement matches the dummy statement, and zero otherwise. For instance, the relative time period dummy minus 2, $D_{i,t}^{-2}$, is equal to one for any county in calendar year 2014 that passed a law in 2016. As standard, we drop the relative time period dummy "minus 1" to avoid multicollinearity and focus on the change around the passage of the law. Sun and Abraham (2021) interact these standard lead lag dummies with cohort specific indicators; i.e. $\mathbf{1}\{E_i = e\}$. In our specification there are three cohorts, with states, respectively counties, implementing the opioid law in 2016, 2017 respectively 2018. Thus, there are three dummies that are equal to 1 for counties that passed the law in the specific cohort year and zero for any other county. This allows us to estimate cohort-specific average treatment effects. We additionally include county controls as defined before.

We restrict t to 2013–2018 to focus on the years around the passage of the law with the first law being passed in 2016 and the last in 2018. Hence, for counties with the law passed in 2016, the relative time period goes from "minus 3" to "plus 2". For counties with the law passed in 2018, the relative time period goes from "minus 5" to "plus 0". Finally, we calculate the proposed interaction-weighted estimator by aggregating the cohort-specific coefficients across each relevant time by their sample share in the relevant time period.

We then apply the same framework to compare the changes in county-level home values in years before and after the passage of the law in *treated* versus *control* counties.

$$PCHomeValue_{c,t} = \alpha + \sum_{e \in \{16,17,18\}} \sum_{l=-5,\neq -1}^{2} \delta_{e,l} \mathbf{1}\{E_i = e\} D_{ct}^{\ell} + \gamma Controls_{c,t-1} + \theta_c + \tau_t + \epsilon_{c,t} \tag{3}$$

Where the dependent variable $PCHomeValue_{c,t}$ is a one-year percentage change in home values defined as in Equation 1. County controls are the same as in the previous specification. Standard errors are clustered at the state level, as the laws were introduced at the state level.

[Insert Figure 3 about here]

Figure 3 plots the estimates of the total interaction weighted coefficient for each relative time period with the 95% confidence interval. The full set of coefficients for each $CATT(e, \ell)$ as well as the coefficients for lead and lag indicators of the two-way fixed effects regression without cohort-specific indicators can be found in Table IA.I in the Internet Appendix IA.2.

Panel A shows that prescription rates declined more on average after the passage of the laws in *treated* counties, relative to the control group. [17] As shown in Panel B, *treated* counties also experienced a higher increase in home values, relative to untreated counties. Counties in states that passed a law saw their home values rise 0.42 percentage points more in the year of the passage of the law, 0.81 percentage points more in the first year, and 1.78 percentage points more in the second year after the passage of the law relative to control counties. These results suggest that the adoption of state laws limiting opioid

[17] In Figure A.II in the Appendix we show that despite overdose death rates increase after the passage of the law, its growth rate decreases.

abuse had the intended result in reducing opioid prescription rates. Importantly, they also had a significant effect on the housing markets, resulting in an increase in home values.

4.1.3 Pre-trends

An identifying assumption in our analysis is that states for which the law has passed (*treatment*), and the ones for which it has not (*control*), are on parallel trends in terms of home value changes before the passage of the law. Table A.I in Appendix A.1, consistent with Ouimet et al. (2021), shows that the only variable that significantly predicts the passage of these laws in the cross section of states is the (age-adjusted) opioid overdose death rate, while economic conditions or political economy are not significant. The fact that economic and political conditions do not seem to differ between treated and control states gives us confidence that it is likely that home value changes were on a similar growth pattern prior to the passage of the law. Further, Figure 3 suggests that the parallel trend assumption is not violated.[18]

Still, Roth (2022) highlights that such a pretest may fail to detect preexisting trends that produce meaningful bias in the treatment effect. We follow Roth (2022) to identify whether our pre-test is likely to be effective. To assess whether our pre-test is likely to be well powered against violations of parallel trends, we plot a linear violation in Figure A.III in Appendix A.1 with a hypothesized slope based on having 50% power, i.e. the probability of passing the pre-test is 50%. The estimated slope is 0.267, meaning that treated states' home values rise every year by 0.267 percentage points more relative to control states. Given a 1-year average percentage change in home values of 1.45% and a standard deviation of 4.53%, we consider this an economically meaningful deviation. The likelihood ratio for this hypothesized trend is 0.568, i.e. the chance of seeing the observed pre-test coefficients under the hypothesised trend relative to under parallel trends is only about half. Further, the 95% confidence interval on the point estimate on percentage change in home value in $t = +2$, is outside of expected coefficient (in blue) we would find based on the hypothesized trend. This result gives us confidence that our pre-test is reasonably effective.

4.1.4 Rents

Given that house prices represent the sum of the discounted cash flows these assets produce, in this subsection we ask a related question: what effect did opioid abuse have on

[18] A related additional assumption is that no other laws that eventually passed at the same time had an impact on home values.

rents? We estimate Equation 3, with change in the median county rent as the main dependent variable[19]. As we can see from Figure A.IV, following the introduction of opioid limiting laws, median county rents significantly increase 2 years after the passage of the laws.

4.1.5 Goodman-Bacon decomposition

Goodman-Bacon (2021) highlights that the general estimator from a two-way fixed effects approach is a "weighted average of all possible two-group/two-period (2x2) DiD estimators". The main coefficient is therefore a combination of many different treatment effects with possible non-intuitive and, at worst, negative weights. To understand which 2x2 DiD estimators drives the aggregate results, we implement a Goodman-Bacon (2021) decomposition. We run the following regression with both prescription rates and home value changes as dependent variable:

$$DepVar_{ct} = \alpha + \beta_1 Post_{ct} + \gamma Controls_{ct-1} + \theta_c + \tau_t + \epsilon_{ct} \tag{4}$$

β_1 is the coefficient of interest. We have nine individual 2x2 DiD estimators. *Earlier* vs *Later Treated* 2x2 DiD estimators include *cohort 2016* vs *cohort 2017*, *cohort 2016* vs *cohort 2018*, and *cohort 2017* vs *cohort 2018*. *Later* vs *Earlier Treated* 2x2 DiD estimators include *cohort 2017* vs *cohort 2016*, *cohort 2018* vs *cohort 2017*, and *cohort 2018* vs *cohort 2016*. Finally, for the *Treated* vs *Untreated* 2x2 DiD estimators we have *cohort 2016* vs *Untreated*, *cohort 2017* vs *Untreated*, and *cohort 2018* vs *Untreated*. We calculate and then plot the weight each 2x2 DiD estimators takes in the total beta (β), as well as the individual coefficient of each 2x2 DiD estimator.

Figure 4 shows the decomposition for the two dependent variables prescription rates and percentage change in home values for the full sample. We can identify two patterns. First, the individual estimate from *Treated* vs *Untreated* units receive the greatest weight within the total beta. This is reassuring, as these are probably the cleanest comparisons. Second, coefficients from *Later* vs *Earlier Treated* tend to have the opposite sign compared to the other estimates in the home value decomposition. Given that the parallel trends in Figure 3 point towards a trend break rather than a unit shift, it is unsurprising that these "bad" comparisons take on the opposite sign. However, the weight attached towards these coefficients is small with less than 9% for the whole group. Hence, their impact on the total beta is marginal.

[19]We collect median gross county rent data from the American Community Survey 5-year Estimates data. Gross rent is the sum of the contract rent plus estimated average monthly cost of utilities and fuels.

[Insert Figure 4 about here]

4.2 County level evidence

In our baseline results the treatment variable is defined at the *state* level, while the outcome variable (home values) varies at the *county* level. In this section, we exploit county-level variation in the propensity to dispense opioids *prior* to the passage of the law to define the treatment variable at the same level as the outcome. We use two proxies for opioid supply at the county level. First, we follow Finkelstein et al. (2022), who show that the *number of physicians per capita* is positively correlated with opioid prescriptions and is one important supply factor of opioids. Second, we follow Engelberg et al. (2014) and use opioid-related pharmaceutical companies' payments to physicians as a proxy for physicians' propensity to prescribe opioid drugs. We estimate the following standard two-way fixed effect regression with calendar year τ_t and county θ_c fixed effects.

$$\begin{aligned} DepVar_{ct} =& \alpha + \beta_1 Post_{ct} + \beta_2 Post_{ct} \times OpioidSupply\ top\ tercile_c \\ &+ \gamma Controls_{ct-1} + \theta_c + \tau_t + \epsilon_{ct} \end{aligned} \tag{5}$$

We use both county prescription rates and home value changes as dependent variable $DepVar_{ct}$. To account for different propensities to supply opioids within a state and therefore different impacts of the law at the county level, we construct an indicator variable, $OpioidSupply\ top\ tercile_c$, that is equal to one for counties in the highest tercile based on a 5-year average number of physicians per capita (total opioid related payments to physicians, respectively) before the first passage of any state law, i.e. between 2011 and 2015. $Post_{ct}$ is an indicator variable that is equal to one for the county-years following the law introduction. Figure IA.I in Appendix IA.2 visualise the top tercile on a United States map. The coefficient of interest is β_2, which captures the intensity of the opioid limiting laws on counties that were *ex ante* more exposed to opioid abuse, as proxied by the relative opioid supply. Table II, Column 2 shows that the drop in prescription rates following the passage of the law was concentrated in the counties with the highest number of physicians per capita, in line with Finkelstein et al. (2022)'s findings. This finding is echoed in Column 3, where we proxy for opioid supply using county-level opioid related pharmaceutical companies' payment to physicians. While home value changes seem to increase following the passage of the laws across all counties, they were greatest in counties in the top tercile of physicians payments (Column 6). These results provide further county-level evidence that opioid limiting laws had the strongest home value effect in counties that were ex ante more exposed to the opioid crisis.

[Insert Table II about here]

4.3 Opioid abuse and home values: economic mechanisms

The evidence presented in the previous section shows that opioid abuse results in lower home values. The decrease in home value can be driven by a reduction in household income, and lower ability to service a mortgage, which may lead to default and, ultimately, higher vacancy rates in the most affected areas. In less extreme cases, drops in home value might be due to lack of maintenance, reflected in fewer home improvement loans. In this section, we explore these channels.

We collect data on the percentage of delinquent mortgages by 90 or more days by county and month from the Consumer Financial Protection Bureau. The underlying data comes from the National Mortgage Database and is aggregated at the county level. 90-day delinquency rates generally capture borrowers that have missed three or more payments and, hence, arguably capture more severe and persistent economic distress. The coverage of this measure is less extensive than our main data, covering only 470 counties across the US. Delinquency rates are only reported for counties with a sufficient number of sample records to avoid unreliable estimates. The average mortgage delinquency rate between 2006 and 2018 was 2.41%. The average 5-year percentage change was -66.98% (see Table A.III in Appendix A.2). The average reduction in mortgage delinquency rates in our sample is large, as the peek of delinquency rates was reached at the beginning of our sample in 2010. Since then, it has steadily declined. As we explore cross-sectional variation in delinquency rates in our analysis, this is not a first-order concern. In addition to these data, we also collect data on the number of home improvement loans from the Home Mortgage Disclosure Act (HMDA), and residential property vacancy rates from the United States Postal Service (USPS). We report summary statistics for these variables in Table A.III in Appendix A.2.

[Insert Table III about here]

As depicted in Table III there is a significant positive long correlation between lagged prescription rates and the percentage change in mortgage delinquency rates, as proxied by the percentage of mortgages that are 90 days plus past due. The correlation is economically meaningful. To interpret the economic magnitude, consider a mortgage delinquency rate of 2.41% (the average in our sample): over 5-years this would have decreased to 0.80% based on the average 5-year percentage change (-66.98%), as reported in Table A.III. Using the county and year fixed effects estimate (column 1), a one standard deviation increase in prescription rate (27.1 prescriptions per 100 people for the 5-year lagged sample) is associated with 22.69 percentage points higher rate of change of delinquent mortgages. Starting out at a 2.41% mortgage delinquency rate, delinquent mortgages would have decreased only to 1.34% (by -66.98% + 22.69% = -44.29%) instead of 0.80%. This result suggests that an increase in mortgage delinquencies following opioid abuse is a possible important channel of how opioid abuse translates into lower housing values.

We also document a negative correlation between home improvement loans and prescription rates. The estimated coefficient is -0.024 when state-year fixed effects are included and -0.175 when county and year fixed effects are included. This means that for a one standard deviation increase in prescription rates (43.3), the rate of change in home improvement loans at the county level is between 1.0 and 7.6 percentage points lower.

Last, we show a positive correlation between residential vacancy rates and prescription rates. The estimated coefficient ranges between 0.062 and 0.267, which represents an increase between 2.7 and 11.6 percentage points in the percentage change of vacancy rates for a one standard deviation increase in prescription rates (43.6).

To further explore these associations, we apply the same framework as in Equation 3 to compare the changes in delinquent mortgages, residential vacancy rates and home improvement loans in years before and after the passage of the law (*the treatment*) in treated versus control counties.

[Insert Figure 5 about here]

Figure 5 plots the estimated coefficients for these channels. We find that the rate of change in mortgage delinquency rate is about 6.17 percentage points lower on average one year after the passage of the laws in *treated* counties, relative to control group. Similarly, the rate of change in home improvement loans is up to 30 percentage points higher two years after the passage of the law and the rate of change in vacancy rate is as much as 8.6 percentage points lower one year after treatment.

These results suggest that the adoption of state laws limiting opioid abuse had a significant effect on the housing markets, by reducing the relative percentage of delinquent mortgages and vacancy rates, while significantly increasing the number of home improvement loans, ultimately resulting in an increase in home values as already documented.

4.3.1 Migration

Motivated by the results that areas that are more affected by the opioid crisis become less attractive to live, in this section we study the impact of opioid abuse on migration out of the county. We expect that both impoverishment from opioid abuse and also the change in the quality of the area would have driven residents out. We collect county level outflow and inflow migration data from the Internal Revenue Service (IRS). The Statistics of Income Tax Stats estimate migration outflows and inflows based on year-to-year address changes reported on individual income tax returns filed. Three measures of migration are reported, namely total adjusted gross income, number of returns filed and number of personal exemptions claimed. We define them as "total income", "number of households" and "number of individuals" in line with the IRS.

Table IV looks at the link between county level migration outflow and opioid abuse. In Panels A and B, we proxy for opioid abuse using 5-year lagged county prescription rates, whereas in Panel C we use opioid overdose death rates (as defined in Section 6.2). In Panel A, the dependent variable is 5-year change in migration outflow. Columns 1, 3 and 5 include county and year fixed effects, while columns 2, 4 and 6 include state-year fixed effects. In columns 1 and 2 we use the 5-year percentage change in total household income outflow from the county, in columns 3 and 4 we use the 5-year percentage change in the number of households who have left the county, while in columns 5 and 6 we use the 5-year change in the number of individuals who have left the county. Across the columns, we can see that an increase in the 5-year lagged county prescription rates is associated with an increase in the subsequent 5-year change in the number of households (individuals) who leave the county, as well as with the total household income outflow. While in columns 1, 3 and 5 the estimated coefficients are imprecisely estimated, in columns 2, 4 and 6 they are significant at the 99% level. In Panel B, we use the natural logarithm of the total household income (columns 1 and 2), of the number of households (columns 3 and 4), and of the number of individuals (columns 5 and 6), as the dependent variables. Similarly to results in Panel A, we see a positive relation between 5-year lagged prescription rates and the subsequent number and total income of households (individuals) who leave the county. While in columns 1, 3 and 5 the estimated coefficients are imprecisely estimated, in columns 2, 4 and 6 they are significant at the 99% level. In Panel C, we link whether the county is in the top tercile opioid overdose deaths in each year with the natural logarithm of the total household income (columns 1 and 2), of the number of households (columns 3 and 4), and of the number of individuals (columns 5 and 6), as the dependent variables. We obtain statistically significant coefficients at the 99% level in all specifications.

[Insert Table IV about here]

What kind of impact did opioid limiting laws have on migration in and out of the treated counties? Figure 6 shows the results of estimating Equation 2, with county migration inflow as the dependent variable. Panel A shows the results with natural logarithm of the total household income inflow, Panel B the natural logarithm of the number of households , and Panel C the natural logarithm of the number of individuals (columns 5 and 6), as the dependent variables. We can see that the treated counties experienced an inflow of (high-income) households following treatment, suggesting that positive income shocks had a desired effect on bolstering housing demand.

[Insert Figure 6 about here]

5 Discussion

5.1 Possible interpretations

Results from the previous section show that the passage of opioid-limiting laws is followed by a decrease in mortgage delinquencies and property vacancy rates, an increase in home improvement loans and population inflows. These effects are consistent with a decrease in defaults, an improvement in the quality of local real estate, and an increase in the local demand for space. This can be due to improving labour markets, as argued by Ouimet et al. (2021), or because of improvements in the area quality and economic conditions (Dougal et al., 2015).

Results of our empirical analysis are also consistent with a "spatial externalities" story à la Ambrus et al. (2020), according to which if a negative shock to a county is severe enough, there is an outflow of (high-income) households and the county tips into an equilibrium with relatively low-income households. In the context of the cholera-outbreak in one neighbourhood of nineteenth century London, Ambrus et al. (2020) model a rental market with frictions in which low-income households exert a negative externality on their neighbours. Similar to their setup, the opioid crisis affected people directly, not the local infrastructure (as would be the case in cases of hurricanes, or earthquakes).[20] In contrast to Ambrus et al. (2020), opioid crisis affected the whole country, with varying treatment intensities across counties.

Our findings are consistent with the Ambrus et al. (2020) model assumption that one of the channels of the effect of opioid abuse is an increase in the share of low-income households in affected counties through death or income-affecting disability of wage-earners. Our findings are also consistent with other direct channels, such as the opioid epidemic temporarily reducing local amenities in affected areas, or inducing rich tenants having higher willingness to pay for such amenities to leave.

[20] Note that opioid abuse can still affect local infrastructure indirectly.

While the focus of Ambrus et al. (2020) model is to study the micro-location effects (within a neighborhood) of a temporary health driven (cholera outbreak) income shock, our paper examines the cross-county impact of opioid abuse.The main difference between Ambrus et al. (2020) set up and ours, is that their unit of analysis, blocks, are much smaller than our unit of analysis, counties. As such, there is more scope for different amenities (local institutions, local infrastructure, etc.) evolving in affected versus non-affected counties during the long period of opioid abuse in our case. As our results on mortgage delinquencies and home improvement loans indicate, this introduces other channels through which housing price differences can be explained.

5.2 Aggregate versus local economic effects of the opioid crisis

Estimating aggregate economic effects using our empirical exercise is admittedly challenging in the absence of a general equilibrium model. Although this is out of the scope of our paper, we provide back of the envelope calculations for aggregate economic impact based on our estimates, abstracting from other effects of health on wealth, as well as general equilibrium considerations that took place in the economy with, for instance, the changes in regulation. For this exercise, we take the agreement of the Sackler family to pay \$6bn on a final settlement with several US states as a benchmark.[21] In 2022 they agreed to pay \$6bn to compensate US states for the damages associated with the opioid crisis.

We provide a calculation based on our long-term correlations analysis. Between 2006 and 2011, US aggregate housing wealth decreased from \$29.2 trillion to \$22.7 trillion, which is equivalent to a -22.26% 5-year percentage change. Our estimates show that a one unit increase in prescription rates per 100 people for the 5-year lagged sample is associated to 0.033 percentage points reduction in house prices growth rates when using county and year fixed effects, and to a 0.008 percentage points reduction with state-year fixed effects.[22] Vowles et al. (2015) find that rates of opioid misuse estimates from 38 studies between 2000 and 2013 averaged between 21% and 29% across most calculations. Assuming that 21% of prescription are misused, we calculate the aggregate housing wealth impact of a 21% opioid prescription rate reduction shock in 2006, i.e. a decrease from 72.4 prescription per 100 to to 57.2 per 100. The reduction of 15.2 prescriptions per 100 people for the 5-year lagged sample translates into a 0.50 percentage points increase in home value

[21] The Sacklers are the billionaire owners of Purdue Pharma, who have been widely blamed for helping to spark the US opioid epidemic with the marketing of OxyContin.

[22] Zillow aggregate home value estimates: https://public.tableau.com/app/profile/zillow.real.estate.research/viz/TotalMarketValue/States

growth rates given the county and year fixed effects estimate, respectively an increase of 0.12 percentage points given the state-year fixed effect estimate. Thus, the US aggregate housing wealth would have decreased only by 21.76% (22.14%) to $22.85 trillion ($22.74 trillion). This equates to $146 billion ($36 billion) housing wealth lost. Figure 7 shows the aggregate housing wealth path from 2006 to 2018 as estimated by Zillow and for the 21% prescription rate shock in 2006 with county and year fixed effects, respectively state and year fixed effects. Figure 8 translates this into the actual gap in aggregate housing wealth lost. While the deviation from the path seems small, the actual estimated wealth lost is a two or even three digit billion dollar figure given the large aggregate housing wealth base.

[Insert Figure 7 about here]

[Insert Figure 8 about here]

We next make use of our natural experiment estimates. We first calculate one year percentage changes in house prices in 2016, 2017, and 2018 and adjust them for states by 0.423%, 0.810% and 1.781% respectively based on the year of the passage of the law. We next recalculate what state total home value would have been without the passage of the law. In the year of the passage of the law ($t = 0$), the aggregate value that all states gained is $69.57 billion (note that for some states this is in 2016, for some in 2017 and some in 2018). Taking just the states that passed the law in 2016, we can accumulate the home value difference over three years: aggregate home value would have been $184.54 billion lower without passing the law for a home value base of $5.91 trillion in 2015. For states that passed the law in 2017 and accumulating over two years this corresponds to $102.55 billion for a home value base of 7.78 trillion in 2016. Last, for states that passed the law in 2018 this corresponds to $11.70 billion for a home value base of $2.77 trillion in 2017.

5.3 Limits to internal and external validity

Our estimates, including aggregate effects rely on the internal validity of our quasi-natural experiment. We have discussed in Section 4 the formal identifying assumption of parallel trends. We assume that states that adopted the law (*treatment*), and the ones that did not (*control*), are on parallel trends in terms of home values before the treatment. In addition, we assume that no other changes in regulation have occurred simultaneously in treated states that affected both prescription rates as well as home values. Similarly, we assume no contamination between treated and control states. For instance, no migration of opioid users from treated to control states.

Our previous estimates for aggregate effects also rely on the external validity of our natural experiment and, as mentioned before, on potential general equilibrium effects as a result of the passage of the law such as the increased consumption of illicit drugs and potential migration of opioid consumers. Nevertheless, if taken into account, these effects would plausibly increase the magnitude of the estimated economic impact.

Importantly, comparing our back of the envelope housing wealth loss estimates with the value of the Sackler settlement reveals that the aggregate housing wealth effect of the opioid crisis is several orders of magnitude larger than the agreed settlement value.

6 Robustness

6.1 Alternative empirical strategies

6.1.1 State-border regression discontinuity design

In this section we employ a spatial regression discontinuity (RD) design exploiting state-border boundaries. In our estimation we compare counties located within a narrow distance from the state border under the assumption that border counties share otherwise similar general economic conditions. We define as *treated*, counties located in the state that passed opioid-limiting laws. The border distance of treated counties is measured to the nearest county where no opioid-limiting state law was passed. Formally, we estimate the following model:

$$y_c = \beta Treat_c + \sum_{p=1}^{P} [\gamma_{p0} + \gamma_{p1} Treat_c] Distance^p + \epsilon_{ct} \qquad (6)$$

where y_c is a county level outcome, e.g. a 1 or 2 year difference in prescription rates or a 1 or 2 year percentage change in home values, $Treat_c$ is an indicator variable equal to one for counties in a state that passed opioid-limiting laws and $\sum_{p=1}^{P}[\gamma_{p0} + \gamma_{p1} Treat_c] Distance^p$ is a polynomial of order P (one or two) of the border distance (distance to the threshold). We calculate the percentage change from the *treatment year - 1* to the *treatment year*, and to the *treatment year + 1*, respectively for two year changes. For control counties, we calculate the difference (percentage change, respectively) from 2015 to 2016 or 2017, as the first law was passed in 2016. As controls, we include the following variables as of 2015: male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio, neoplasm mortality, and physicians. We follow Calonico et al.

(2014) to choose the optimal bandwidth, which in this case corresponds to the distance to the border. Standard errors are clustered at the state level.

[Insert Table V about here]

Table V shows the results.[23] We show that treated counties show significant lower prescription rates when compared to control ones. Estimated coefficients for the difference in prescription rates over 1 year and 2 years are between 3.6 and 4.3 prescriptions per 100 people. This is a difference of about 5% evaluated at the mean. We then estimate the difference in terms of the percentage change in average home values over 1 and 2 years between treated and control counties around the border. The estimated coefficient is between 1.2 for one-year period and 2.2 for the two year period. Figure 9 shows the regression discontinuity plots. Results are overall consistent with previous differences-in-differences approach.

[Insert Figure 9 about here]

An important identifying assumption in our RD design is that there are no spill-over effects across the state borders. This would occur, for instance, if users can cross the border to fill their prescriptions, or due to "doctor shopping", when patients search (out of state) for doctors who will prescribe powerful medications. Although recent evidence suggests that only 0.7 percent of all patients with an opioid prescriptions are "doctor shoppers" (McDonald and Carlson, 2014, 2013), it might still be the case that patients can cross the border to have their prescriptions filled, which can bias our estimates upwards.[24] To address this concern we exclude counties with more than 8 "pill mill" pharmacies from our analysis. [25] Panel B of Figure 10 shows the results, which are overall consistent with the our main specification.

[Insert Figure 10 about here]

The internal validity of our quasi-experimental design relies on an important assumption that the treatment and control groups are similar, on average, in all other relevant aspects except for the treatment assignment, allowing us to isolate the causal effect of the treatment on the outcome. Figure A.V in the Appendix shows no significant differences in main economic variables across the state border, including our outcome variables, home values and prescription rates, before treatment.

[23]Results of estimating Equation 6 without control variables are shown in Internet Appendix Table IA.II.
[24]States vary in how restrictive they are in filling out-of-state controlled substance prescriptions.
[25]See Section 6.2.1 for detailed definition of pill mill counties.

6.1.2 Purdue marketing and supply chain instrumental variables

Cornaggia et al. (2022) employ instrumental variables to establish causal effects of opioid abuse on municipal finance conditions. In this section, we follow their approach and apply two alternative instrumental variables. The first one is based on the aggressiveness of Purdue's marketing of the reformulated oxycodone (branded as OxyContin). The second is based on the "leaky" supply chains and the desirability of the product by addicts. We obtain data on the quantity of OxyContin distributed to 3-digit zip codes.[26] We calculate the percentage change in the quantity of OxyContin distributed by Purdue Pharma between 1997 and 2003 and use this as instrument for prescription rates after linking 3-digit zip codes to counties.

[Insert Table VI about here]

Table VI shows the results. The first stage regression shows a strong positive association between the aggressiveness of Purdue marketing and prescription rates using a 4 and 5-year lag. In the second stage regression we find a negative effect of instrumented prescriptions on home values, which is consistent with our previous estimates. These estimates are significant when we cluster the standard errors by state and year, but not when clustering by county.

The second IV builds on two components. The first component is the type of opioid: we focus on those opioids with the highest addictive potential and the highest desirability to addicts. The second component is the distribution channel for these pills: we focus on pills sold through pharmacies with the least oversight and most potential for abuse – "leakiest" supply chains. Opioid abuse in contrast to more legitimate opioid use for treatment should be highest under such conditions. The Washington Post published detail pain pill transaction data between 2006 and 2014 based on the Drug Enforcement Administrationâs Automation of Reports and Consolidated Orders System.[27] Within this database, we focus on strong types of opioids, namely fentanyl, hydromorphone, levorphanol, oxycodone, and oxymorphone, that have the highest addictive potential and the highest desirability to addicts. Further, we consider only "retail" pharmacies as distribution channel, as retail pharmacies have the least oversight and therefore most potential for abuse. Within this opioid and distribution subset, we calculate the annual distribution of morphine milligram equivalent (MME) per county. Standardizing opioid strength using the MME value for each pill (e.g., oxycodone is 50% stronger than hydrocodone, so it has

[26] We thank Cornaggia et al. (2022) for sharing their data.
[27] https://wpinvestigative.github.io/arcos/

an MME multiplier of 1.5) allows us to account for for different dosages. Finally we scale the total annual distribution by 1000 county inhabitants.

[Insert Table VII about here]

Table VII shows the results. We find a strong positive association between prescription rates and availability and desirability of opioids. The second stage regressions show a negative relation between prescriptions and home values, however these are not statistically significant at conventional levels.

Using instrumental variables has the advantage of using a source of exogenous variation in a variable that is endogenous. An identifying assumption of this methodology is that the instrument is not correlated with the outcome variable through any other channel but the one considered in the analysis. In this case we rely on the assumption that Purdue marketing aggressiveness and supply chain conditions are not related to local home values through any other economic mechanism than opioid abuse. The findings presented in this section using the IV approach provide support for our baseline results.

6.2 Measurement

Measuring opioid abuse accurately is challenging. We proxy opioid abuse via opioid prescriptions assuming that high levels of opioid prescription lead to opioid abuse due to its highly addictive nature. However, prescription rates may not lead to abuse *one for one*. Illnesses and the need for justified opioid prescription may differ by region, as well as the likelihood of opioid prescription turning into opioid abuse. Finally, opioid prescriptions may be distributed in one county, but consumed in another county. We also use an alternative measure of opioid abuse by Cornaggia et al. (2022) and Li and Zhu (2019) is opioid mortality. Opioid mortality in a county implies a high addiction rate, albeit it only captures the most severe cases, because this outcome is at the very end of the addiction stage. We construct three measures of overdose death, *OpioidDeath*, namely annual drug overdose mortality rate per 100,000 residents, 3-year drug overdose mortality rate per 100,000 residents, and a dummy for counties in the top tercile for the 3-year drug overdose mortality rate per 100,000 residents.

Our key measure, *OpioidDeath*, is the drug overdose mortality rate per 100,000 residents. Following Cornaggia et al. (2022) and Li and Zhu (2019), we use data on county-level opioid mortality rates available in the Multiple Cause of Death data from the National Center for Injury Prevention and Control (NCIPC) of the Centers for Disease Control (CDC). The database complies county-level mortality data from 1999 based on the death certificates for all U.S. residents. Deaths are classified by the International Classification of Diseases, 10th Revision (ICD-10).We define drug overdose (or poisoning) deaths as those with ICD-10 underlying cause-of-death codes X40-X44 (unintentional overdose), X60-X64 (suicide by drug self-poisoning), X85 (homicide by drug poisoning), or Y10-Y14 (undetermined intent).

There are two potential limitations of this data set. First, the aggregate drug poisoning death counts include not only overdose deaths caused by opioid abuse but also deaths caused by other types of drugs with abuse potential (e.g., cocaine, methamphetamine, amphetamine, prescription stimulants). However, this is unlikely to confound our results because deaths involving opioids account for the vast majority of overall drug mortality in the U.S. While opioid deaths significantly increased during our sample period, deaths due to non-opioids drugs remain relatively stable. Second, if a county has fewer than 10 deaths in a given year, CDC data suppress the report of death counts to protect personal privacy. This implies that our overdose death rate is left-censored. To avoid potential biases arising from this censorship, we try to extend the coverage by focusing in addition to the annual overdose death rate on three-year overdose death rates as well as on on a dummy capturing counties in the top tercile of overdose death rates, which allows us to extend the coverage by imputing overdose death rates for suppressed data, as described in Appendix IA.3.

Since overdose deaths are at the end of the abuse timeline, we run to some extent contemporaneous regressions between the one-year percentage change in home values and overdose death rates:

$$PCHomeValue_{c,t-1 \text{ to } t} = \alpha + \beta OpioidDeath_{c,t} + \gamma Controls_{c,t-1} + \theta_c + \tau_t + \epsilon_{ct} \qquad (7)$$

For instance, for the percentage change of home values between 2017 and 2018, we use the annual overdose death rate from 2018 and the three-year overdose death rate from 2016, 2017 and 2018 for both the quantitative variable and the top tercile dummy. Thus t corresponds to the last year of the three years for the three-year death rate. County controls are the same as in our main specification and are lagged by one year. As in our main specifications, we consider both county and year fixed effects as well as state-year fixed effects. We report results for counties with observations during the full sample period, i.e. 13 observations. Results are robust to considering all available county data. For the annual overdose death rate this leads to about 7,300 county-year observations, and about 11,800 respectively 17,500 county-year observations for the 3-year rate and 3-year rate dummy. Results are shown in Table VIII.

Consistent with our previous estimates, changes in home values are negatively correlated to opioid abuse across all measures of overdose death and considering either fixed-effect specification. The results are more pronounced and significant for the 3-year overdose death rate top tercile dummy, which benefits from the largest sample. The percentage change in one year home values is 0.218 percentage points lower for counties in the top tercile of the 3-year overdose death rate, when using county and year fixed effects. The point estimate is 0.173 percentage points when using state-year fixed effects.

[Insert Table VIII about here]

6.2.1 Excluding "pill mill" counties

Another limitation of using prescription rates as an opioid abuse measure is the potential misalignment between the prescription of the drug and intake. Drug consumers may have travelled miles to reach a doctor and pharmacy where they can receive a prescription and subsequently the drugs. A typical "pill mill" has a store front pain clinic with doctors prescribing opioids after a brief consultation, and usually limited proof of medical purpose. The prescriptions are often filled at the clinic to avoid other pharmacies challenging the legitimacy of the prescriptions. These pill mills are considered to have worsened the opioid crisis, as they were responsible for dispensing a large fraction of opioids.[28] Drug intake in pill mill counties is unlikely to be equivalent to prescription rates, leading to noise. Furthermore, pill mill counties may be correlated to weaker economic areas with implications for home value growths. These counties may therefore bias our analysis.

To address this concern we follow Ouimet et al. (2021) and drop counties that are most likely to have a pill mill. The Automation of Reports and Consolidated Orders System (ARCOS) data provides information on the milligrams of active ingredient (MME) dispensed by pharmacy.[29] We classify a pharmacy as a pill mill if it dispenses opioid MME in the top 5% of the sample. We then drop counties with more than 8 pill mills (equivalent to 6.3% of counties). Table IX shows that our main results are robust to dropping "pill mill" counties.

[Insert Table IX about here]

[28] Between 2006 and 2012 15% of pharmacies received for instance 48% of pain pills, see https://www.washingtonpost.com/investigations/the-opioid-crisis-15-percent-of-the-pharmacies-handled-nearly-half-of-the-pills/2019/08/12/b24bd4ee-b3c7-11e9-8f6c-7828e68cb15f_story.html.

[29] The Drug Enforcement Agency (DEA) collected this data and made it available to the public following a FOIA lawsuit by the Washington Post. Only the two most common forms of opioid prescriptions, OxyContin and Hydrocontin, are covered.

7 Conclusion

This paper estimates the sensitivity of home values to opioid abuse. We find a negative association between home values and opioid abuse that is monotonically increasing and persistent over a 5-year period. We exploit variation in opioid abuse induced by the staggered passage of state laws that aim to limit these prescriptions as a source of variation in opioid prescriptions. Home values respond positively to the passage of the state laws intended to reduce opioid abuse.

We study possible underlying economic mechanisms for this relation. We find that opioid abuse is negatively correlated with the number of initiated home improvement loans, and positively correlated with vacant residential property rates and delinquent mortgages. Passage of effective anti-opioid legislation results in a decrease (increase) in mortgage delinquencies and property vacancy rates (the number of home improvement loans and migration inflows, respectively), consistent with a decrease in defaults, an improvement in the quality of local real estate, and an increase in the local demand for space being the main drivers of the observed effect. Our findings are also consistent residential sorting where further impact on house values can be rationalized through the associated outflow migration of people from areas that are most affected by the opioid crisis. Overall, our results point to a broad set of area externalities channel(s) driving the observed patterns in home values.

Our results have two main implications. First, they suggest that although opioid usage has been associated with low income and economically disadvantaged conditions (Case and Deaton, 2015), limiting the supply of prescription drugs has both a significant impact on reducing opioid usage, as well as a relevant economic impact, namely in positively affecting home values and reducing the percentage of delinquent mortgages. Second, lost labor productivity and thus household income may be one driver of how opioid abuse impacted home values via delinquent mortgages, but also through negative spatial externalities of opiod abuse which resulted in spatial redistribution of households.

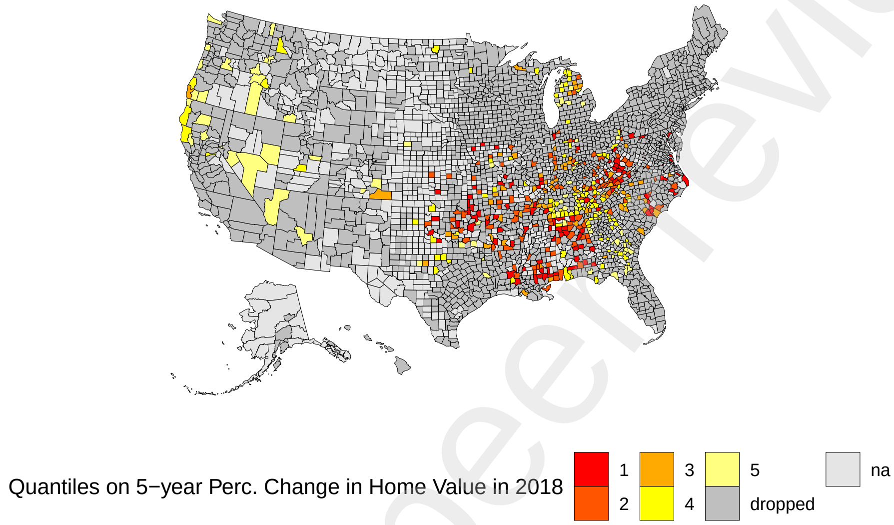
Our work offers insights into externalities of public health policies. We find evidence that public health policies that were instituted with the aim of limiting opioid abuse had a far reaching effect on the real economy. We believe that this study will foster further interest in examination of transmission and feedback effects of public health policies and real economic outcomes.

8 Figures & Tables

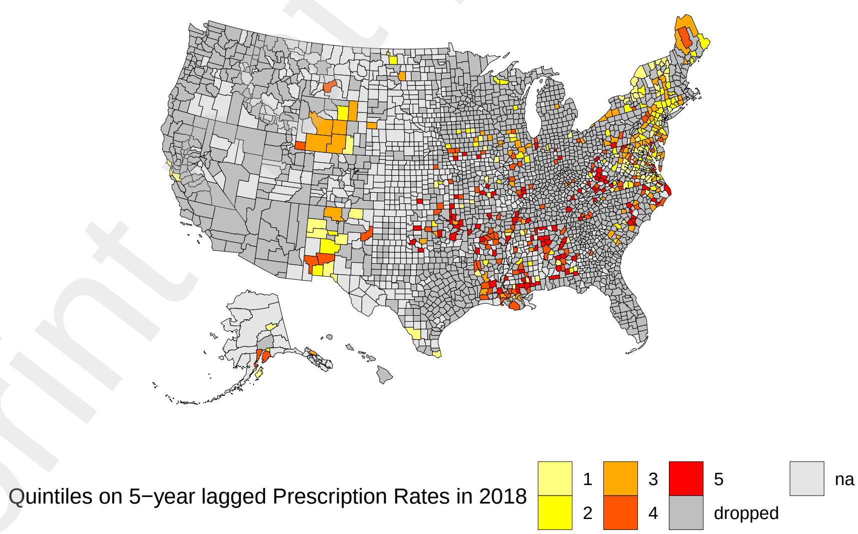
8.1 Main Figures

FIGURE 1: HOME VALUE AND OPIOID PRESCRIPTION RATE

(A) COUNTIES IN HIGHEST PRESCRIPTION RATE QUINTILE COLORED BY PERCENTAGE CHANGE IN HOME VALUES



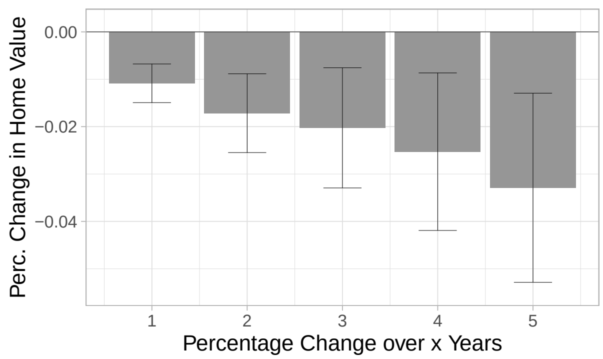
(B) COUNTIES IN LOWEST PERCENTAGE CHANGE IN HOME VALUES QUINTILE COLORED BY PRESCRIPTION RATE



Notes: We plot percentage changes in home value between 2014 and 2018 and prescription rates in 2014. This is the last year of our sample with the most observations. Panel A shows counties in the highest prescription rate quintile in 2014. Excluded counties are dark grey, counties without data are light grey. Heat colours for the remaining counties are based on the quintiles of the 5-year percentage change in home values from 2014 to 2018. Dark red represents the lowest percentage change in home values. Panel B shows counties in the lowest quintile of percentage change in home values and assigns heat map colors based on the prescription rate quintile in 2014. Dark red in Panel B corresponds to the highest prescription rate quintile.

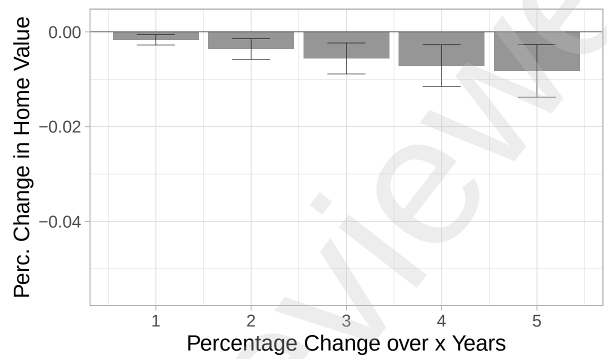
Figure 2: Home value and opioid prescription rate: Correlations

(A) County & Year Fixed Effects



	over 1 year	over 2 years	over 3 years	over 4 years	over 5 years
x-year lagged Prescription Rate	-0.011*** (0.002)	-0.017*** (0.004)	-0.020*** (0.006)	-0.025*** (0.008)	-0.033*** (0.010)
Adj. R2	0.599	0.648	0.699	0.735	0.767
No. of Obs	25,026	22,510	19,993	17,487	15,075
SD Pres. Rate	41.203	41.670	42.136	42.459	42.620

(B) State-Year Fixed Effects

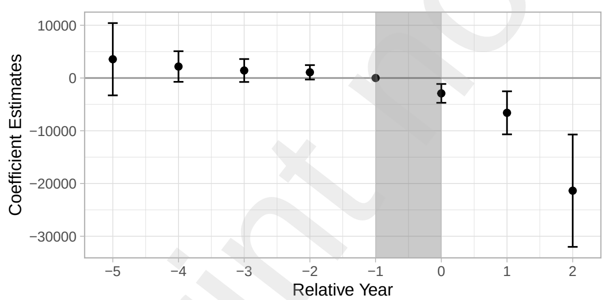


	over 1 year	over 2 years	over 3 years	over 4 years	over 5 years
x-year lagged Prescription Rate	-0.002*** (0.001)	-0.004*** (0.001)	-0.006*** (0.002)	-0.007*** (0.002)	-0.008*** (0.003)
Adj. R2	0.759	0.806	0.838	0.854	0.854
No. of Obs	25081	22572	20077	17590	15157
SD Pres. Rate	41.247	41.714	42.216	42.563	42.640

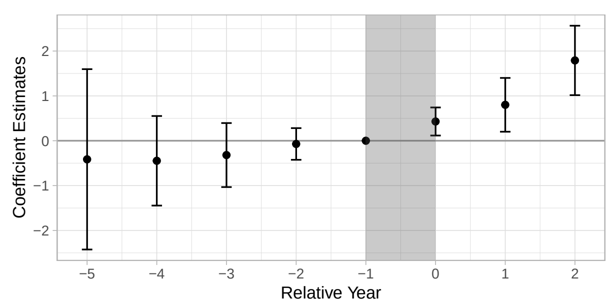
Notes: The sample period is 2006 to 2018. The dependent variable is a log percentage change of average county home values ($log(HV_t/HV_{t-x}) * 100$) over 1, 2, 3, 4 and 5 years. We report and plot coefficients and 95% confidence intervals on lagged prescription rates. County controls include the male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio, neoplasm mortality, and physicians. Controls are lagged over the same period as the prescription rate. Panel A includes county and year fixed effects and Panel B state-year fixed effects. All variables are winsorized at the 2 and 98 % level. Standard errors are clustered at the county level.

Figure 3: The effect of opioid limiting laws on prescription rate and home values

(A) County prescriptions



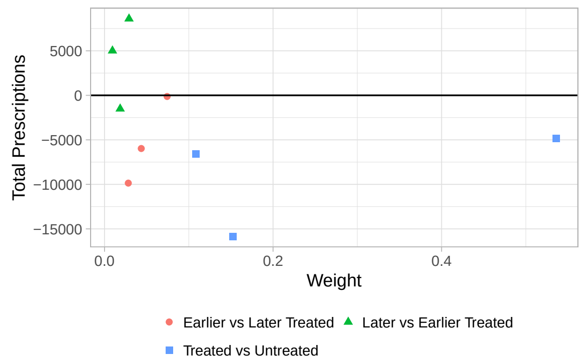
(B) Percentage Change in Average County Home Value (in %)



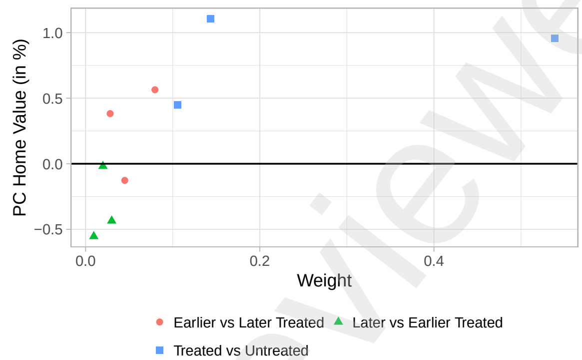
Notes: The sample period is 2013 to 2018. The dependent variable is total county prescriptions in Panel A and the log percentage change in average county home values in Panel B. Controls include one year-lagged male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio, neoplasm mortality, and physicians. In Panel A we additionally control for log county population. We plot the interaction weighted total coefficient with a 95% confidence interval for each relative time period following Sun and Abraham (2021). Standard errors are clustered at the state level.

Figure 4: Goodman-Bacon decomposition

(A) County Prescriptions

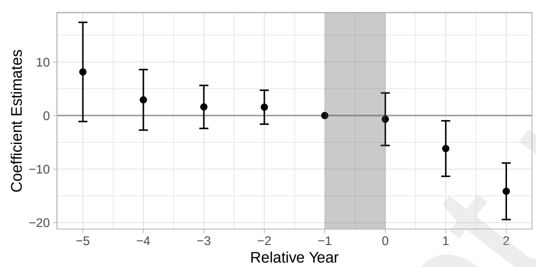


(B) Perc. Change in Home Values

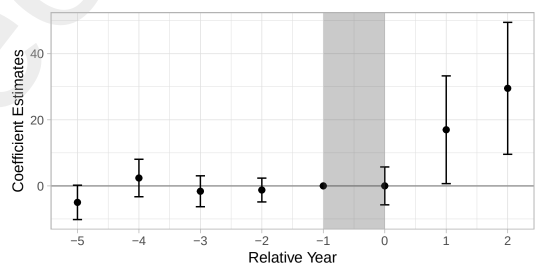


Notes: The sample period is 2013 to 2018. The dependent variable is *Prescriptions* in Panel A and *PCHomeValue* in Panel B. We show the Goodman-Bacon (2021) decompositions for the TWFE regression $Dep.\ variable_{ct} = \alpha + \beta Post_{ct} + \theta_c + \tau_t + \epsilon_{ct}$. We do not include any controls in the regression.

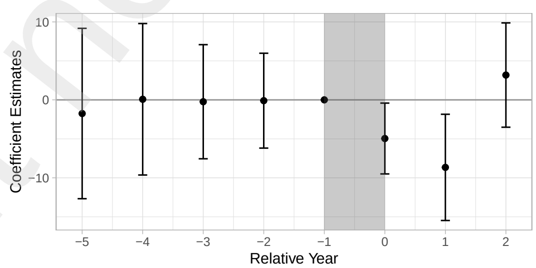
Figure 5: The effect of opioid limiting laws on year-on-year changes in delinquent mortgages, home improvement loans and vacancy rates



(A) Mortgages 90 plus days past due



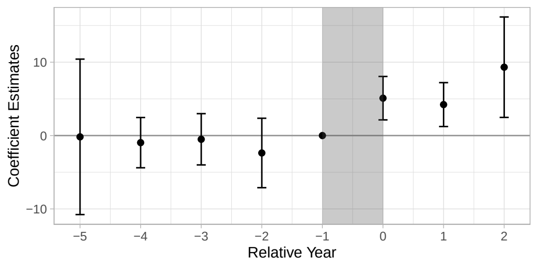
(B) Home improvement loans



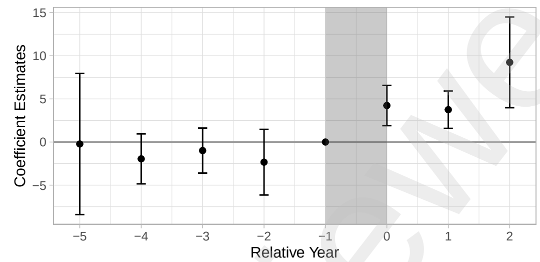
(C) Residential vacancy rate

Notes: The sample period is 2013 to 2018. The dependent variable is the log percentage change in mortgages 90 plus days past due (in %) in Panel A, the log percentage change in the number of home improvement loans (in %) in Panel B and the log percentage change in the residential vacancy rate(in %) in Panel C. Controls include one year-lagged male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio, neoplasm mortality, and physicians. We plot the interaction weighted total coefficient with a 95% confidence interval for each relative time following Sun and Abraham (2021). Standard errors are clustered at the state level.

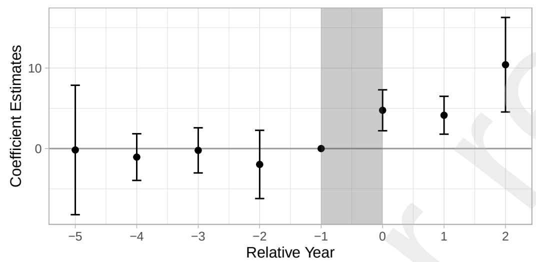
Figure 6: The effect of opioid limiting laws on migration inflow



(A) Total income



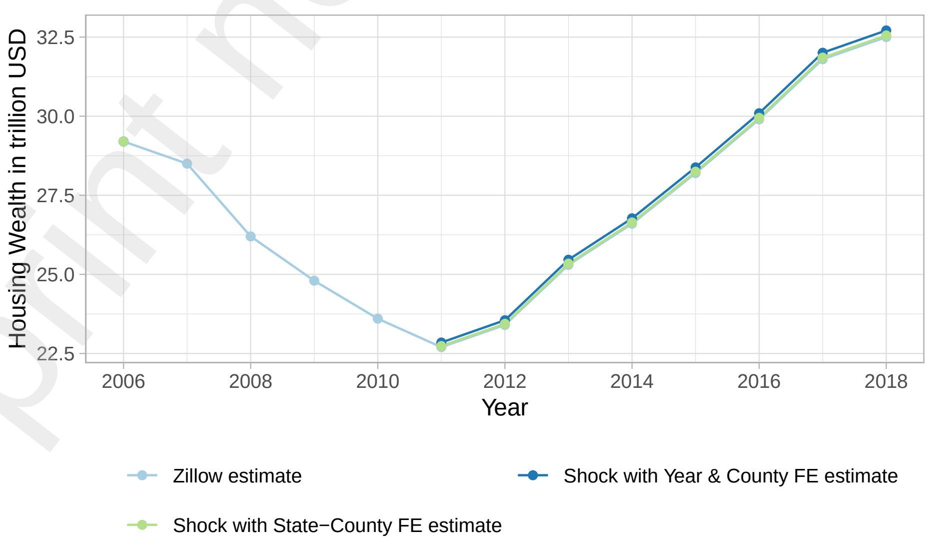
(B) Number of households



(C) Number of individuals

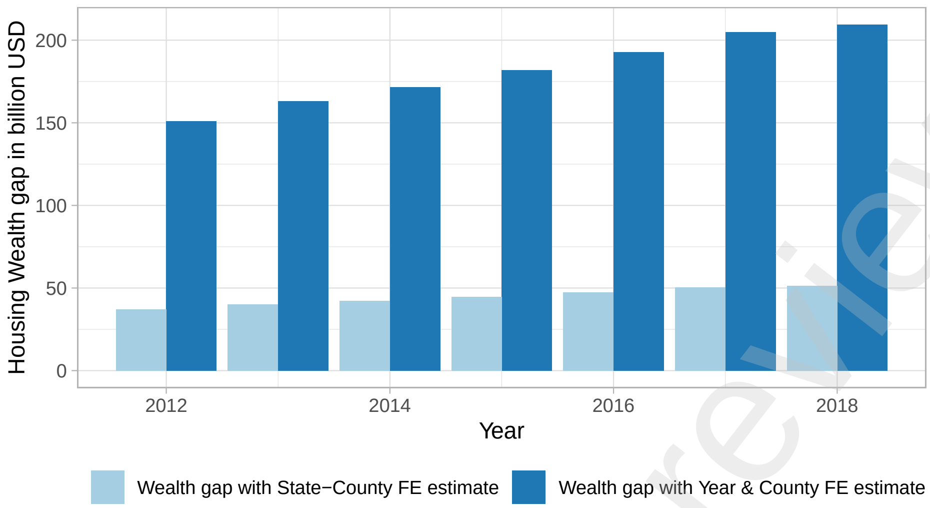
Notes: The sample period is 2013 to 2018. The dependent variable is the log total migration inflow income in Panel A, the log total migration inflow number of households in Panel B and the log total migration inflow number of individuals in Panel C. Controls include one year-lagged male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio, neoplasm mortality, and physicians. We plot the interaction weighted total coefficient with a 95% confidence interval for each relative time period following Sun and Abraham (2021). Standard errors are clustered at the state level.

Figure 7: Housing wealth over time



Notes: We report US aggregate housing wealth by year as well the path estimated with a 21% prescription rate reduction shock in 2006 and the same housing wealth growth rate thereafter.

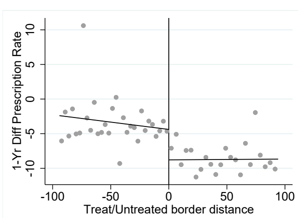
FIGURE 8: HOUSING WEALTH GAP OVER TIME



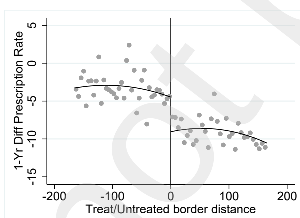
Notes: We report the gap in US aggregate housing wealth by year estimated with a 21% prescription rate reduction shock in 2006 and the same housing wealth growth rate thereafter.

FIGURE 9: OPIOID LAW IMPACT ON PRESCRIPTION RATES AROUND STATE BORDERS: RD PLOTS

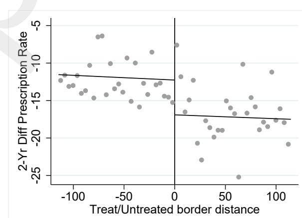
(A) ALL COUNTIES



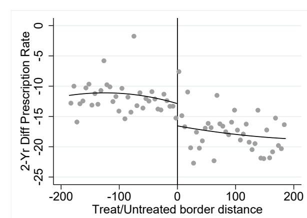
(A.1) 1-YR DIFFERENCE & LINEAR POLYNOMIAL



(A.2) 1-YR DIFFERENCE & QUADRATIC POLYNOMIAL

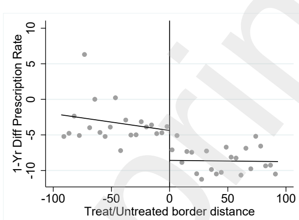


(A.3) 2-YR DIFFERENCE & LINEAR POLYNOMIAL

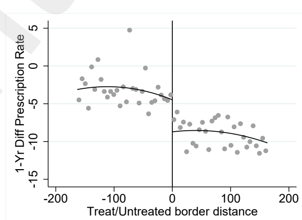


(A.4) 2-YR DIFFERENCE & QUADRATIC POLYNOMIAL

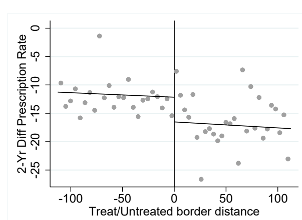
(B) EXCLUDING COUNTIES WITH MORE THAN 8 PILL MILLS



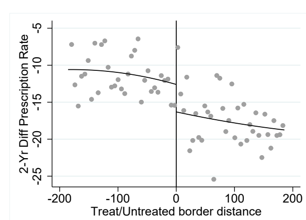
(B.1) 1-YR DIFFERENCE & LINEAR POLYNOMIAL



(B.2) 1-YR DIFFERENCE & QUADRATIC POLYNOMIAL



(B.3) 2-YR DIFFERENCE & LINEAR POLYNOMIAL

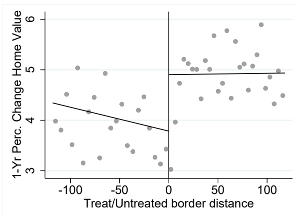


(B.4) 2-YR DIFFERENCE & QUADRATIC POLYNOMIAL

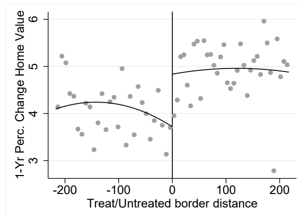
Notes: The unit of observations are counties. We consider all counties in Panel A and all counties but counties with more than 8 pill mills in Panel B. We calculate one or two-year difference in prescription rates from the treatment year - 1 to the treatment year, respectively treatment year + 1. For control counties, we calculate the difference from 2015 to 2016 or 2017, as the first law was passed in 2016. As controls, we include the following variables as of 2015: male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio, neoplasm mortality, and physicians. We follow Calonico et al. (2014) to choose the optimal bandwidth. Standard errors are clustered at the state level. The regression continuity plots correspond to Panel A in Table V.

Figure 10: Opioid Law Impact on home values around state borders: RD plots

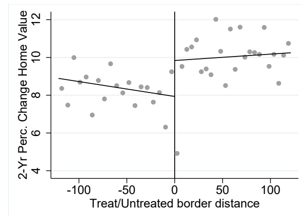
(A) All Counties



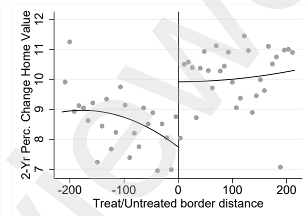
(A.1) 1-yr perc. change & Linear polynomial



(A.2) 1-yr perc. change & Quadratic polynomial

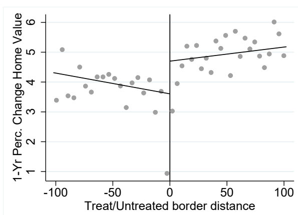


(A.3) 2-yr perc. change & Linear polynomial

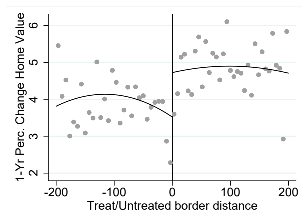


(A.4) 2-yr perc. change & Quadratic polynomial

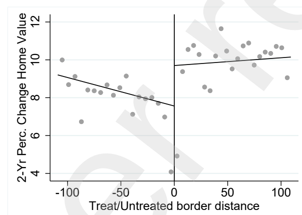
(B) Excluding counties with more than 8 pill mills



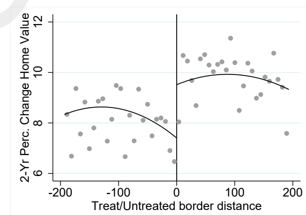
(B.1) 1-yr perc. change & Linear polynomial



(B.2) 1-yr perc. change & Quadratic polynomial



(B.3) 2-yr perc. change & Linear polynomial



(B.4) 2-yr perc. change & Quadratic polynomial

Notes: The unit of observations are counties. We consider all counties in Panel A and all counties but counties with more than 8 pill mills in Panel B. We calculate one or two-year percentage change in home values from the treatment year - 1 to the treatment year, respectively treatment year + 1. For control counties, we calculate the percentage change from 2015 to 2016 or 2017, as the first law was passed in 2016. As controls, we include the following variables as of 2015: male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio, neoplasm mortality, and physicians. We follow Calonico et al. (2014) to choose the optimal bandwidth. Standard errors are clustered at the state level. The regression continuity plots correspond to Panel B in Table V.

8.2 Main Tables

Table I: Summary statistics

	N total	Avg N Annual	Mean	Min	P25	Median	P75	Max	Std. Dev.
	Panel A: Opioid abuse proxies								
Prescription Rate (per 100)	36,704	2,823	82.60	4.20	53.20	77.80	106.90	198.99	42.48
County Prescriptions	36,704	2,823	71,802.60	301.05	8,895.14	26,982.68	75,065.89	582,964.53	117,074.74
Annual Drug Overdose Death Rate	12,990	999	18.82	4.70	11.05	15.83	23.49	56.51	11.14
3-year Drug Overdose Death Rate (in %)	20,073	1,544	17.02	5.24	10.61	14.96	21.01	46.59	8.94
	Panel B: Home values								
	N total	Avg N Annual	Mean	Min	P25	Median	P75	Max	Std. Dev.
Avg Home Value ($)	33,481	2,575	140,033.56	47,116.70	85,275.08	117,306.50	169,095.08	425,161.58	79,347.56
1-year Perc Change HV (in %)	30,633	2,553	1.45	-10.27	-1.40	1.91	4.66	10.23	4.53
2-year Perc Change HV (in %)	27,799	2,527	2.50	-19.42	-2.94	3.25	8.67	19.10	8.56
3-year Perc Change HV (in %)	24,990	2,499	3.38	-27.70	-4.33	4.09	12.04	27.19	12.07
4-year Perc Change HV (in %)	22,227	2,470	4.36	-33.35	-5.12	4.77	14.87	34.60	14.89
5-year Perc Change HV (in %)	19,524	2,440	5.36	-35.52	-5.54	5.33	16.75	41.10	16.85

Our sample period covers 2006 to 2018. We report descriptive statistics for opioid abuse proxies in Panel A. This includes retail opioid prescriptions dispensed per 100 persons per year, total county level retail opioid prescriptions, annual drug overdose death rate per 100,000 residents considering ICD-10 underlying cause-of-death codes X40-X44 (unintentional overdose), X60-X64 (suicide by drug self-poisoning), X85 (homicide by drug poisoning), or Y10-Y14 (undetermined intent), as well as 3-year drug overdose death rate per 100,000 residents with the same cause-of-death codes that aggregates the deaths across three years. Panel B reports county level home value statistics: the raw estimated home value of a typical house within a county based on the 2019 revision of the Zillow Home Value Index (ZHVI), as well as 1, 2, 3, 4 and 5-year log percentage changes in county level home value.

Table II: Opioid supply propensity interaction

	(1)	(2)	(3)	(4)	(5)	(6)
	Prescription Rate			Percentage Change Home Prices		
Post	-2.533^{*}	-1.658	0.261	0.731^{**}	0.673^{**}	0.569^{*}
	(1.310)	(1.423)	(1.376)	(0.319)	(0.317)	(0.319)
Post X Physicians per capita Tercile 3		-2.266^{*}			0.148	
		(1.204)			(0.185)	
Post X Phys. Opioid Payment Rate Tercile 3			-5.998^{***}			0.346^{**}
			(1.415)			(0.160)
R2	0.950	0.950	0.950	0.589	0.590	0.590
N	15199	15199	15199	14695	14695	14695

The sample period is 2013 to 2018. The dependent variable is prescription rate in columns 1 to 3, respectively a log percentage change of average county home values over 1 year in columns 4 to 6. *Post* is a dummy equal to one in the year of the passage of the law in the respective county and thereafter; *Physicians per capita Tercile 3* is a dummy equal to one for counties whose average physicians per capita between 2011 to 2015 is in the top tercile and *Phys. Opioid Payment Rate Tercile 3* is a dummy equal to one for counties in the top tercile based on opioid related payments to physicians from August 2013 (data start) until the end of 2015. Controls include: Male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio and neoplasm mortality. We include county and year fixed effects. Standard errors are clustered at the state level. $***$ indicates p < 0.01, $**$ indicates p < 0.05, and $*$ indicates p < 0.1.

TABLE III: ECONOMIC MECHANISMS: CORRELATION WITH PRESCRIPTION RATES

	(1)	(2)	(3)	(4)	(5)	(6)
	5-year percentage change in					
	Mortgage delinquency rate		No. of home improvement loans		Residential vacancy rate	
Lag Prescription Rate	0.837***	0.192***	−0.175***	−0.024**	0.267***	0.062***
	(0.188)	(0.047)	(0.045)	(0.010)	(0.047)	(0.022)
R2	0.904	0.901	0.672	0.661	0.758	0.337
N	2350	2320	14721	14794	9488	9589
Std. dev. prescription rate	27.11	27.08	43.29	43.34	43.55	43.63
County F.E.	Yes	No	Yes	No	Yes	No
Year F.E.	Yes	No	Yes	No	Yes	No
State-Year F.E.	No	Yes	No	Yes	No	Yes

The sample period is 2006 to 2018.The regression specification and controls is the same as in Equation 1 but for the dependent variables. The dependent variable is a 5-year percentage changes in the mortgage delinquency rate (percent of mortgages 90 days plus past due) in columns 1 and 2, over 5 years, in the number of home improvement loans columns 3 and 4, and in the residential vacancy rates in columns 5 and 6. The key independent variable of interest is the lagged prescription rate. County controls include the male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio, neoplasm mortality, and physicians. All independent variables are lagged over five years. All variables are winsorized at the 2 and 98 % level. Standard errors are clustered at the county level. $***$ indicates $p < 0.01$, $**$ indicates $p < 0.05$, and $*$ indicates $p < 0.1$.

TABLE IV: OPIOID ABUSE AND MIGRATION OUTFLOW

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: 5-year lagged prescription rates and 5-year percentage change in migration outflow measures						
	Perc Change Total income		Perc Change no. households		Perc Change no. individuals	
Lag Prescription Rate	-0.005	0.008^{**}	0.002	0.015^{***}	0.001	0.015^{***}
	(0.016)	(0.004)	(0.010)	(0.003)	(0.011)	(0.003)
R2	0.506	0.468	0.628	0.640	0.638	0.634
N	17208	17275	17222	17288	17222	17288
Panel B: 5-year lagged prescription rates and log migration outflow measures						
	Log(Total income)		Log(Households)		Log(Individuals)	
Lag Prescription Rate	-0.003	0.394^{***}	-0.001	0.380^{***}	-0.003	0.380^{***}
	(0.013)	(0.023)	(0.008)	(0.027)	(0.009)	(0.027)
R2	0.989	0.825	0.995	0.809	0.994	0.806
N	17215	17281	17222	17288	17222	17288
Panel C: Opioid overdose death and log migration outflow measures						
	Log(Total income)		Log(Households)		Log(Individuals)	
3-year overdose death rate top tercile	0.613^{*}	13.370^{***}	0.648^{***}	14.440^{***}	0.836^{***}	15.181^{***}
	(0.355)	(2.020)	(0.226)	(2.025)	(0.240)	(2.009)
R2	0.991	0.863	0.996	0.817	0.995	0.812
N	18260	18250	18264	18254	18264	18254
County F.E.	Yes	No	Yes	No	Yes	No
Year F.E.	Yes	No	Yes	No	Yes	No
State-Year F.E.	No	Yes	No	Yes	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes

The sample period is 2006 to 2018. The dependent variable is a measure of total migration outflow based on on individual income tax returns filed with the IRS. In column 1 and 2, it is based on the total adjusted gross income, in column 3 and 4 the number of households approximated by the number of returns filed and in column 5 and 6 the number of individuals approximated by personal exemptions claimed. In Panel A, we calculate 5-year percentage changes for the dependent variables and in Panel B and C we calculate logs of the dependent variable. In Panel A and B the key independent variable of interest is the 5-year lagged prescription rate. The specification therefore follows Equation 1 and takes the same 5-year lagged controls. The specification in Panel C follows Equation 7. We consider only the most populated opioid overdose measure as independent variable, namely "3-year overdose death rate top tercile". Controls are lagged by one year. Standard errors are clustered at the county level. $***$ indicates $p < 0.01$, $**$ indicates $p < 0.05$, and $*$ indicates $p < 0.1$.

TABLE V: OPIOID LAW IMPACT ON PRESCRIPTION AND HOME VALUES AROUND STATE BORDERS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All counties				Excluding pill mill counties			
	Difference in County Prescription Rates over ...							
	1 year		2 years		1 year		2 years	
RD Estimate	-4.219***	-4.176***	-4.004**	-3.544*	-3.972***	-3.837***	-3.794**	-3.269
	(1.004)	(1.099)	(1.771)	(2.047)	(1.062)	(1.174)	(1.914)	(2.188)
Observations	2389	2389	2066	2066	2210	2210	1923	1923
MSEBandwidth	94	165	115	186	93	163	113	186
Effective LHS Obs	504	754	574	783	479	714	545	744
Effective RHS Obs	546	872	474	695	507	804	439	645
Polynominal Order	1	2	1	2	1	2	1	2
	All counties				Excluding pill mill counties			
	Percentage Change in County Average Home Values over...							
	1 year		2 years		1 year		2 years	
RD Estimate	1.157*	1.195*	2.158*	2.165*	1.180*	1.257*	2.232**	2.279**
	(0.699)	(0.708)	(1.148)	(1.176)	(0.703)	(0.685)	(1.065)	(1.116)
Observations	2334	2334	2020	2020	2157	2157	1879	1879
MSEBandwidth	118	217	121	215	102	200	109	193
Effective LHS Obs	570	788	583	784	496	736	519	729
Effective RHS Obs	660	1041	498	769	544	918	427	666
Polynominal Order	1	2	1	2	1	2	1	2

The unit of observations are counties. In columns 1 to 4 we consider all counties. In columns 5 to 8 we exclude counties with more than 8 pill mills. We calculate one or two-year difference in prescription rate, respectively percentage changes in home values from the treatment year - 1 to the treatment year, respectively treatment year + 1. For control counties, we calculate the difference, respectively percentage change from 2015 to 2016 or 2017, as the first law was passed in 2016. As controls, we include the following variables as of 2015: male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio, neoplasm mortality, and physicians. We follow Calonico et al. (2014) to choose the optimal bandwidth. Standard errors are clustered at the state level. $***$ indicates $p < 0.01$, $**$ indicates $p < 0.05$, and $*$ indicates $p < 0.1$.

Table VI: Instrumental variable: Purdue marketing

	(1) IV: Stage 1	(2) IV: Stage 2	(3) IV: Stage 1	(4) IV: Stage 2
Panel A: 4-year percentage change in home values				
Purdue Marketing	1.322***		1.322***	
	(0.298)		(0.116)	
Estimated Prescription Rate		−0.030		−0.030*
		(0.025)		(0.017)
R2	0.357	0.857	0.357	0.857
N	19726	17965	19726	17965
F-statistic	41.1	7.5	228.6	15.4
Panel B: 5-year percentage change in home values				
Purdue Marketing	1.329***		1.329***	
	(0.303)		(0.122)	
Estimated Prescription Rate		−0.039		−0.039*
		(0.031)		(0.021)
R2	0.362	0.857	0.362	0.857
F-statistic	17183	15532	17183	15532
N	39.6	7.4	215.0	16.1
State-Year F.E.	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Std. Error	County	County	State-Year	State-Year

The sample period is 2006 to 2018. The depend variable is 4-year percentage changes in home values in Panel A and 5-year percentage changes in Panel B. We run a two-stage least squares regression with *Purdue Marketing* as instrument. *Purdue Marketing* is defined as growth in pill distribution between 1997 and 2003. Controls include: Male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio and neoplasm mortality. We also include state-year fixed effects. In columns 1 and 2 we cluster standard errors at the county level and in columns 3 and 4 at the state and year level. $***$ indicates $p < 0.01$, $**$ indicates $p < 0.05$, and $*$ indicates $p < 0.1$.

TABLE VII: INSTRUMENTAL VARIABLE: SUPPLY CHAIN

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	8)
	State-Year F.E.				County & Year F.E.			
	Cluster County		Cluster state x year		Cluster County		Cluster state x year	
	IV: Stage 1	IV: Stage 2	IV: Stage 1	IV: Stage 2	IV: Stage 1	IV: Stage 2	IV: Stage 1	IV: Stage 2
Panel A: 4-year percentage change in home values								
Supply Chain	1.020^{***}		1.020^{***}		1.020^{***}		1.020^{***}	
	(0.065)		(0.071)		(0.065)		(0.071)	
Estimated Prescription Rate		−0.006		−0.006		−0.006		−0.006
		(0.007)		(0.006)		(0.007)		(0.006)
R2	0.413	0.839	0.413	0.839	0.413	0.839	0.413	0.839
N	14479	12910	14479	12910	14479	12910	14479	12910
F-statistic	59.3	8.5	175.6	10.7	59.3	8.5	175.6	10.7
Panel B: 5-year percentage change in home values								
Supply Chain	1.025^{***}		1.025^{***}		0.279^{***}		0.279^{***}	
	(0.065)		(0.071)		(0.042)		(0.031)	
Estimate Prescription Rate		−0.011		−0.011		−0.144		−0.144
		(0.009)		(0.007)		(0.092)		(0.158)
R2	0.415	0.845	0.415	0.845	0.948	0.796	0.948	0.796
N	14479	12910	14479	12910	14411	12840	14411	12840
F-statistic	59.4	8.2	175.6	14.1	7.4	37.2	13.0	17.9
County F.E.	No	No	No	No	Yes	Yes	Yes	Yes
Year F.E.	No	No	No	No	Yes	Yes	Yes	Yes
State-Year F.E.	Yes	Yes	Yes	Yes	No	No	No	No
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Std. Error	County	County	State-Year	State-Year	County	County	State-Year	State-Year

The sample period is 2006 to 2018. The depend variable is 4-year percentage changes in home values in Panel A and 5-year percentage changes in Panel B. We run a two-stage least squares regression with leaky supply chains (*Supply Chain*) as instrument. *Supply Chain* is defined as annual MME per 1000 county inhabitants distribution of strong types of opioid to retail pharmacies. Controls include: Male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio and neoplasm mortality. We include state-year fixed effects in columns 1 to 4 and county and year fixed effects in columns 5 to 8. In columns 1, 2, 5 and 6 we cluster standard errors at the county level and in columns 3, 4, 7 and 8 at the state and year level. $***$ indicates $p < 0.01$, $**$ indicates $p < 0.05$, and $*$ indicates $p < 0.1$.

TABLE VIII: HOME VALUE AND OVERDOSE DEATH RATES

	One-year percentage change in home values					
	(1)	(2)	(3)	(4)	(5)	(6)
Overdose death rate	-0.014^{*}	-0.005				
	(0.008)	(0.005)				
3-year overdose death rate			-0.001	-0.008^{*}		
			(0.009)	(0.004)		
3-year overdose death rate top tercile					-0.218^{**}	-0.173^{***}
					(0.093)	(0.052)
County F.E.	Yes	No	Yes	No	Yes	No
Year F.E.	Yes	No	Yes	No	Yes	No
State-Year F.E.	No	Yes	No	Yes	No	Yes
R2	0.685	0.801	0.657	0.783	0.647	0.778
N	7288	7249	11773	11756	17467	17462
Std. dev. overdose variable	10.542	6.585	8.992	5.600	.469	.366

The sample period is 2006 to 2018. The dependent variable is a 1-year log percentage change of average county home values ($log(HV_t/HV_{t-1}) * 100$). *Overdose death rate* is the annual overdose deaths per 100,000 county inhabitants at t, *3-year overdose death rate* is the 3-year overdose death rates per 100,000 county inhabitants for the years t, $t-1$ and $t-2$, and *3-year overdose death rate top tercile* is a dummy equal to one for counties in the tercile with the highest 3-year overdose death rates. We restrict the sample to counties with data in every period. One year lagged controls include: Male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio and neoplasm mortality. Columns 1, 3 and 5 control for county and year fixed effects and columns 2, 4 and 6 for state-year fixed effects. We require counties to have data for the whole time series, i.e. the full 13 years, to avoid counties dropping in and out depending on suppressed data. Standard errors are clustered at the county level. $***$ indicates p < 0.01, $**$ indicates p < 0.05, and $*$ indicates p < 0.1.

TABLE IX: HOME VALUE AND OPIOID PRESCRIPTION RATES: CORRELATIONS EXCLUDING COUNTIES WITH MORE THAN 8 PILL MILLS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Log Perc. Change Home Value									
	Lag over					Lag over				
	1 Year	2 Years	3 Years	4 Years	5 Years	1 Year	2 Years	3 Years	4 Years	5 Years
Lag Prescription Rate	-0.007^{***}	-0.011^{***}	-0.012^{*}	-0.016^{*}	-0.022^{**}	-0.001^{*}	-0.002^{**}	-0.004^{**}	-0.005^{**}	-0.005^{*}
	(0.002)	(0.004)	(0.006)	(0.008)	(0.010)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)
County F.E.	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
Year F.E.	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
State-Year F.E.	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
R2	0.636	0.689	0.740	0.776	0.807	0.753	0.802	0.835	0.850	0.851
N	22930	20605	18279	15964	13743	22971	20656	18354	16059	13818

The sample period is 2006 to 2018.The regression specification and controls is the same as in Equation 1, but we drop counties with more than 8 pill mills, equivalent to dropping the top 6.3% counties based on the number of pill mills. The dependent variable is a log percentage change of average county home values ($log(HV_t/HV_{t-x}) * 100$) over 1, 2, 3, 4 and 5 years. County controls include the male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio, neoplasm mortality, and physicians. All variables are winsorized at the 2 and 98 % level. Columns 1 to 5 include county and year fixed effects and columns 6 to 10 state-year fixed effects. Standard errors are clustered at the county level. $***$ indicates p < 0.01, $**$ indicates p < 0.05, and $*$ indicates p < 0.1.

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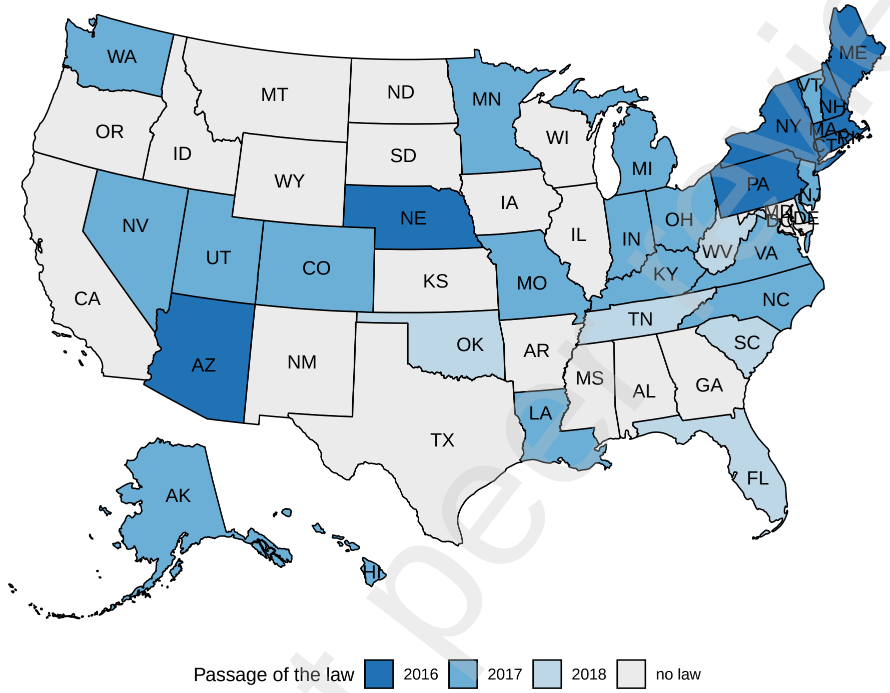
A Appendix

A.1 Opioid laws and regulations

FIGURE A.I: PASSAGE OF OPIOIDS LEGISLATION BY STATE



Notes: We colour states by the year in which they passed an opioid distribution law or regulation.

TABLE A.I: DETERMINANTS OF OPIOIDS STATE LEGISLATION

	(1)	(2)	(3)	(4)
	State Law and Regulation Indicator			
Avg Prescription Rate	−0.003	0.004	−0.002	0.004
	(0.003)	(0.006)	(0.004)	(0.006)
Age Adjusted Overdose Death Rate	0.031***	0.027**	0.029**	0.026**
	(0.011)	(0.012)	(0.012)	(0.013)
Unemployment Rate		−0.008		−0.010
		(0.085)		(0.089)
Ln(Median Household Income)		1.505		1.527
		(1.241)		(1.290)
Poverty Ratio		0.041		0.042
		(0.051)		(0.052)
Ln(GDP per capita)		0.132		0.112
		(0.610)		(0.634)
Democratic			0.003	0.030
			(0.203)	(0.211)
Republican			−0.071	−0.015
			(0.165)	(0.176)
R2	0.159	0.208	0.163	0.209
N	50	50	50	50

This is a cross-sectional regression with all 50 US states. The dependent variable is an indicator variable equal to one if a state passed a opioid law or regulation between 2016 and 2018. Following Ouimet et al. (2021), independent variables include: Average state prescription rate between 2006 and 2015 per 100,000 people; Age adjusted overdose death rate, unemployment rate, ln(median household income in current dollars), poverty ratio, ln(GDP per capita in current dollars) at the state level as of 2015; Democratic and Republican are indicators that equal one if the state governor, state senate and state house are all Democratic, respectively all Republican, in 2015. Standard errors are robust. $***$ indicates $p < 0.01$, $**$ indicates $p < 0.05$, and $*$ indicates $p < 0.1$.

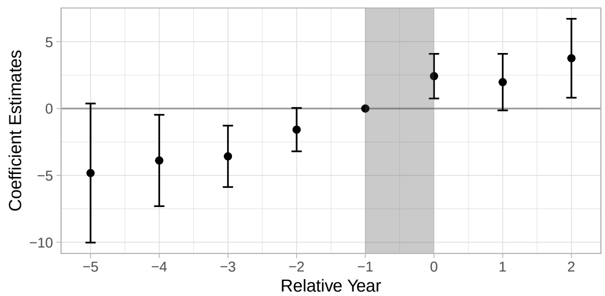
TABLE A.II: COUNTY/STATE OBSERVATIONS FOR OPIOID LAW INTRODUCTIONS

	Opioid Prescriptions Observations		Home Value Observations	
	States	Counties	States	Counties
State Law Passed in 2016	9	279	9	253
State Law Passed in 2017	18	1095	18	1060
State Law Passed in 2018	5	340	5	334

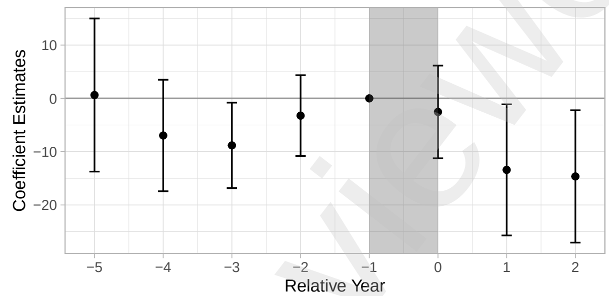
The table reports the number of states that passed laws intended limit opioid abuse as well as the number of observations with data for opioid prescriptions, respectivelyu home value, at the county level.

Figure A.II: The effect of opioid limiting laws on overdose death

(A) Overdose Death Rate

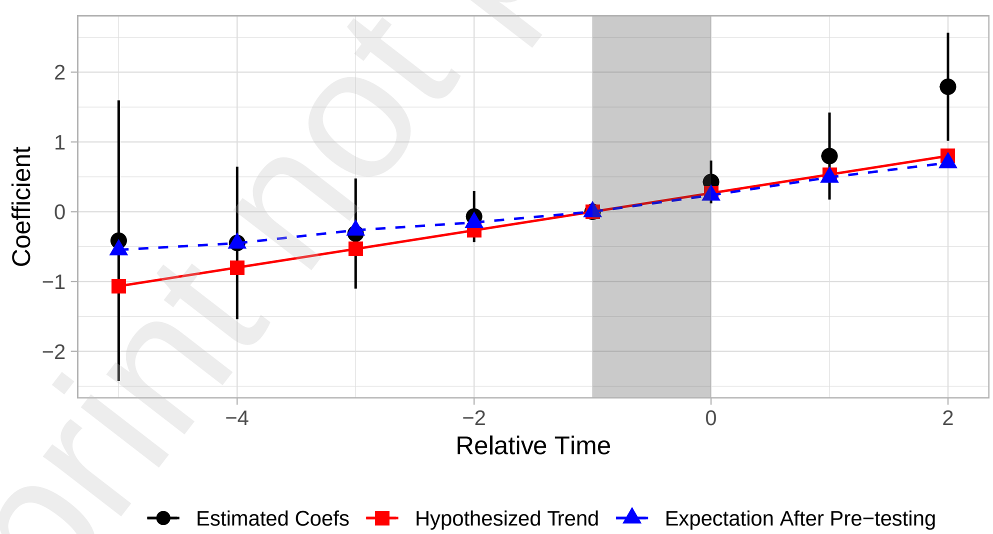


(B) Percentage Change in Overdose Death Rate (in %)



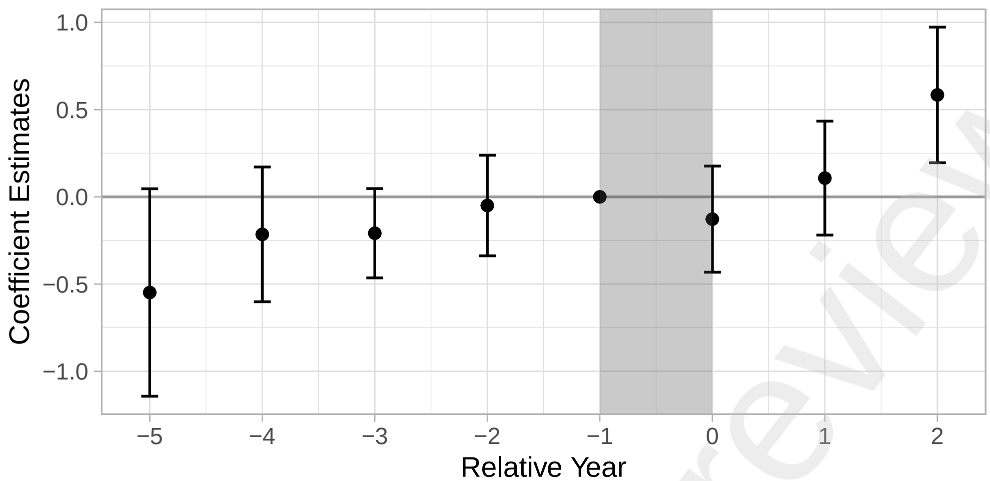
Notes: The sample period is 2013 to 2018. The dependent variable is the annual overdose death rate in Panel A and the percentage change in the annual overdose death rate in % in Panel B. We restrict the sample to counties with overdose death data in every period between 2013 and 2018. Controls include one year-lagged male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio, neoplasm mortality, and physicians. We plot the interaction weighted total coefficient with a 95% confidence interval for each relative time period following Sun and Abraham (2021). Standard errors are clustered at the state level.

Figure A.III: Event plot for home value with hypothesized trend based on 50% power



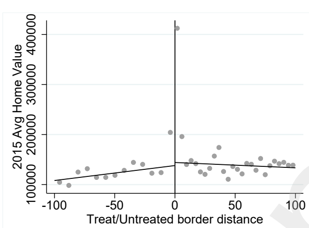
Notes: The sample period is 2013 to 2018. The dependent variable is log percentage change in average county home values. We follow Roth (2022) and plot a linear violation of the pre trend based on a 50% power in red. Black are coefficients we find in our regression and blue are the expected coefficient we would find based on the hypothesized trend in red.

Figure A.IV: The effect of opioid limiting laws on rent

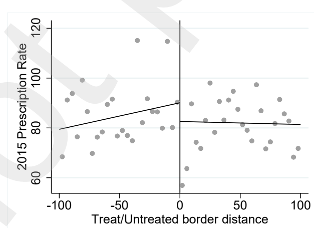


Notes: The sample period is 2013 to 2018. The dependent variable is log percentage change in median rent. Controls include one year-lagged male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio, neoplasm mortality, and physicians. We plot the interaction weighted total coefficient with a 95% confidence interval for each relative time period following Sun and Abraham (2021). Standard errors are clustered at the state level.

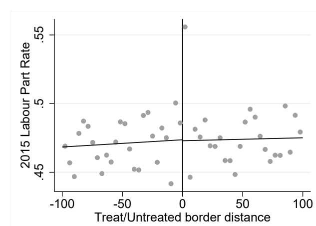
Figure A.V: Regression discontinuity plots for covariates in 2015



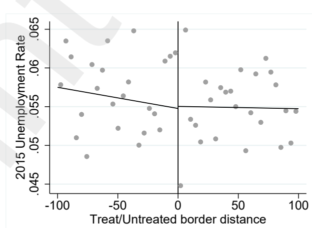
(a) Home Value



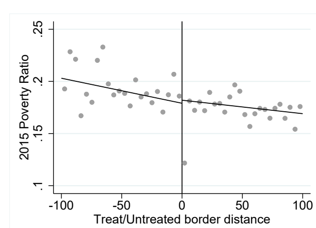
(b) Prescription Rate



(c) Labour participation rate



(d) Unemployment Rate



(e) Poverty Ratio

Notes: The unit of observations are counties. The dependent variables are levels in home value (Panel A), prescription rate (Panel B), labour participation rate (Panel C), unemployment rate (Panel D) and poverty ratio (Panel E) as of 2015. We follow Calonico et al. (2014) to choose the optimal bandwidth and do not include any other controls. Standard errors are clustered at the state level.

A.2 Economic mechanisms

TABLE A.III: SUMMARY STATISTICS ECONOMIC MECHANISMS

Panel A: Summary statistics: Channel variables	N total	Avg N Annual	Mean	Min	P25	Median	P75	Max	Std. Dev.
Percent of Mortgages 90+ days past due	5,170	470	2.41	0.42	1.27	2.06	3.16	7.36	1.55
5- year Perc Change Mtgs 90+ days past (in %)	2,820	470	-66.98	-195.90	-113.08	-75.51	-29.35	94.28	68.83
No. of home purchase loans	38,290	3,191	894.51	5.00	62.00	190.00	644.00	9,480.96	1,865.67
5-year Perc Change home pruchase loans (in %)	22,208	3,173	16.82	-88.31	-9.65	23.19	48.10	98.90	43.96
Residential vacancy rate (in %)	28,109	3,123	4.25	0.00	1.56	3.41	5.98	15.27	3.64
5-year Perc Change residential vacancy rate (in %)	11,335	2,834	-14.01	-833.29	-33.51	-7.03	14.31	639.88	79.47

Panel B: Summary statistics: Migration	N total	Avg N Annual	Mean	Min	P25	Median	P75	Max	Std. Dev.
Log(Mig-out total income)	40,586	3,122	10.18	7.29	9.08	9.97	11.13	14.08	1.57
5-year Perc Change Mig-out total income (in %)	24,923	3,115	12.97	-49.82	-2.57	13.05	28.88	69.77	25.24
Log(Mig-out no households)	40,607	3,124	6.54	3.69	5.56	6.40	7.42	9.99	1.44
5-year Perc Change Mig-out no households (in %)	24,949	3,119	-1.91	-49.79	-12.54	-1.07	9.60	36.78	18.22
Log(Mig-out no individuals)	40,607	3,124	7.20	4.33	6.24	7.07	8.06	10.59	1.42
5-year Perc Change Mig-outno individuals (in %)	24,949	3,119	-0.93	-51.03	-12.73	0.07	11.90	40.07	19.52
Log(Mig-in total income)	40,535	3,118	10.18	7.18	9.03	10.00	11.19	14.04	1.61
Log(Mig-in no households)	40,556	3,120	6.51	3.61	5.51	6.37	7.43	9.99	1.47
Log(Mig-in no individuals)	40,556	3,120	7.21	4.32	6.23	7.07	8.09	10.58	1.44

We report summary statistic for the economic mechanism variables delinquent mortgages, home improvement loans and residential vacancy rates in Panel A and for migration outflow and inflow in Panel B.

IA Internet Appendix

IA.1 Opioid laws and regulations

Opioid Laws and Regulations Passed between 2016 and 2018

Alaska (*2017 / Law*) limits first-time opioid prescriptions to seven days except for chronic pain or patients with travel/ logistical barriers.

Arizona (*2016 / Regulation*) limits first-time opioid prescriptions to seven days for insured people under state's Medicaid or state's employee insurance plan. In 2018, a new law limits first-time opioid prescription to five days.

Colorado (*2017 / Regulation*) limits first-time opioid prescriptions to seven days with 2 more seven-day prescriptions and a fourth seven-day prescriptions upon department approval possible. In 2018, a new law limits first-time opioid prescription to seven days with one possible seven day extensions. Exceptions include chronic pain patients, cancer patients, patients under hospice care, and patients experiencing post-surgical pain.

Connecticut (*2016 / Law*) limits first-time opioid prescriptions to seven days except for chronic pain patients. in 2018, a second law reduce opioid prescription limits for minors from seven days to five days.

Delaware (*2017 / Regulation*) limits first-time opioid prescriptions to seven days unless the doctor determines a patient requires more. Patients receiving longer supply must undergo a physical exam and are educated about the danger of opioid abuse.

Florida (*2018 / Law*) limits opioid prescriptions for acute pain to three days, with some exceptions allowing seven days.

Hawaii (*2017 / Law*) limits first-time opioid prescriptions to seven days except for cancer patients, post-operative care patients and patients in palliative care.

Indiana (*2017 / Law*) limits first-time opioid prescriptions to seven days unless the doctor determines a patient requires more or the patient is in palliative care.

Kentucky (*2017 / Law*) limits first-time opioid prescriptions to three days unless the doctor determines a patient requires more or the patient is treated for chronic pain, cancer-related pain or post-surgery pain.

Louisiana (*2017 / Law*) limits first-time opioid prescriptions to seven days except for chronic pain patients, cancer patients, or patients receiving hospice care.

Maine (*2016 / Law*) limits first-time opioid prescriptions to seven days for acute pain and thirty days for chronic pain. Morphine milligram equivalents (MME) are limited to 100 per day except for cancer patients, hospice and palliative care patients and substance abuse disorder treatment patients.

Massachusetts (*2016 / Law*) limits first-time opioid prescriptions to seven days except for cancer pain patients, chronic pain patients, and palliative care patients.

Michigan (*2017 / Law*) limits opioid prescriptions to seven days for acute pain.

Minnesota (*2017 / Law*) limits opioid prescriptions to four days for acute dental or ophthalmic pain.

Missouri (*2017 / Regulation*) limits first-time opioid prescriptions to seven days for Medicaid recipients.

Nebraska (*2016 / Regulation*) limits opioid prescriptions to 150 doses of short-acting opioids in 30 days. In 2018, a law was passed to limit opioid prescriptions to seven days for patients under 19.

Nevada (*2017 / Law*) limits first-time opioid prescriptions to fourteen days for acute pain and 90 morphine milligram equivalents per day. Exceptions are possible, but require additional scrutiny by doctors, respectively blood and radiology tests to determine the cause of pain.

New Hampshire (*2016 / Law*) limits opioid prescriptions to seven days in an emergency room, urgent care setting or walk-in clinic.

New Jersey (*2017 / Law*) limits first-time opioid prescriptions to five days for acute pain except for cancer pain patients, hospice care patients, patients in a long-term care facility or substance abuse treatment patients.

New York (*2016 / Law*) limits first-time opioid prescriptions to seven days for acute pain except for chronic pain patients, cancer pain patients and patients in hospice or palliative care.

North Carolina (*2016 / Law*) limits first-time opioid prescriptions to five days for acute pain and seven days for post-surgery patients. Exemptions are for cancer patients, chronic pain patients, hospice or palliative care patients as well as patients being treated for substance use disorders.

Ohio (*2017 / Regulation*) limits opioid prescriptions to seven days for acute pain and an average 30 morphine equivalent does per day except for cancer patients, chronic pain patients, hospice or palliative care patients and patients treated for substance use disorders.

Oklahoma (*2018 / Law*) limits opioid prescriptions to seven days for acute pain.

Pennsylvania (*2016 / Law*) limits opioid prescriptions to seven days in emergency rooms and urgent care centers except for cancer patients, chronic pain patients and hospice and palliative care patients.

Rhode Island (*2016 / Law*): limits opioid prescription to 30 morphine milligram equivalents per day for a maximum of 20 doses except for cancer pain patients, chronic pain patients and hospice and palliative care patients.

South Carolina (*2018 / Regulation*) limits first-time opioid prescriptions to five days or

90 morphine milligram equivalents per day except for cancer pain patients, chronic pain patients, sickle cell disease-related patients, palliative care patients and substance abuse disorder treated patients.

Tennessee (*2018* / *Law*) limits first-time opioid prescriptions to three days, but allows for ten and thirty day prescriptions if certain requirements are met.

Utah (*2017* / *Law*) limits first-time opioid prescriptions to seven days for acute pain except for complex or chronic conditions patients

Vermont (*2017* / *Regulation*) sets opioid limits for minor, moderate, severe and extreme pain. Adults suffering from moderate pain are limited to 24 morphine milligram equivalents per day and with severe pain to 32 morphine milligram equivalents per day.

Virginia (*2017* / *Regulation*) limits opioid prescriptions to seven days for acute pain and 14 days for post-surgical pain except under extenuating circumstances.

Washington (*2017* / *Law*) limits opioid prescriptions for Medicaid patients under the age of 20 to 18 tablets and for patients 21 years and older to 42 tablets, equivalent to about a seven day supply. Limits can be exceeded if deemed necessary by the prescriber and do not apply to cancer patients as well as hospice and palliative care patients.

West Virginia (*2018* / *Law*) limits opioid prescriptions to seven days for short-term pain, four days fro emergency room prescriptions and three days for prescriptions by a dentist or optometrist except for cancer patients, hospice patients and nursing home/ long/term care patients.

IA.2 Difference-in-differences estimates: opioid laws and regulations

TABLE IA.I: SUN AND ABRAHAM (2021): ESTIMATES FOR THE EFFECT OF OPIOID LAWS ON PRESCRIPTIONS AND HOME VALUES

Panel A: Dependent Variable: Total County Prescriptions

Year Relative To	Fixed Effect	Interaction Weighted			
Legislation	Total	Total	CATT Treat-year 2016	CATT Treat-year 2017	CATT Treat-year 2018
-5	2689.698	3497.861			3497.861
	(3056.589)	(3427.335)			(3427.335)
-4	1157.515	2151.615		2176.786	2071.731
	(1947.820)	(1407.503)		(1559.227)	(3165.726)
-3	860.781	1341.518	595.802	1485.804	1448.472
	(1297.242)	(1022.672)	(2522.228)	(1244.869)	(2484.415)
-2	581.373	1017.781	-585.046	1507.798**	676.753
	(841.488)	(668.658)	(2617.587)	(748.834)	(1136.858)
-1	0.000	0.000	0.000	0.000	0.000
0	-2702.161***	-2662.167***	-5339.808***	-2405.188**	-1449.456
	(1017.822)	(870.132)	(1900.458)	(1210.829)	(1253.547)
1	-7006.290***	-6136.949***	-13886.934***	-4287.188*	
	(2512.969)	(2056.392)	(4490.847)	(2310.707)	
2	-18439.869***	-19745.131***	-19745.131***		
	(5731.248)	(5496.416)	(5496.416)		

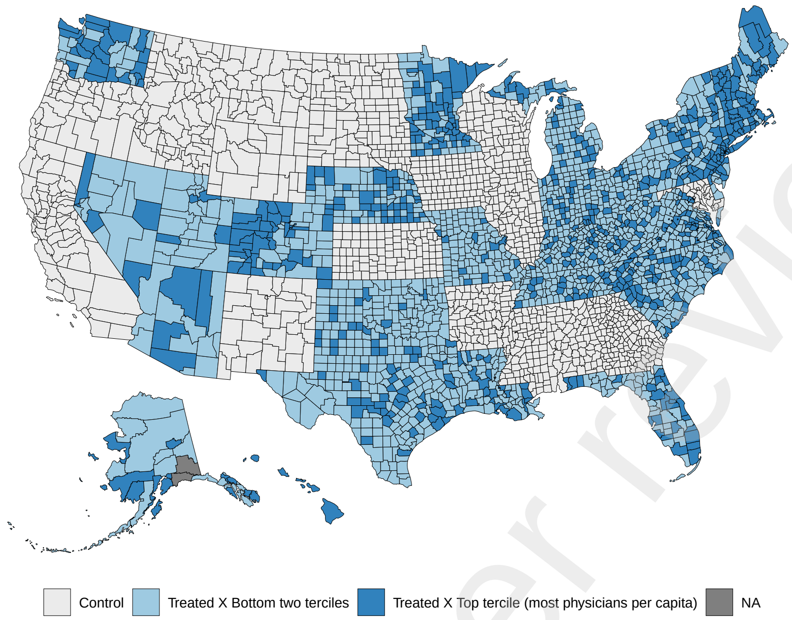
Panel B: Dependent Variable: Percentage Change in Average County Home Value

Year Relative To	Fixed Effect	Interaction Weighted			
Legislation	Total	Total	CATT Treat-year 2016	CATT Treat-year 2017	CATT Treat-year 2018
-5	-0.584	-0.471			-0.471
	(1.014)	(1.080)			(1.080)
-4	-0.405	-0.506		-0.495	-0.539
	(0.555)	(0.522)		(0.638)	(0.801)
-3	-0.166	-0.342	0.530	-0.680	0.070
	(0.380)	(0.375)	(0.692)	(0.528)	(0.574)
-2	0.016	-0.056	-0.151	-0.114	0.198
	(0.176)	(0.185)	(0.473)	(0.248)	(0.285)
-1	0.000	0.000	0.000	0.000	0.000
0	0.437***	0.423***	0.549**	0.465**	0.193
	(0.153)	(0.160)	(0.222)	(0.200)	(0.436)
1	0.954***	0.810***	1.418***	0.665*	
	(0.302)	(0.302)	(0.304)	(0.367)	
2	1.664***	1.781***	1.781***		
	(0.360)	(0.382)	(0.382)		

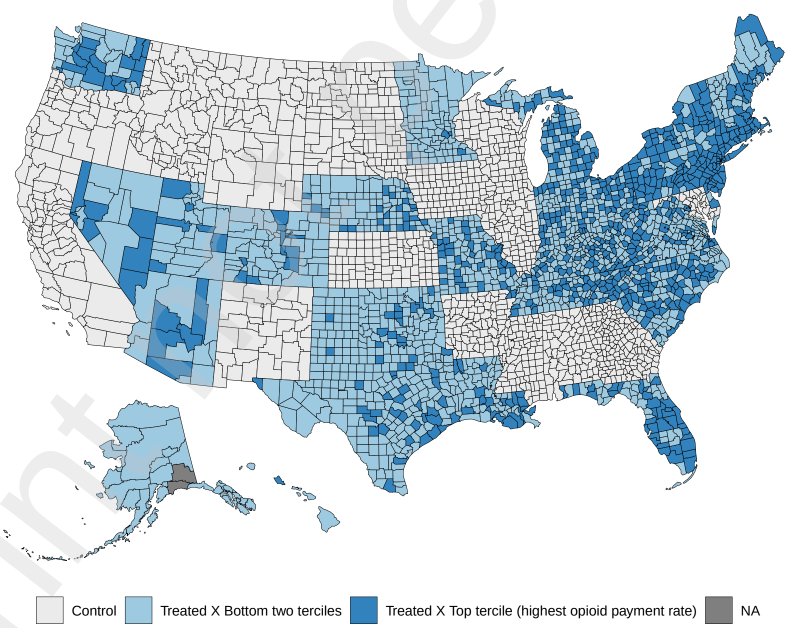
The sample period is 2013 to 2018. The dependent variable is total county prescription in Panel A and the log percentage change in average county home values in Panel B. We estimate a two-way fixed effects (FE) regression with relative time treatment dummies based on the passage of the law in column 1 as well as Sun and Abraham (2021)'s interaction weighted (IW) regression in columns 2 to 5. Column 2 reports the sample share weighted average of the *CATT* in columns 3 to 5. County controls include the male population ratio, White ratio, Black ratio, American-Indian ratio, Hispanic ratio, age 20-64 ratio, age over 65 ratio, migration inflow ratio, poverty ratio, unemployment ratio, labor force participation ratio, neoplasm mortality, and physicians. In Panel A, we additionally include log total population as control. Standard errors are clustered at the state level. $***$ indicates $p < 0.01$, $**$ indicates $p < 0.05$, and $*$ indicates $p < 0.1$.

Figure IA.I: Interaction of opioids laws with supply propensity dummies

(a) Panel (A): Top physicians per capita tercile



(b) Panel (B): Top physician opioid payment rate tercile



Notes: We visualise the realtive treatment intensity within a state based on total physicians per capita in Panel A and physician opioid payment in Panel B. Control states/counties are coloured in grey. Treated states in the bottom two terciles based on either measure are coloured in light blue. Treated sates in the top terciel based on either measure, i.e. those where the treatement was strongest, are colored in dark blue.

Table IA.II: Opioid Law Impact on prescription and home values around state borders: No controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All counties				Excluding pill mill counties			
	Difference in County Prescription Rates over ...							
	1 year		2 years		1 year		2 years	
RD Estimate	-4.101***	-3.963***	-2.524	-2.286	-3.938***	-3.819**	-2.361	-2.105
	(1.363)	(1.410)	(2.531)	(2.599)	(1.430)	(1.488)	(2.674)	(2.750)
Observations	2725	2725	2375	2375	2546	2546	2232	2232
MSEBandwidth	104	191	117	203	104	189	118	202
Effective LHS Obs	644	944	691	955	624	895	673	915
Effective RHS Obs	684	1075	567	848	646	1004	541	793
Polynominal Order	1	2	1	2	1	2	1	2
	Percentage Change in County Average Home Values over...							
	1 year		2 years		1 year		2 years	
RD Estimate	1.338*	1.307*	2.622**	2.638*	1.358*	1.384*	2.671**	2.762**
	(0.760)	(0.785)	(1.299)	(1.355)	(0.755)	(0.766)	(1.284)	(1.313)
Observations	2551	2551	2217	2217	2374	2374	2076	2076
MSEBandwidth	134	233	151	232	125	227	143	230
Effective LHS Obs	676	872	733	871	629	826	678	827
Effective RHS Obs	821	1203	672	910	729	1109	612	854
Polynominal Order	1	2	1	2	1	2	1	2

The unit of observations are counties. In columns 1 to 4 we consider all counties. In columns 5 to 8 we exclude counties with more than 8 pill mills. We calculate one or two-year difference in prescription rate, respectively percentage changes in home values from the treatment year - 1 to the treatment year, respectively treatment year + 1. For control counties, we calculate the difference, respectively percentage change from 2015 to 2016 or 2017, as the first law was passed in 2016. We do not include additional control variables. We follow Calonico et al. (2014) to choose the optimal bandwidth. Standard errors are clustered at the state level. $***$ indicates p < 0.01, $**$ indicates p < 0.05, and $*$ indicates p < 0.1.

IA.3 Overdose death rate variables

As Li and Zhu (2019), we rely on the public-use mortality data that captures drug overdose mortality. These data is censored, suppressing counties with less than 10 deaths. To address the censorship issue, we first impute missing annual death rate from 2-year death rates and annual death rates. This allows us to impute below 10 death rates for annual death rates that follow or are followed by annual death rates' above 10. We also consider 3-year death counts, as this substantially increases the number of counties covered. The 10 death cut-off is now aggregated across three years. For both the annual as well as the 3-year death counts, we calculate overdose death rates per 100,000 residents. The 3-year death rate accounts for 3 years of county population.

Finally, we construct a dummy to capture counties in the top tercile of the 3-year death rate. This allows us to impute the maximum death rate of previously suppressed counties. By definition, the maximum number of deaths of suppressed observations is 9 which allows us to calculate a maximum death rate. Counties that fall into the bottom two terciles with the "maximum" death rate will be part of the bottom two terciles with their true death rate as well, which is lower or equal to the maximum death rate. However, we cannot stop after this first iteration, as counties whose imputed maximum death rate may actually be lower and therefore push counties within the bottom two terciles above the cutoff. We therefore first drop counties that are in the top tercile with their imputed death rate, as we cannot assign these counties with certainty. Next, we repeat the tercile construction in an iterative way, dropping of top-tercile imputed counties until we are only left with imputed counties at the bottom two terciles. This allows us to substantially increase observations and address the censorship issue. We end up with three alternative opioid overdose death measures.

EXHIBIT 194

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Spillover Effects of the Opioid Epidemic on Consumer Finance

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Abstract

I examine the impact of the opioid epidemic on subprime auto lending. Using a difference-in-differences framework, I find that county-level increases in opioid abuse cause an increase in loan defaults. Moreover, I find that traditional credit scoring attributes (e.g., FICO score) fail to predict loan performance deterioration associated with opioid addiction. The weak predictive performance of traditional credit measures and the resulting higher default rates generate a negative externality for borrowers in opioid-afflicted areas, as evidenced by 5.7% higher loan costs for subprime borrowers.

I. Introduction

Prescription opioid and heroin addiction is a global epidemic that affects both health and economic welfare. In the United States, over 2 million people suffer from opioid-related use disorders and over 700,000 people have died from overdoses in the last 20 years. The epidemic shows no signs of abating during Covid (Bauman and Lopez (2021)), as deaths from opioid overdoses are now more common than fatalities from automobile accidents (Centers for Disease Control and Prevention (2018a)). In addition to its effects on health and mortality rates, opioid abuse has significant economic costs. In 2015, the total annual cost of the opioid epidemic was estimated at $504 billion (Council of Economic Advisers (2017)).

Although many of the health impacts and some of the economic impacts of opioid abuse have been examined, little is known about the opioid epidemic's spillover effects on financial markets. This study provides the first empirical evidence of a relation between opioid abuse and consumer credit. This article investigates i) whether local exposure to opioid abuse is a significant risk factor for lenders, and ii) whether this risk factor creates costly externalities for borrowers. If communities

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with high rates of opioid abuse experience higher loan default rates, and if traditional credit scoring attributes (e.g., FICO) fail to identify borrowers who are prone to abusing opioids, then lenders in those markets will face higher credit risks, and borrowers may face credit rationing and higher prices. The consequences of the opioid epidemic could thus extend beyond the labor market and affect the pricing of consumer finance products, possibly leading to other repercussions (e.g., deteriorating credit-market conditions) for consumers.

The subprime loan market is an ideal setting in which to study the impact of opioid abuse on consumer finance because its borrowers fall within the at-risk population for opioid abuse (Zedler, Saunders, Joyce, Vick, and Murrelle (2017)) and its size is large. Most U.S. households have a vehicle, and more than one-third have an auto loan (Bricker, Dettling, Henriques, Hsu, Jacobs, Moore, Pack, Sabelhaus, Thompson, and Windle (2017)). Recent auto loan balances exceed \$1.1 trillion, and 40% of these loans are nonprime or lower credit (Zabritski (2018)).

Using a difference-in-differences framework in a natural experiment, I document the relation of opioid abuse to loan performance using a panel of 118,709 subprime auto loans. To assess the impact of opioid abuse on consumer finance, the study uses county-level data on drug-poisoning rates (i.e., deaths). Drug-poisoning rates are a useful proxy for opioid abuse, as 70.6% of overdose deaths in the United States involve opioids (Centers for Disease Control and Prevention (2021)). I then explore whether traditional credit attributes allow lenders to identify risk factors associated with opioid addiction. Finally, I use loan repayment and collections data to examine how increases in county-level opioid abuse manifest real costs for lenders and borrowers.

I find that counties with higher rates of drug-related deaths have higher loan default rates. After accounting for borrowers' creditworthiness and local economic conditions, I find that a 1-standard-deviation increase in the county-level drug-related death rate is associated with a 12.6% increase ($p < 0.01$) in loan defaults, relative to the mean. This *increase* in default rates is comparable to about a 4.7% *reduction* in the average borrower's FICO score. Studies on the intertemporal choices of opioid-dependent patients show that these individuals tend to choose more immediate rewards even if the rewards are smaller (Madden, Petry, Badger, and Bickel (1997), Kirby, Petry, and Bickel (1999)).[1] Such choices are likely to be unconducive to servicing consumer debt.

The identification of the relation between opioid abuse and loan defaults could be problematic in the aforementioned ordinary least squares (OLS) regression. First, one must rule out the possibility that an omitted variable related to changing local economic conditions is driving the increases in both opioid abuse and loan defaults. Such a variable could bias the estimates from an OLS specification. Second, reverse causality is a concern, as one could plausibly argue that loan defaults cause an increase in opioid abuse. To address these concerns, I identify a relation between opioid abuse and loan defaults using a difference-in-differences framework in a natural experiment.

[1]The psychological effects associated with opioid abuse alter brain chemistry, sometimes leading to repeated use of the drug. As substance dependence develops, initial enjoyment gives way to anxiety about the next use. Thus, individuals who are facing strong withdrawal symptoms may be more interested in satisfying their drug cravings than in making consistent car payments.

In this experiment, I exploit the legalization of marijuana, a drug whose analgesic benefits for chronic pain have been compared to those of prescription opioids (Hill (2015)). (Prescription opioids are the drugs to which many opioid abusers initially become addicted.) When states legalize marijuana, addicted opioid users can choose to acquire opioids, often illegally and at high costs, or less-expensive legal marijuana from a dispensary. The medical literature has documented that many choose to substitute marijuana (Bachhuber, Saloner, Cunningham, and Barry (2014), Reiman, Welty, and Solomon (2017), and Powell, Pacula, and Jacobson (2018)). Drug-abuse treatment efforts that increase the availability of substitutes for opioid drugs have been shown to reduce the pathological behavior associated with substance abuse (Bickel, Madden, and Petry (1998)).

Using a difference-in-differences specification, I find that states that legalize recreational marijuana experience significant declines in the drug-related death rate and loan defaults relative to other states. Put simply, legal marijuana appears to crowd out illicit opioid use and its negative effects on household finance. I use two strategies to alleviate concerns that differences in the economic and political conditions across states are driving the relation between opioid abuse and loan defaults. First, in the difference-in-difference analysis, I construct the control group from borrowers living in states where recreational marijuana use was illegal during the sample period but has since been legalized. Second, I instrument for changes in opioid abuse using the timing of marijuana legalization in each state. I find that states that legalize recreational marijuana during the sample period (2012 to 2016) experience a significant decline ($p < 0.01$) in the drug-related death rate (after legalization), relative to states that do not legalize marijuana sales during the sample period but do so later. When I then instrument the drug-related death rate with the legalization of recreational marijuana, I find that a decrease in drug-related deaths results in a decrease in loan defaults.

To better understand the relation between opioid abuse and loan defaults, I investigate the reliability of lenders' credit models in assessing the riskiness of auto loans during the opioid epidemic. Lenders use a broad range of information to determine the likelihood that a prospective borrower will default. But if lenders cannot distinguish between 2 otherwise similar borrowers who are differentially shocked by an unobserved risk factor (i.e., the opioid epidemic), then they may ration credit or increase the cost of credit similarly for both borrowers. I investigate the predictive power of traditional risk-assessment factors (e.g., the borrower's FICO score, income, and other observable credit attributes) on realized default rates and find that data on the drug-related death rate significantly improves lenders' ability to predict out-of-sample loan defaults.

While loan default rates are an important predictor of loan profitability, subprime lenders are principally concerned with actual repayments (as loans in default can still be profitable for them). In further tests, I examine loan repayments and find that they vary with the local drug-related death rate during the height of the opioid epidemic. The out-of-sample performance of the lenders' traditional credit model declines by over 24% in areas with high levels of drug-related deaths; less affected areas see no such declines. Adding data on the drug-related death rate to the model increases the adjusted R^2 of the (out-of-sample) payment prediction model by 19%

in areas in the highest tercile of the drug-related death rate, but does not lead to meaningful improvements in less affected areas.

In the final tests, I compare how the opioid epidemic differentially affected the total loan costs in the period of peak opioid abuse, relative to an earlier period (before the great financial crisis) with lower abuse rates. The total loan costs reflect not only the increase in contracted payments but also the added costs of financial penalties attributable to delinquency and default. I find that during the peak of the opioid epidemic, borrowers in counties at the 75th percentile of the drug-related death rate pay $1,394 more over the life of an average subprime auto loan, relative to borrowers in counties at the 25th percentile. This represents a 5.7% increase over the total average loan cost for the average subprime borrower, ceteris paribus. By comparison, differences in the drug-related death rate had no significant impact on total loan costs before the epidemic intensified. The higher overall default rate, combined with the poor out-of-sample predictive performance of traditional borrower credit attributes (e.g., FICO score), may explain why borrowers in opioid-afflicted areas pay so much more for subprime auto loans.

This article makes three contributions. First, by connecting the opioid epidemic with financial markets, it adds to the literatures on opioid addiction and economic outcomes (Florence, Luo, Xu, and Zhou (2016), Krueger (2017), Currie, Jin, and Schnell (2018), Harris, Kessler, Murray, and Glenn (2020), Ouimet, Simintzi, and Ye (2020), and Park and Powell (2021)), on the economic spillovers from substance abuse more generally (Levitt and Porter (2001), Aliprantis and Schweitzer (2018), and Case and Deaton (2020)), and on the relation between health conditions and finance (Himmelstein, Thorne, Warren, and Woolhandler (2009), Dobbie and Song (2015), Mahoney (2015), Cohn and Wardlaw (2016), and Xue, Zhang, and Zhao (2021)) (including recent analyses of COVID-19 and financial outcomes (Goodell (2020)). Using new data on auto loan outcomes and origination terms, I find that opioid abuse, as proxied by drug-related deaths, leads to higher loan default rates. The economic implications of this finding are significant. If the relation I identify persists in subprime markets, then the opioid epidemic may be responsible for an additional 80,000 auto loan defaults per year, representing $1.2 billion of outstanding debt.[2] The resulting defaults can also spill over into the $100 billion auto loan securitization market.

Second, by showing that drug abuse has predictive power in credit modeling and that borrowers in opioid-afflicted areas pay more for access to credit, this article lends support to the theoretical literature's predictions on how supply-side responses to asymmetric information affect credit availability (Akerlof (1970), Stiglitz and Weiss (1981)).

Third, this article extends the literature on the externalities associated with deteriorating credit-market conditions (Campbell, Giglio, and Pathak (2011), Anenberg and Kung (2014), and Mian, Sufi, and Trebbi (2015)). Specifically, it supports the argument that the opioid epidemic's impact on local credit markets could be a factor in the economic decay in opioid-afflicted areas.

[2]These results may be conservative due to the limited availability of loan data in the areas that are most exposed to the opioid epidemic. Forty percent of the approximately 12 million auto loans (average loan balance of $16,000) per year are nonprime or lower credit (Jefferies (2018)).

II. Data

To assess the impact of opioid abuse on consumer finance, the study uses county-level data on drug poisoning death rates as a proxy for county-level opioid abuse. Data on drug poisoning deaths per 100,000 persons, for all races, both sexes, and ages 20–79, from 1999 to 2016 comes from the National Center for Injury Prevention and Control (NCIPC) of the Centers for Disease Control (CDC). The data shows that the mortality rate attributable to opioids increased fivefold from 1999 to 2016, with most of the increase occurring after 2011. Further details on the variables used in this study are in Appendix A of the Supplementary Material.

While a direct measure of opioid abuse would be ideal, the county-level measure of drug-related deaths is a reasonable substitute, for two reasons. First, data on drug-related deaths are readily available, and recent data from the CDC shows that 70.6% of overdose deaths involve the use of prescription or nonprescription opioids. Opioid abuse, in contrast, is difficult to measure, and panel data is not available.[3] Second, the assumption underlying my use of the county-level drug-related death rate – that the opioid death rate per abuser is relatively constant across counties – seems reasonable.

My use of a county-level (rather than individual-level) measure also allows me to shed light on how opioid abuse within communities causes negative spillover effects both for individual borrowers and for the community as a whole. For example, one indirect effect of opioid abuse on the local community is a crime (Hammersley, Forsyth, Morrison, and Davies (1989)).

Although a mechanical relation exists between drug-related deaths and loan defaults, the impact of this relation on the total number of loan defaults is small, as the vast majority of loan defaults are not directly caused by overdose deaths. At the end of 2016, for example, approximately 3.2 million subprime auto loans were 90 days delinquent. In that year, 63,632 drug overdose deaths occurred (Centers for Disease Control and Prevention (2018b)).

I match the county-level data on drug-related death rates with new data on the origination terms and outcomes of subprime automotive loans. The database of automotive loans comes from a lender that acquires loans in 44 U.S. states. The data spans 23 years ending in 2017 and includes 259,467 loans, which were originated at 3,926 dealerships in 1,903 U.S. zip codes. To avoid censorship, I remove loans from the sample if their full term is not observed or if the CDC does not report the drug-related death rate for the county of origination. I also remove loans if the credit score, income, prior bankruptcy flag, loan terms, or vehicle book value is not available. The resultant sample is 118,705 loans.

Table 1 shows the summary statistics for the loans used in the article. The average borrower in the sample has a FICO score of 533 and a monthly gross income of $3,330. Borrowers purchase vehicles with an average book value of $13,380 on a 66-month (average) term. The average default rate is 28.6%. In this setting, a default is defined as a delinquency that leads to lender efforts to repossess

[3]Emergency room (ER) visits related to opioid overdoses (which are correlated with drug-related deaths) would also make a good proxy, but data on these visits are only available for a small sample of states and a limited number of years.

TABLE 1
Summary Statistics

Table 1 reports summary statistics for the sample of 118,705 auto loans extended by 3,926 dealerships in 1,903 ZIP codes. Means, standard deviations, and the 25th, 50th, and 75th percentiles are reported. The data summarizes borrower, vehicle, loan, and loan environment characteristics. Appendix A of the Supplementary Material reports definitions for the variables used in the analysis.

	Mean	Std. Dev.	P25	P50	P75	Count
Borrower, vehicle, and loan characteristics						
FICO_SCORE	533	53	497	532	567	118,705
MONTHLY_INCOME ($ ’000s)	3.33	2.37	2.25	3.37	4.60	118,705
PRIOR_BANKRUPTCY (=1)	0.26	0.44	0.00	0.00	1.00	118,705
DISCOUNT	421.64	605.33	150	499	799	118,705
VEHICLE_BOOK_VALUE ($ ’000s)	13.38	4.54	10.35	12.93	15.78	118,705
TERM (months)	66	8	60	72	72	118,705
DOWN_PAYMENT ($)	1.19	1.46	0.30	1.00	1.50	118,705
DEFAULT (%)	28.57	45.17				118,705
TOTAL_PAYMENTS_TO_LENDER ($ ’000s)	4.06	4.67	0.00	2.69	7.18	110,922
TOTAL_LOAN_COST ($ ’000s)	20.94	8.04	15.04	19.86	25.71	106,779
Loan environment						
DRUG_DEATH_RATE (per 100,000)	16.79	7.51	11.20	15.20	21.71	118,705
ALCOHOL_DEATH_RATE (per 100,000)	9.11	4.96	5.92	7.30	11.42	114,871
TAXABLE_MARIJUANA_SALES ($ millions)	5.48	28.95	0.00	0.00	0.00	118,705
LABOR_FORCE_PARTICIPATION (%)	66.80	4.32	63.28	67.01	69.80	118,703
UNEMPLOYMENT_RATE (%)	5.49	1.84	4.10	5.20	6.50	118,683
YIELD_SPREAD (%)	2.03	0.95	1.31	1.93	2.43	118,176
COUNTY_INCOME	4.40	0.79	3.85	4.14	4.81	117,428

the vehicle. The summary statistics of the loans in this sample are similar to those reported by Jefferies (2018) and Zabritski (2018) for the total U.S. subprime auto loan market.

Table 1 also summarizes the CDC data for the drug-related death rate by county. The average drug-related death rate (per 100,000) for the sample is 16.79, with a standard deviation of 7.51. The highest observed death rate in the CDC data is 139.44.[4]

III. The Opioid Epidemic and Loan Performance

In this section, I compare loan outcomes across counties and states with different drug-related death rates to determine if opioid abuse affects loan outcomes.

I estimate an ordinary least squares model of the relation between opioid abuse (as proxied by drug-related deaths) and loan defaults. Specifically, I estimate the following:

$$Y_{i,j,\sigma,\tau} = \beta_1 Z_{j,\tau} + \beta_2 X_i + \lambda_j + \lambda_{\sigma,\tau} + \varepsilon_{i,j,\sigma,\tau}, \tag{1}$$

where $Y_{i,j,\sigma,\tau}$ is the dependent variable of interest – an indicator of loan default for borrower i, in county j, in state σ, in year τ. The variable $Z_{j,\tau}$ represents the drug-related death rate for county j in year τ. The equation includes controls X_i for

[4]The summary statistics are similar to the full sample of drug-related death rates for the United States (e.g., Mean = 17.76 and SD = 11.63), suggesting that my sample of loans is representative of the exposure of subprime loans to the opioid epidemic at that time. The slightly lower average death rate in my sample indicates that, if anything, my sample is biased toward areas with lower drug-related death rates. Given the large sample of loans from 44 states, the external validity of this study is compelling. And the study’s undersampling of the most afflicted areas suggests that the results may be conservative.

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TABLE 2

Loan Performance OLS

Table 2 contains coefficient estimates from ordinary least squares regressions on an indicator for loans terminated due to default (reported as %) on the drug-related death rate. Controls are included for the riskiness of the individual borrower and the local environment. County, year, state × year, and dealership fixed effects are included as reported. Robust standard errors, clustered by county, are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: DEFAULT				
	1	2	3	4	5
DRUG_DEATH_RATE	0.235***	0.356***	0.455***	0.420***	0.479***
	(0.078)	(0.085)	(0.094)	(0.088)	(0.099)
FICO_SCORE		−0.149***	−0.145***	−0.149***	−0.145***
		(0.006)	(0.006)	(0.006)	(0.006)
MONTHLY_INCOME		−1.666***	−1.609***	−1.647***	−1.590***
		(0.187)	(0.175)	(0.180)	(0.168)
PRIOR_BANKRUPTCY		−13.175***	−12.541***	−13.002***	−12.414***
		(1.148)	(1.094)	(1.163)	(1.119)
VEHICLE_BOOK_VALUE		−0.374***	−0.307***	−0.384***	−0.321***
		(0.066)	(0.069)	(0.066)	(0.069)
TERM		0.186***	0.185***	0.192***	0.192***
		(0.030)	(0.028)	(0.031)	(0.028)
DOWN_PAYMENT		−1.437***	−1.496***	−1.438***	−1.487***
		(0.304)	(0.320)	(0.296)	(0.310)
YIELD_SPREAD		−2.006***	−1.765***	−1.927***	−1.716***
		(0.211)	(0.227)	(0.211)	(0.232)
ALCOHOL_DEATH_RATE		−0.103	−0.032	−0.023	0.022
		(0.135)	(0.125)	(0.180)	(0.145)
UNEMPLOYMENT_RATE		1.842***	1.811***	1.881***	1.887***
		(0.369)	(0.401)	(0.455)	(0.457)
LABOR_FORCE_PARTICIPATION		1.972***	2.251***	3.032***	3.099***
		(0.367)	(0.427)	(0.493)	(0.481)
County FE	Yes	Yes	No	Yes	No
Dealership FE	No	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	No	No
State × year FE	No	No	No	Yes	Yes
No. of obs.	117,452	116,035	115,685	116,020	115,670
Adj. R^2	0.068	0.111	0.120	0.114	0.123

an individual borrower, loan, and vehicle characteristics. The specification also includes county (λ_j) fixed effects, which help address persistent local variation. To help rule out time-varying heterogeneity at the state level (e.g., state-level initiatives to address the opioid epidemic), I also include state by year-fixed effects (λ_{σ}, τ). In the analyses, I present heteroscedasticity-robust standard errors clustered at the county level to account for intertemporal correlation across loans originated in the same county.[5]

Table 2 presents OLS regression results on the percentage of loans terminated due to default. The regressor is the county-year drug-related death rate as described in Section II. Column 1 shows that the county-level drug-related death rate is positively correlated ($p < 0.01$) with loan defaults. To control for the local economic environment, the specification includes county and year-fixed effects.

[5]Figure C.1 of the Supplementary Material graphs coefficient plots that show the variation in confidence intervals (90% and 99%) for different clustering strategies. The relation between the drug-related death rate and loan defaults remains statistically significant at the 1% level.

In column 2, controls for the riskiness of the individual borrower (credit score, income, and prior bankruptcy), the vehicle (book value), and the loan terms (term and down payment) are introduced.

The specification in column 2 also includes 3 time-varying controls: the labor participation rate, the unemployment rate, and the alcohol abuse rate. In column 3 (and column 5), I substitute dealership fixed effects for county fixed effects. Dealership fixed effects capture any differences in the behavior of dealership personnel that affect loan outcomes (e.g., dealership sales incentives that disregard the likelihood of loan default). Their inclusion helps address the concern that dealers differentially treat prospective borrowers who show a propensity to abuse drugs. Finally, in columns 4 and 5, I replace the year-fixed effects with state-by-year fixed effects and find that the results are largely unchanged.

In all specifications, I find that borrowers who reside in counties with higher drug-related death rates are more likely to default on their auto loans. When I include the full set of controls in the specification (column 5), a 1-standard-deviation increase in the drug-related death rate is associated with a 3.6-percentage-point increase in the likelihood of default, a 12.6% increase relative to the mean.[6] For the average borrower in the loan sample, this represents an increase, in the likelihood of default, from 28.5% to 32.1%, which is commensurate with a 25-point *decrease* in a borrower's FICO score.[7]

The medical literature has identified a mechanism that could help explain the link between opioid abuse and loan defaults. Bickel and Marsch (2001) describe a "reinforcement pathology" among drug abusers that is characterized by delay discounting, impulsivity, and loss of control. Studies on the intertemporal choices of opioid-dependent patients (Madden et al. (1997), Kirby et al. (1999)) show that these individuals are likely to choose more immediate rewards even if they are smaller. The illicit acquisition of a consistent supply of high-quality opioids is both costly and time-consuming. Addicted users who are in withdrawal are likely to be more interested in satisfying their cravings than in maintaining consistent employment or making monthly car payments.

Another explanation for the relation between opioid abuse and loan defaults centers on labor force participation. Krueger (2017) finds that almost half of working-age men who are not participating in the labor force are taking pain medication daily. The causality of the relation between labor force participation and opioid use is unclear. Workplace injuries could be pushing workers out of the workforce and into opioid dependence, but there is no medical evidence of higher rates of workplace injuries in recent years. It seems more likely that the pharmacological properties of opioids are negatively impacting labor force participation. The lack of labor market participation, combined with the significant acquisition costs associated with satisfying an opioid addiction, could largely explain the changes in loan performance that I attribute to the opioid epidemic.

[6]In untabulated results, I find that the inclusion of lags for prior year drug-related deaths in the specification does not significantly change the results. The results are also robust to adding nonlinear factors such as credit score squared.

[7]I divide the change in the default rate (3.6%) by the coefficient on the FICO score (−0.145) to determine how the marginal income affects the likelihood of default.

Marijuana Legalization and Loan Defaults

In an ideal experiment, borrowers would be randomly assigned to the opioid epidemic to determine how the epidemic affects their loan default rate. To instead use the drug-related death rate as a regressor in an OLS specification is empirically insufficient, since an unobserved variable could be correlated with both the drug-related death rate and loan defaults. For example, a manufacturing plant's closing could simultaneously affect employment (and thus loan defaults) and opioid abuse (and drug-related deaths).

To help address this identification challenge, I take advantage of laws legalizing the recreational use of marijuana. Because these regulatory changes alter the supply of a nonopioid analgesic and potential opioid substitute – marijuana – but not the supply (or prices) of prescription opioids, they could be a source of exogenous variation in the drug-related death rate, which would be useful empirically. Using a difference-in-differences approach, I, therefore, assess how these laws differentially impact both the drug-related death rate and loan defaults.

Recent studies in the medical literature found that laws allowing legal access to marijuana reduce the use of opioid analgesics and deaths from an opioid overdose (Bachhuber et al. (2014), Powell et al. (2018)). In 1 survey, 97% of opioid-using medical marijuana patients reported decreasing their opioid consumption when they used marijuana (Reiman et al. (2017)).

As of Jan. 2018, 3 U.S. states had implemented laws permitting the legalized the sale of marijuana for nonmedical reasons: Colorado in 2014, Washington in 2014, and Oregon in 2015. While there are multiple ways to access marijuana, laws that permit its recreational sales and use should provide wider and less costly access to it, which in turn may facilitate its substitution for opioids.[8] I, therefore, use the implementation of these laws to identify the impact of opioid abuse on loan performance.

The empirical strategy compares changes in opioid abuse in states that do and states that do not implement laws permitting the sale of recreational marijuana. Using a difference-in-differences strategy, I use the nonadopting states as controls and the differential timing of marijuana legalization as the treatment, then compare the changes in outcomes between states. To mitigate concerns about a differential effect in the states that legalized marijuana, I include state-fixed effects and year-fixed effects in the specification.

To formally identify the impact of opioid abuse, I use the legalization of marijuana as a source of exogenous variation in the drug-related death rate in a difference-in-differences (DiD) framework. Identification originates solely from the introduction of marijuana legalization interacted with the timing of the law. This strategy allows me to control for the independent effects of the legalization (through year-fixed effects) and state economic conditions (through state-fixed effects). The DiD regression equation is given by

[8]Laws related to medical marijuana pose an empirical challenge, as states with medical marijuana dispensaries have regularly changed their regulations in response to changes in federal marijuana policy since 2010 (Powell et al. (2018)).

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$$y_{i,\sigma,\tau} = \lambda_\sigma + \lambda_\tau + \beta_1 D_{i,\tau} + \varepsilon_{i,\sigma,\tau}, \tag{2}$$

where $y_{i,\sigma,\tau}$ represents the outcome (i.e., the drug-related death rate in state σ in year τ), and $D_{i,\tau}$ represents the indicator for states that have i) legalized recreational marijuana usage and ii) implemented operational and legally protected dispensaries. A borrower is treated if the loan is originated in a state where those 2 conditions are met. Regressions include controls for the riskiness of the borrower (e.g., credit score, income, and prior bankruptcy). In addition, I control for the county unemployment rate, which might influence access to health insurance or the ability to pay for prescription drugs. The specification includes state-fixed effects, to account for fixed cross-sectional differences across states, as well as year-fixed effects, to account for national shocks and trends in heroin availability, enforcement, prices, and other factors common across states. In all analyses, I present robust standard errors clustered at the state level.

Column 1 of Table 3 reports results from OLS regressions on the drug-related death rate for indicator variables (POST_LEGALIZATION) for loans that were originated in states with legalized marijuana sales. The coefficient on the postlegalization indicator variables suggests that the legal-marijuana states experience a significant 1.1% decline ($p < 0.01$) in drug-related deaths after legalization, relative to other states.[9]

TABLE 3

Loan Performance: Difference in Difference

Table 3 reports results from OLS regressions on the drug-related death rate (in columns 1 and 2) and the loan default rate (reported as % in columns 3 and 4). The dependent variable is an indicator variable (POST_LEGALIZATION) equal to 1 for loans that were terminated in states that had implemented laws allowing the recreational sale of marijuana, or 0 for loans terminated in all other states (columns 1 and 3) or in states that legalized the recreational sale of marijuana after the end of the sample period and prior to 2021 (AZ, CA, IL, MA, ME, MI, NJ, NM, NY, NV, SD, VA, and VT) (columns 2 and 4). Regressions include controls for the riskiness of the borrower (credit score, income, and prior bankruptcy), the loan (term, down payment), the vehicle (vehicle book value), and the macroeconomic environment (unemployment rate, alcohol death rate, labor market participation, and yield spread). State- and year-fixed effects are included as reported. Robust standard errors, clustered by state year, are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	DRUG_DEATH_RATE		DEFAULT	
	1	2	3	4
POST_LEGALIZATION	−1.104***	−0.796**	−4.875***	−6.002***
	(0.359)	(0.385)	(1.292)	(1.429)
Borrower controls	Yes	Yes	Yes	Yes
Loan controls	Yes	Yes	Yes	Yes
Vehicle controls	Yes	Yes	Yes	Yes
Environment controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Sample	All	MJ legal	All	MJ legal
No. of obs.	50,326	20,615	50,326	20,615
Adj. R^2	0.626	0.632	0.087	0.088

[9]To satisfy a concern that the use of loan-level data underestimates the standard errors, I examine the relation between marijuana legalization and drug-related death rates using observations that are collapsed at the county level. To retain the differences in the borrower characteristics of the loan data, I have also collapsed the borrower characteristics. Table C.1 of the Supplementary Material reports these

Column 3 reports the results from a reduced form regression on the likelihood of a loan default for an indicator variable (POST_LEGALIZATION) for loans that were originated in states that had legalized marijuana sales. The results indicate that marijuana legalization results in a 4.9% *decrease* ($p < 0.01$) in loan defaults relative to other states.

The analysis in columns 1 and 3 of Table 3 compares the 3 states (Oregon, Colorado, and Washington) that legalized marijuana with all other states. To help allay concerns that the choice of states is coincidental, I repeat the test shown in column 3 of Table 3 with placebos constructed using random samples of 3 states.[10] If the results can be replicated with these random samples, then the effect that I attribute to opioid abuse may be spurious. If the results consistently differ from those of the original test, then my hypothesis that opioid abuse leads to loan defaults will become more credible. In Figure C.2 of the Supplementary Material, the histogram shows a sample of 10,000 regressions that are centered around a mean of 0. This iterative procedure provides a distribution of *t*-statistics for the states that did not legalize recreational marijuana during my sample period. It shows that when random U.S. states are substituted for the 3 states that legalized recreational marijuana, the outcome in column 2 of Table 3 is very rarely reproduced. The incidence of Colorado, Washington, and Oregon adopting the laws is, at minimum, a significant outlier in the data.

Nevertheless, one must consider that during the sample period of 2012 to 2016, the opioid crisis was most acute in the Appalachian states of Ohio, West Virginia, Tennessee, and Kentucky. In these states, the economic and political conditions were different from those in other regions. To help alleviate concerns that the control group is not representative of the treatment group of states, I create a second control group consisting of states that legalized marijuana after the end of the sample period and prior to 2021 (AZ, CA, IL, MA, ME, MI, NJ, NM, NY, NV, SD, VA, and VT). I then conduct a balance test between the treatment and the control groups. Table C.2 of the Supplementary Material reports the summary statistics and differences in observable characteristics of the treatment and control groups.

The balance test shows no statistically significant differences in borrower FICO score, prior bankruptcy, vehicle book value, down payment, loan term, yield spread, or labor participation rate. However, the table does show that incomes were $213 per month higher in the treatment group, and the unemployment rate was slightly lower (0.86 percentage points).

Income is unlikely to drive the change in default rates, for 2 reasons. First, the specifications directly control income. Second, the income differences are persistent, as shown in Figure C.3 of the Supplementary Material. The figure presents borrower monthly income for each month across the states that first legalized the sale of marijuana and across the states that subsequently legalized marijuana, with

results. The coefficients on the legalization variable are significantly larger (2.7%) than in the comparable specification in Table 3. That is, marijuana legalization leads to a statistically significant reduction in opioid abuse, as measured by the drug-related death rate.

[10]In this analysis, I draw from the full sample of U.S. states rather than a selected sample of states near Washington, Oregon, and Colorado. Using bordering states as the counterfactual would confound the analysis since the residents of those states can easily access marijuana dispensaries across the state line.

dotted lines representing the adoption dates of legalized marijuana in Colorado, Washington, and Oregon.

Returning to Table 3, the results in column 2 show that marijuana legalization led to a 0.8% decline ($p < 0.01$) in drug-related death rates after legalization, relative to the control group of states that later legalized marijuana. Further, column 4 shows that the default rate in the treated states declined by 6.0%. These results support the findings from my initial test, in which the control group comprised all states that did not legalize recreational marijuana during the sample period.

Identification in the difference-in-differences model requires that changes in the control group serve as an appropriate counterfactual for the treatment group absent the policy change. This is commonly referred to as a "parallel trends" assumption. A violation of the parallel trends assumption represents a threat to the identification. To investigate this potential threat, I compare differences in outcome pretends by plotting a difference in difference around the time that recreational marijuana was legalized.

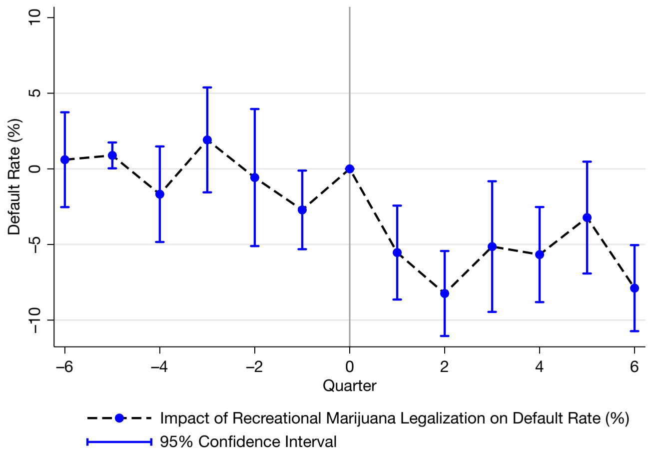
Figure 1 presents differences in the percentage of loans that default across states that legalized the sale of marijuana during the sample period and states that had not legalized the sale of marijuana during the sample period but did so subsequently. The figure shows a regression discontinuity for the date when marijuana legalization was implemented and is centered on that date. The regression includes the same set of controls described in Table 3 and shows confidence intervals at 95%.

In the 6 quarters preceding the legalization of marijuana, the loan default rates in the treatment group were not different from those in the control group at the 95% level. The figure shows that the default rate, though noisy, appears to be centered

FIGURE 1

Impact of Recreational Marijuana Legalization on Auto Loan Defaults

Figure 1 presents differences in the percentage of loans that default across i) states that legalized the sale of *marijuana* during the sample period and ii) states that did not legalize the sale of marijuana during the sample period but did so subsequently. The figure shows a regression discontinuity for the date on which marijuana legalization was implemented and is centered on the legalization date. Controls include monthly income, credit score, prior bankruptcy, down payment, loan term, book value of the vehicle, unemployment rate, and labor force participation. Standard errors are clustered by calendar quarter and state. The figure includes confidence intervals at 95%.



around 0%. That is, the default rates in the prelegalization period are similar in the treatment group and the control group. In contrast, the default rate is consistently and significantly lower in the treatment group after the legalization of marijuana.

Another explanation for the observed relation between the drug-related death rate and marijuana legalization is that other regulations (e.g., laws restricting access to opioids) that were passed concurrently with marijuana legalization are driving the results. If this is happening, then the mechanism I attribute to marijuana is incorrectly identified, but the relation between opioid abuse and loan defaults remains valid. Appendix B of the Supplementary Material describes how the absence of important new opioid regulations in Washington, Oregon, and Colorado during my sample period is consistent with the inference that marijuana legalization explains the subsequent reduction in opioid abuse.

To further allay the concern that another regulatory change that occurred simultaneously with the implementation of marijuana legalization drives the relation between the drug-related death rate and loan defaults, I examine the relation between taxable marijuana sales and loan defaults.[11] Table C.3 of the Supplementary Material reports that, in the first 3 states with legal recreational marijuana, an increase in taxable marijuana sales leads to a decline in drug-related death rates relative to all other states (column 1) and to states that legalized marijuana after the sample period (column 2). Further, columns 3 and 4 show that increases in marijuana sales are correlated with reductions in the loan default rate. These results reaffirm the main results from Table 3.

As a final test of the identification strategy, I instrument the drug-related death rate with an indicator for marijuana legalization. Table 4 reports these results. Two concerns must be addressed in the use of the instrument. First, the instrument should be sufficiently correlated with the endogenous variable. In this case, the relevance condition is easily verifiable. Columns 1 and 2 show that a statistically significant variable drives the first-stage results. OLS regressions on the drug-related death rate on an indicator variable (POST_LEGALIZATION) for loans terminated in a state that implemented laws allowing recreational marijuana sales are statistically significant, whether the control group consists of all other states (column 1) or only of states that subsequently legalized marijuana (column 2). The table also reports the Cragg–Donald F-statistic (77.809 for the full sample, and 73.310 for the restricted sample) to test the significance of the instruments. In addition, the medical literature (e.g., Bachhuber et al. (2014)) provides strong evidence of the first-stage relation.

Columns 3 and 4 of Table 4 report a 2-stage least squares (2SLS) regression, in which an indicator for marijuana legalization is used as an instrument for opioid abuse. The coefficient estimate of the 2SLS analysis is similar to the one for the full sample, but is 1.5 percentage points (7.536 vs. 6.038) larger than the one in the difference-in-difference analysis (i.e., Table 3).

One concern about the instrument and its reliance on exogenous variation is that the exclusion restriction could be violated. If, for example, people who use

[11]Studies of the impact of medical marijuana laws on opiate addiction (Pacula, Kilmer, Grossman, and Chaloupka (2010), Pacula, Powell, Heaton, and Sevigny (2015), and Powell et al. (2018)) are consistent with the relation I find between opioid abuse (as proxied by the drug-related death rate) and marijuana legalization, and with my hypothesis that improved access to marijuana dispensaries is associated with a lower incidence of drug-related deaths.

TABLE 4

Loan Performance: 2-Stage Least Squares

Table 4 reports results from a 2-stage least squares regression. Columns 1 and 2 report the first stage: OLS regressions on the drug-related death rate on an indicator variable (postlegalization) of loans that were terminated in a state that implemented laws allowing the recreational sale of marijuana. Columns 3 and 4 report a 2-stage least squares regression, in which an indicator for marijuana legalization is used as an instrument for drug-related death rates. The sample includes all states (columns 1 and 3) or states that implemented laws allowing the recreational sale of marijuana after the end of the sample period and prior to 2021 (columns 2 and 4). Regressions include controls for the riskiness of the borrower (credit score, income, and prior bankruptcy), the loan (term, down payment), the vehicle (vehicle book value), and the environment (unemployment rate, alcohol death rate, labor market participation, and yield spread). State- and year-fixed effects are included as reported. To test the significance of the instruments, the Cragg–Donald F-statistic is reported. Robust standard errors, clustered by state year, are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	DRUG_DEATH_RATE		DEFAULT	
	1st Stage		2nd Stage	
	1	2	3	4
POST_LEGALIZATION	−1.104***	−0.796**		
	(0.359)	(0.385)		
DRUG_DEATH_RATE			4.415***	7.536**
			(1.675)	(3.625)
Borrower controls	Yes	Yes	Yes	Yes
Loan controls	Yes	Yes	Yes	Yes
Vehicle controls	Yes	Yes	Yes	Yes
Environment controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Sample	All	MJ legal	All	MJ legal
Adj. R^2	0.626	0.632		
No. of obs.	50,326	20,615	50,326	20,615
F-stat.	77.809	73.310		

marijuana become more responsible and better at bill paying, or if the economic environment improves as a result of marijuana legalization, then marijuana alone could account for the changes I observe in default rates. Marijuana policies could also impact the labor supply and other economic outcomes.

However, if the exclusion restriction is violated because legal marijuana positively impacts economic outcomes, then we would expect to see the effects of this not only among opioid users but in other populations, such as heavy drinkers. In unreported results, a placebo test shows that the alcohol death rate, unlike the drug-related death rate, does *not* decrease with the implementation of marijuana legalization. This finding helps to mitigate concerns that the effect I observe on loan defaults results from an unobserved local economic effect.

IV. The Opioid Epidemic and Loan Origination

Lenders typically use observable information to determine the expected default rate of a prospective borrower. If lenders cannot distinguish between otherwise similar borrowers who are differentially shocked by an unobserved risk factor (i.e., the opioid epidemic), then they may ration credit or increase the cost of credit for all borrowers. In this section, I explore the predictive power of traditional credit information in assessing the riskiness of loans during the opioid epidemic. Specifically, I use a difference-in-differences (DiD) framework to investigate how traditional credit attributes, such as the borrower's FICO score, predict default rates in areas exposed to the opioid epidemic.

First, I estimate the likelihood that a buyer would default, given the full set of characteristics that a lender observes at the time of origination. To construct the expected default rate, I generate a model that predicts the likelihood of default for each loan in the data. Specifically, I regress the default rate of loans that originated prior to the height of the opioid epidemic (i.e., before 2012) against the borrower- and loan-specific characteristics, then use the coefficient estimates to predict a default rate for the loans originated after 2011. I interpret the predicted default rate as a composite measure of the riskiness of each borrower. Importantly, the measure reflects only information about the prospective loan risk that was available at the time of the transaction. One assumption underlying the composite measure is that lenders use similar factors in assessing a buyer's riskiness over time. I thus assume that the coefficient estimates are valid out-of-sample weights.

Table 5 reports the coefficient estimates from ordinary least squares regressions on the loan default rates for loans originated after 2011 on the drug-related death rate and the predicted default rate, which represents a composite measure of the borrower riskiness. Column 1 shows that the predicted default rate, county and year-fixed effects, and in-sample contemporaneous unemployment rate and labor force participation account for 12.4% of the variation in default rates. Notably, when I add the lagged drug-related death rate (in column 2), the lender is able to predict 14.3% of defaults, a 15.3% improvement in the out-of-sample performance of the credit model. Next, I examine whether this result is robust to the inclusion of county-level income changes. Column 3 shows that the coefficient estimate is not

TABLE 5

Credit Modeling

Table 5 reports the coefficient estimates from ordinary least squares regressions on the loan default rates (reported as %) for loans originating after 2011 on the lagged drug-related death rate and the predicted default rate, a composite measure of the borrower riskiness. I construct the counterfactual default rate by regressing the default rate of loans terminating before 2012 against borrower- and loan-specific characteristics. I then use the coefficient estimates to predict a default rate for all loans originated after 2011. All columns include controls for the unemployment rate and labor force participation rate. Column 3 includes a control for county per capita income ($ '0,000s). County and year-fixed effects are as reported. Robust standard errors, clustered by county, are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: DEFAULT		
	1	2	3
PREDICTED_DEFAULT_RATE	1.559***	1.514***	1.514***
	(0.041)	(0.042)	(0.042)
DRUG_DEATH_RATE		0.370***	0.370***
		(0.086)	(0.086)
UNEMPLOYMENT_RATE	−4.817***	−4.737***	−4.744***
	(0.518)	(0.542)	(0.543)
LABOR_FORCE_PARTICIPATION	−1.866***	−1.837***	−1.833***
	(0.626)	(0.659)	(0.660)
COUNTY_INCOME			0.359
			(1.332)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
No. of obs.	19,617	19,286	19,286
Adj. R^2	0.124	0.143	0.143

statistically different. Moreover, the predictive power of the lender model is unchanged.

While loan default rates are an important predictor of loan profitability, subprime lenders are principally concerned with the actual customer payments. Subprime lenders can still profit from auto loans that default because these loans i) have high rates of interest and ii) allow lenders to easily repossess the collateral and sue borrowers for deficiencies. In the next set of tests, I examine the lenders' ability to predict loan repayment. Using the methodology described for the tests in Table 5, I construct a counterfactual payment rate from loans terminating prior to 2011. I assess the strength of this composite risk measure out-of-sample by comparing the predicted (ex ante) default rates to the realized (ex post) default rates for the sample of loans.

Table 6 reports the coefficient from an OLS regression of the *predicted* payments on the *realized* payments. Columns 1–3 report the coefficients for loans terminating before 2012 for counties sorted by drug-related death rate tercile. Based on observable characteristics, the lender is able to predict 21.5% (column 1) of the variation in payment for low opioid exposure areas and 24.5% (column 3) of the variation in payment for high opioid exposure areas. The mechanical relation of the in-sample predicted payment rate and the realized payment rate is not statistically different from 1.0 for the middle ($p < 0.10$) and high terciles ($p < 0.10$).

Columns 4–9 of Table 6 report the out-of-sample performance of the predicted payment rate that was trained on the loan data terminating before 2012. The results show that after 2011, the power of the traditional loan characteristics in predicting payment rates declines precipitously in counties in the highest tercile of drug-related death rate: The out-of-sample performance of the credit model declines by 24% in these areas but does not drop in less affected areas. In fact, for the areas in the lowest (middle) tercile of drug-related death rate, the predictability of out-of-sample loan performance generally improves after the great financial crisis, as evidenced by a 33% (6%) gain. The improvement in model predictability is consistent with reports, from lenders, that the predictive power of risk models improved as the financial crisis revealed more risk data on prospective borrowers. This contrasts sharply with the poor model performance in counties that had the highest tercile of opioid abuse as proxied by the drug-related death rate.

In the next set of tests, I investigate how the addition of data on drug-related deaths improves lenders' ability to predict loan repayment. Columns 7–9 in Table 6 report these results. Adding data on drug-related deaths to the payment model increases the R^2 of the out-of-sample payment-prediction model by 19% in the highest tercile of drug-related death rates (column 9). In contrast, the addition of drug-related death rate data provides only minor improvements in R^2 in areas less affected by opioid abuse (columns 7 and 8). These findings suggest that traditional credit models still work well in areas that are unaffected or lightly affected by the opioid epidemic but not in more strongly affected areas. In the more strongly affected areas, new models that capture an "opioid risk factor" may be needed.

V. Borrower Loan Cost

In the final tests, I investigate how the opioid epidemic affects the total realized cost of automotive subprime loans. The total realized cost includes i) all payments

TABLE 6

Loan Payment and the Opioid Crisis

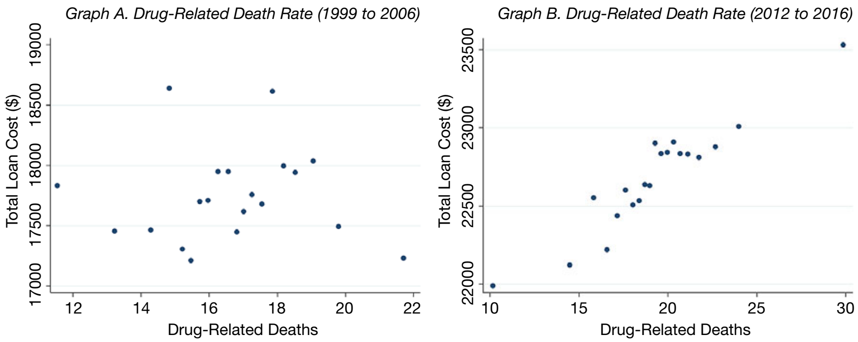
Table 6 reports the coefficient estimates from ordinary least squares regressions on the total loan payments made by borrowers for i) loans terminating before 2012 (sample columns 1–3), and ii) loans originating after 2011 (sample columns 4–9). Columns represent terciles (high, medium, and low) of the county-level drug-related death rate. The regressor is the predicted payment, which represents a composite measure of the repayment propensity of the borrower. To construct the counterfactual repayment rate, I regress the default rate of loans terminating before 2012 against the borrower- and loan-specific characteristics. I then use the coefficient estimates to predict a payment rate for all loans in the data. Controls for the unemployment rate and labor force participation rate, as well as county and year-fixed effects, are as reported. Robust standard errors, clustered by county, are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: TOTAL_PAYMENTS_TO_LENDER								
	Precrisis			During Opioid Crisis: Using Model Trained on Pre-2012 Data					
	1	2	3	4	5	6	7	8	9
PREDICTED_PAYMENT_RATE	0.908***	1.016***	1.009***	0.131***	0.153***	0.107***	0.129***	0.153***	0.112***
	(0.036)	(0.067)	(0.057)	(0.022)	(0.025)	(0.019)	(0.022)	(0.025)	(0.021)
DRUG_DEATH_RATE							156.492*	19.601	64.900***
							(88.465)	(46.000)	(16.151)
UNEMPLOYMENT_RATE	531.733***	381.719***	440.177***	−869.708***	−694.248***	−545.225**	−860.636***	−696.775***	−541.582***
	(71.177)	(47.689)	(55.967)	(88.396)	(129.940)	(217.267)	(87.497)	(129.278)	(176.951)
LABOR_FORCE_PARTICIPATION	−8.901	−12.359	−84.945**	−26.428	−14.812	−21.913	−9.458	−13.408	−55.051*
	(23.543)	(26.376)	(41.434)	(29.709)	(38.963)	(24.215)	(31.909)	(38.687)	(28.477)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	No	No	No	No	No	No	No	No	No
Drug death rate tercile	Low	Middle	High	Low	Middle	High	Low	Middle	High
No. of obs.	8,384	8,007	7,469	9,798	9,693	9,014	9,798	9,693	9,014
Adj. R^2	0.215	0.192	0.245	0.285	0.202	0.186	0.295	0.202	0.221

FIGURE 2

Auto Loan Costs and Drug-Related Death Rate

Figure 2 presents a binned scatter plot of the total loan costs versus the drug-related death rate for loans originated in (Graph A) the years 1999–2006 (the early stages of the opioid epidemic), and (Graph B) the years 2012–2016 (when opioid abuse was widespread). The total loan costs represent i) all payments made by the borrower, ii) all costs arising from the repossession and sale of the vehicle, and iii) postdefault collections efforts. Controls include borrower credit score, income, and prior chapter 7 bankruptcy; vehicle book value and loan term; county unemployment rate and labor market participation rate; and county and year-fixed effects.



of principal, interest, and fees made by the borrower to the lender, ii) the loss of value and costs borne by the borrower for the repossession and sale of the vehicle, and iii) all payments made by the borrower arising from postdefault collections efforts.

Graphs A and B of Figure 2 are binned scatter plots of the total loan costs versus the drug-related death rate for the years 1999–2006 and 2012–2016, respectively.[12] The figures show a sharp change in the effect of opioid abuse on total loan costs over time. While Graph A of Figure 2 shows no significant relation between drug-related death rate and total loan costs during the early stages of the epidemic, Graph B of Figure 2 shows a strong positive correlation during the later stages.

The ordinary least squares regressions in Table 7 confirm the results described in the figures. I find that the higher opioid abuse rates (as proxied by the drug-related death rate) at the height of the epidemic are associated with increases in total realized loan costs for subprime borrowers. Between 1999 and 2006, total realized loan costs are not significantly higher in areas with higher rates of a drug-related death. Between 2012 and 2016, however, borrowers residing in counties at or above the 75th percentile of drug-related death rates pay $1,394 more over the life of an average subprime auto loan, compared with buyers in counties at or below the 25th percentile. This represents a 5.7% increase over the total average loan cost, ceteris paribus. The higher overall default rate, combined with a poor out-of-sample predictive performance of traditional borrower credit attributes (e.g., FICO score), may explain why borrowers in opioid-afflicted areas pay significantly more for subprime auto loans.

In addition to paying significantly higher direct financial costs for loans, buyers in opioid-afflicted areas may also incur indirect costs that are not observable in the data. For example, consumers with a history of default or vehicle repossession

[12]To avoid any confounding effects of the Great Recession, the years 2007–2011 have been excluded from this analysis.

TABLE 7
Opioid Abuse and Borrower Loan Cost

Table 7 summarizes results from regressions on the total loan costs related to a subprime auto loan. Total loan costs include payments of principal and interest, fees, and collections payments after loan default. Coefficient estimates are reported on the drug-related death rate. Columns 1 and 3 report results before the financial crisis (1999–2007); columns 2 and 4 report results after the financial crisis (2012–2016). Regressions include controls for the riskiness of the borrower and the contract origination terms. Local economic effects as well as county and year-fixed effects are included as reported. Robust standard errors, clustered by county, are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: TOTAL_LOAN_COST			
	1	2	3	4
DRUG_DEATH_RATE	−0.069	166.154***	−36.633	149.914***
	(45.728)	(23.378)	(53.545)	(20.370)
FICO_SCORE	−4.408***	−5.232***	−4.384***	−5.066***
	(0.476)	(1.153)	(0.444)	(1.119)
MONTHLY_INCOME	378.396***	291.179***	375.618***	290.211***
	(53.254)	(14.008)	(53.361)	(14.192)
PRIOR_BANKRUPTCY	−273.151***	−91.140	−259.940***	−57.931
	(75.295)	(58.129)	(79.320)	(59.360)
DISCOUNT	−0.529***	−1.009***	−0.512***	−1.019***
	(0.065)	(0.043)	(0.062)	(0.045)
VEHICLE_BOOK_VALUE	904.570***	1,061.949***	907.864***	1,064.154***
	(21.811)	(10.959)	(22.025)	(11.119)
TERM	78.117***	93.130***	76.118***	93.284***
	(10.617)	(5.142)	(10.622)	(5.085)
YIELD_SPREAD	−68.011	−130.232***	−49.282	−131.857***
	(58.078)	(41.782)	(56.243)	(41.069)
ALCOHOL_DEATH_RATE			340.149***	302.886***
			(90.976)	(47.075)
LABOR_FORCE_PARTICIPATION			172.201*	−60.394
			(103.395)	(85.794)
UNEMPLOYMENT_RATE			−173.253	47.173
			(107.453)	(72.496)
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Sample	1999–2007	2012–2016	1999–2007	2012–2016
No. of obs.	45,737	48,499	45,737	48,499
Adj. R^2	0.508	0.594	0.514	0.598

may face especially high-interest rates on future loans or be unable to secure credit. Moreover, borrowers without access to alternative transportation may be unable to commute to their workplaces. If this is the case, then the total realized cost described in this study only captures a fraction of the costs incurred.

VI. Conclusion

While several studies have examined the economic impacts of the opioid epidemic (e.g., increases in mortality and medical expenses, and decreases in labor participation and productivity), this is the first article to examine the epidemic's effects on household finance. Specifically, I use new data to explore links between opioid abuse and loan performance and origination terms.

Using a sample of individual auto loans matched with county-level data on drug-related deaths, I examine the relation between the opioid epidemic and auto lending and find evidence that opioid abuse is an empirically relevant explanation for higher loan default rates. I identify these results through a natural experiment involving the supply of an opioid substitute: recreational marijuana. I find that states that implement laws allowing dispensaries to sell marijuana for recreational use experience *declines* in both drug-related death rates and loan default rates. While the mechanism underlying loan defaults is unobserved, studies on the intertemporal choices of opioid-dependent patients show that these individuals tend to choose more immediate rewards even if the rewards are smaller (Madden et al. (1997), Kirby et al. (1999), Bernheim and Rangel (2004), Cutler and Glaeser (2005), and Gul and Pesendorfer (2007)). Such choices are likely to be unconducive to servicing consumer debt.

The results of this study suggest that asymmetric information in the subprime loan market leads to an overall increase in loan costs in opioid-afflicted regions. The results in Tables 5 and 6 suggest that lenders find it more difficult to assess the creditworthiness of borrowers in areas strongly affected by the opioid crisis. If lenders cannot predict which borrowers are at risk of using opioids, then the 20 million borrowers in markets with high opioid use will pay more for their loans, as shown in Table 7. This, together with the significantly higher default rates in these areas, results in borrowers paying significantly more for access to consumer credit. This is consistent with a spillover effect on consumer finance attributable to the opioid epidemic.

This article presents initial evidence that the opioid epidemic is significantly affecting a financial market. Given the magnitude of this effect, more work on the opioid epidemic's market effects is warranted. Two promising avenues for future research are i) loan securitization and ii) the impact of the opioid epidemic on the supply of consumer finance in afflicted areas.

Supplementary Material

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EXHIBIT 195

The Opioid Epidemic and Consumer Credit Supply: Evidence from Credit Cards*

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Abstract

Using a unique dataset of unsolicited credit card offer mailings by banks to consumers, we investigate how opioid abuse affects consumer credit supply. To identify causal effects, we employ instrumental variables, propensity score matching, and contiguous counties techniques, and control for a battery of demand and supply factors and fixed effects. We find that banks *contract* credit supply to consumers in counties highly exposed to opioid abuse by offering higher interest rates, lower credit card limits, and fewer rewards and reducing credit offers overall. Further analyses using the supervisory Federal Reserve Y-14M credit card dataset confirm these effects. What is more, the credit contraction disproportionately impacts riskier consumers, minorities (particularly Blacks), low income, and younger individuals. Our examination of various state-level anti-opioid abuse legislation shows that *opioid supply-oriented laws* are somewhat helpful in curbing opioid overdoses or mitigating the credit supply contraction, but demand-oriented laws are not. Finally, we uncover that the opioid abuse-induced credit contraction has important social welfare implications: local consumer spending significantly declines in the highly-affected areas.

JEL Codes: G01, G28, D10, D12, E58
Keywords: Opioid Epidemic, Household Finance, Credit Supply, Spending, Risk

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1 Introduction

For the past two and a half decades, the U.S. has suffered tremendously from one of the largest and deadliest public health crises — the opioid epidemic, with no solution yet in sight.[1] Over a million people died from overdoses involving opioids from 1999 to present (Figure 1),[2] another two million are currently struggling with opioid-related disorders.[3] Behind every statistic is a real person, a real family, and a real community suffering. It is a crisis that demands attention and action. The crisis has worsened over time, affecting an increasingly large demographic strata of the population, particularly minorities, working-age and young men, and the less educated (Figure 2). Not surprisingly, there is now growing evidence linking opioid abuse to reduced productive economic activities such as reduced labor force participation and increased unemployment.[4]

The reduction in productive economic activities associated with opioid abuse necessarily leads to consumer income losses and income volatility, two important determining factors of loan repayment and credit access. Opioid abusers who use credit to sustain their addiction face additional default risk due to increases in expenditures related to their addiction and unsound decisions due to "reinforcer pathology." Lenders, however, cannot directly detect individuals vulnerable to opioid addiction and/or those who would use the financing to sustain their addiction. The social stigma associated with opioid addictions exacerbates information asymmetry as individuals are afraid to seek help for their addiction for fear of revealing their addiction history. Lenders may also incur increased costs for screening and ongoing monitoring in affected areas. As a result, lenders may abstain from and/or curtail credit in harder-hit opioid areas to reduce exposure.

This paper investigates the spillover effects of the opioid epidemic on consumer credit supply using the credit card market as a laboratory. The credit card market is more likely used by the opioid-impacted population as it does not require collateral. The credit card market has over 175

[1] The other major health crisis is the recent global COVID-19 outbreak with also over one million deaths, but its effects were largely contained by the quick vaccine development and implementation.

[2] see, among others, Quinones (2015), and the Centers for Disease Control and Prevention (CDC) 2021, https://www.cdc.gov/nchs/pressroom/nchs_press_releases_2021_20211117.htm.

[3] Https://www.cdc.gov/opioids/basics/epidemic.html.

[4] See Case and Deaton (2015), Van Hasselt, Keyes, Bray and Miller (2015), Krueger (2017), Harris, Kesslery, Murray and Glenn (2019), Park and Powell (2021), Aliprantis, Lee and Schweitzer (2020), and Ouimet, Simintzi and Ye (2020).

million users in the U.S. and spans over 80% of the consumers.[5] Credit cards are also significant determinants of bank risk, partly due to their unsecured nature, inducing significant loss given default. Sudden and large rises in consumer defaults can deteriorate banks' portfolio quality and can contribute to widespread financial distress and financial crises.

We construct our individual credit supply variables using bank credit card mail offers data from the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File (Mintel/TransUnion Match File). Such credit offers are a direct informative measure of consumer credit supply by the banks, helping circumvent challenges of disentangling supply from demand forces that plague other studies (e.g., Han, Keys and Li (2018); Dettling and Hsu (2021)). We focus on the years between 2010 and 2019 so that our results are not contaminated by the implementation of the Credit Card Accountability Responsibility and Disclosure (CARD) Act of 2009, the Great Recession over 2007-2009, or the COVID-19 pandemic from 2020 onward. The years covered in our analyses mark the last two waves of the opioid epidemic, that recorded perhaps the most dangerous abuse using both prescription and illicit opioids.[6]

To measure the severity of the opioid crisis, we follow the literature reviewed in the next section and construct, at the county level, exposure measures based on confidential opioid-related death rates collected from the CDC/National Center for Health Statistics (NCHS).[7] Consumers' drug abuse is then measured via the severity of the opioid crisis in their county of residence. This measurement choice likely replicates the financial institutions' credit risk management models. That is, in the absence of perfect information on the affected individuals, financial institutions' credit models resort to instead capturing average opioid risk treatment based on the crisis intensity in the individuals' local market of residence.[8] Such policies can create negative social externalities.

[5] See https://www.federalreserve.gov/publications/files/2018-report-economic-well-being-us-households-201905.pdf or https://files.consumerfinance.gov/f/documents/cfpb_consumer-credit-card-market-report_2021.pdf.

[6] The first opioid wave involves prescription opioid deaths from the 1990s to 2009; second wave marks the rise in heroin deaths from 2010-2012; and the third wave marks the rise in the synthetic opioid deaths, particularly from illicitly manufactured fentanyl.

[7] National Center for Health Statistics, 2020. All-County Mortality Micro Data, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program.

[8] Other studies on local treatments and/or bank policies in the presence of borrower information asymmetry include Sufi (2007); Karlan and Zinman (2009); Berger, Espinosa-Vega, Frame and Miller (2011); DeFusco, Tang and Yannelis (2022); and Mian, Sufi and Khoshkhou (2023).

Our main findings are as follows. Lenders reduce credit supply significantly in areas with higher exposure to the opioid crisis by charging higher interest rates (1.2 percentage points higher) and offering much smaller credit limits (17% decrease), particularly to consumers with higher perceived credit risk (based on credit score, past delinquency, and derogatory filings, etc.), minorities, low income, and younger consumers in those areas. Furthermore, banks offer less credit card rewards (4% decrease) and are also much less likely (10% decrease) to solicit consumers for credit cards in areas highly exposed to the opioid crisis. Consistent with these credit supply contractions, our analyses of loan performance suggest that lenders decrease credit supply because of increased credit risk in these areas. Specifically, consumers in counties with higher exposure to the opioid crisis experience more days past due, higher probability of default on credit cards, make reduced payments, or have lower credit scores. Additional studies of bank balance sheet indicate that single-branch banks with presence in the more exposed areas experience higher non-performing loans across credit cards and the unsecured consumer sector. We further conduct a welfare analysis by investigating effects of the opioid crisis on consumer consumption as in other household finance literature (e.g., Mian and Sufi (2012); Mian, Rao and Sufi (2013); Mian, Sufi and Khoshkhou (2023); Mian, Sufi and Verner (2020)). We demonstrate that the credit policy adopted by banks vis-à-vis the opioid abuse crisis has had severe externalities: the reduced credit supply has led to significant declines in consumer local consumption, i.e., 4.3% as captured by total purchases per county population. Finally, our analyses of the various state-level anti-opioid regulations targeting both the supply and the demand for opioids reveal that only the *supply-oriented laws* show some positive effects on curbing the opioid prescription and death rates or reversing the credit contraction in affected areas. The *demand-oriented laws* often have no positive or even reverse effects.

The identification challenge here and a common concern in the literature is that these negative credit consequences and the opioid exposure may both arise from negative economic conditions that are not observed or controlled for, i.e., the so-called ”deaths of despair” (Ruhm (2019)). To mitigate this concern and isolate the relations studied, we first saturate our models with numerous demand and supply factors and fixed effects by taking advantage of the richness of our datasets. Then, to more formally alleviate the endogeneity concerns and identify causal effects of the opioid crisis, we employ an instrumental variable (IV) methodology by exploiting supply shocks in opioid marketing and distribution. Our approach relies on the observation that prescription opioids are involved in at least 40% of all opioid overdoses in the U.S. (e.g., Hadland, Krieger and Marshall (2017)) and the majority of illegitimate drug users start taking opioids prescribed by their physicians, even if many later progress to illicit opioids (e.g., Kaestner and Engy (2019); Coffin, Rowe, Oman, Sinchek, Santos, Faul, Bagnulo, Mohamed and Vittinghoff (2020)). It is also motivated by the findings in recent economic literature that emphasize the lack of strong correlation between economic activities and opioid abuse (e.g., Ruhm (2019); Currie, Jin and Schnell (2019); Currie and Schwandt (2021); McGranahan, Parker et al. (2021)).

Our main instrument captures the scale of the pharmaceutical industry's opioid marketing to physicians, particularly the number of physicians who receive non-research marketing visits and payments per 1,000 population in a county. This variable is available annually starting in 2013, when the Physician Payments Sunshine Act came into effect. Hadland, Krieger and Marshall (2017) show that pharmaceutical companies invest tens of millions of dollars annually in direct-to-physician marketing of opioids, while Hadland, Rivera-Aguirre, Marshall and Cerda (2019) show that opioid prescriptions and mortality from opioid overdoses went up with the increase in the number of physicians receiving marketing compensation for opioids. This opioid marketing to physicians is unlikely correlated with the consumer or bank credit behavior other than through the increased risks brought on by the opioid abuse itself.

Our results are robust to using alternative instruments based on marketing payments made by the pharmaceutical companies to physicians or using the aggressive pre-sample marketing of OxyContin by Purdue Pharma between 1997 and 2002, after its market introduction in 1996. Regarding the latter, Purdue increased its marketing and promotion budget by almost 800% over 1997-2002, marketing the drug aggressively to physicians and pharmacies under the slogan "The One to Start With and the One to Stay With," and turning OxyContin into the most abused prescription opioid by 2004 (e.g., Van Zee (2009); Cornaggia, Hund, Nguyen and Ye (2021)). The growth rates in the locally received OxyContin pills in these early periods were shown to directly impact the rate of opioid prescription by doctors as well as elevated mortality in the later periods, but has little direct correlation with either the financial situation of people or bank lending choices in the affected areas (e.g., Aliprantis, Lee and Schweitzer (2020), Alpert, Evans, Lieber and Powell

(2022); Currie and Schwandt (2021)).

We also conduct numerous other robustness analyses to address identification and/or rule out alternative explanations: use alternative definitions for the opioid crisis intensity such as opioid prescription and illicit deaths rates or use actual opioid prescription rates; employ univariate and regression analyses using propensity score matching where we match the high-quartile opioid deaths counties to other non-treated counties by year and county characteristics using several matching techniques; use contiguous counties to high opioid death counties only; control for even more local market factors; use multiple death causes instead of underlying causes; exclude Florida, which was an epicenter for the opioid crisis distribution; exclude zero-death counties; reconfirm results also using a completely different dataset based on credit card supervisory data; and conduct different cross-sectional tests by consumer characteristics. All of our approaches, despite sometimes covering somewhat different sample periods due to data availability, consistently show statistically as well as economically significant adverse effects on consumer credit risk and credit supply caused by opioid abuse. Additionally, we also uncover evidence that although the opioid crisis had affected the overall population, the negative credit supply effects are larger for riskier consumers, minorities particularly African American, low income, and younger consumers.

Finally, we analyze the effectiveness of recent laws and regulations about opioid abuse. These laws have only been studied one at a time even though they often overlap. By contrast, we run a horse race and test six different opioid-related laws at the state level in cross-sectional tests or sample splits: those laws that target *opioid supply* including the "Opioid Prescription Limiting Law", the mandatory "Prescription Drug Monitoring Program (PDMP) Law", and the "Triplicate Prescription Law;" and those that affect *opioid demand* or users including the "Naloxone Law," the "Good Samaritan Law," and the "Medical Marijuana Permitting Law." We find strong and positive effects from the *opioid supply-oriented laws* in reducing opioid prescriptions and opioid prescription death rates, but limited effects in reducing illicit opioid death rates. Not surprisingly, as a result, we find positive effects from the laws that target opioid supply in mitigating credit supply reduction by banks to consumers. In contrast, the *opioid demand-oriented laws* have little beneficial or even unfavorable effects on both opioid deaths and consumer credit supply.

Understanding the opioid crisis effects on consumer markets and the effectiveness of recent laws and regulations may be helpful for policymakers and financial institutions to devise effective strategies to combat the crisis and allocate resources where they are needed most. Results in this study may help inspire targeted interventions to minimize the crisis financial and social impact while safeguarding the well-being of consumers and their communities.

The rest of the paper is organized as follows. We discuss the related literature in Section 2. Section 3 presents two simple toy models to illustrate how opioid abuse affects an individual's decision to make loan payments and a lender's decision on loan terms, respectively. The datasets used for our analyses are described in Section 4. Our empirical strategy is described in Section 5. Section 6 presents our results. Section 7 concludes.

2 Literature Review

This paper relates to several strands of literature. First and foremost, there is a large literature in the medical as well as economics fields that studies the determinants of opioid abuse. See Currie and Schwandt (2021) and Maclean, Mallatt, Ruhm and Simon (2020) for a review of this literature. The studies generally conclude that neither contemporaneous nor long-term economic conditions can explain a large part of the opioid epidemic. Instead, the opioids spread in the country results from three key factors: a change in beliefs among physicians that pain was not treated adequately; aggressive marketing by pharmaceuticals who made the claim that the new generation of opioids may have been effective at treating pain with little risk of addiction; and finally, until recently, there was little public oversight of opioid prescriptions by doctors. This literature inspires our choice of instruments as we alluded to in the Introduction.

There also exists a relatively large literature studying the economic impact of the opioid epidemic. For example, several papers find a detrimental impact of opioid abuse on employee productivity and labor market participation (e.g., Van Hasselt, Keyes, Bray and Miller (2015), Krueger (2017); Aliprantis, Lee and Schweitzer (2020); Harris, Kesslery, Murray and Glenn (2019); and Park and Powell (2021)). Focusing on firm outcomes, Ouimet, Simintzi and Ye (2020) find that firm growth is negatively affected by the exposure to opioid-affected areas as the eroding labor market conditions force firms to invest more in technology and substitute capital for the relatively scarcer labor. Rietveld and Patel (2021) and Sumell (2020) find negative impacts on new small firm formation and survival. Finally, Langford (2021) finds that opioid use reduces net firm entry and results in a shift in industrial composition due to labor supply issues in the affected areas, driving long-term stagnation and fiscal difficulties. This literature serves as evidence of the channels through which the opioid crisis affects the consumer markets we study here.

By comparison, the literature on the effects of the opioid epidemic on finance is small. Cornaggia, Hund, Nguyen and Ye (2021) find negative impacts of the local opioid abuse on municipal bonds, which impede municipalities' ability to provide the necessary public services and infrastructure. Custodio, Cvijanovic and Wiedemann (2021) find lower housing values in areas more affected by the opioid epidemic, which are mitigated by the passage of state laws aimed at curbing opioid abuse. D'Lima and Thibodeau (2022) find that house price changes around opioid dispensaries are negatively associated with the quantity of opioids dispensed. Jansen (2019) uses data on subprime automotive loans acquired from a U.S. lender and documents an increase in consumer defaults in subprime auto loans as a result of local market opioid abuse problems. Lastly, Li and Yue (2022) study the spillover effects of the opioid epidemic through the banking network and find a negative link between local opioid supply and deposit growth at both the county and bank level. We add to this literature by providing the first study of the credit supply and consumption consequences of the local opioid abuse using the credit card market as a laboratory.

3 Simple Models of Opioid Abuse and Consumer Finance

We present two simple models to illustrate how opioid abuse affects an individual's decision to make loan payments and a lender's decision on loan terms, respectively.

3.1 Opioid Abuse and Consumer Loan Repayment Decision

Consider a static model where an individual, after receiving his income and facing necessary consumption such as basic food and rents denoted by c, decides whether to make a loan payment $(1 + r) * b$. The term r represents the interest on the loan b. His income is a product of his employment probability e and the wage w he is able to command. If the individual is risk neutral, then the decision is simply captured by his net gain from payment,

$$e * w - c - (1 + r) * b. \tag{1}$$

The individual will only make the payment if the term in equation (1) is nonnegative. Let ϕ denote the repayment decision, then we have $\phi = 1$, if $e * w - c \geq (1 + r)b$, and $\phi = 0$ otherwise.[9]

For a highly dependent opioid user, the drug cost increases his necessary consumption c. Moreover, according to Bickel, Athamneh, Snider, Craft, DeHart, Kaplan and Basso (2020), the addiction itself can lead to other unsound decisions due to a "reinforcer pathology" that increases the individuals' overvaluation of short-term tangible rewards and undervaluation of long-term negative consequences, in addition to impulsivity, nonconformity to rules, and cognitive issues. All these make him less employable and reduce the wages he can command (see the literature review), i.e., both e and w are likely smaller. Last, as we discuss next in lenders' decisions, the person may also face higher interest rate r. If the person is not addicted to opioids but lives in an area heavily exposed to the epidemic, drug cost is no longer an issue, but he may still receive a lower income and be charged a higher interest rate because of the spillover effect due to the information problem employers and lenders face (see our discussion in the next subsection).

All of these factors suggest that a person in an area heavily exposed to opioids is more at risk of defaulting on his loan obligations and thus a potentially "riskier" credit borrower. The one countering force in our simple model is if the person also borrows less voluntarily or due to credit rationing, that is, b is smaller.[10]

When we aggregate individual behavior to, for example, the county level, the discussion above suggests that the areas with high-opioid exposure will likely have more consumers default on their loan obligations. An immediate implication is that banks with higher operational exposure to these areas will have riskier consumer loan portfolios.

[9] For simplicity here, we rule out partial loan payment cases.

[10] In dynamic models where consumers may need to borrow in many periods and lenders can impose punishment on those who default, drug addicts, having large discount factor, will also be less affected by the punishment.

3.2 Opioid Abuse and Consumer Credit Lending Decision

A lender decides the loan amount b and the interest rate r, and his payoff is as follows,

$$\phi * (1 + r) * b - (1 + r_d) * b, \tag{2}$$

assuming that the per-unit cost of funding is r_d and the loan is noncollateralized. If the lender observes the repayment probabilities ϕ, then, in a competitive environment/under a zero profit condition, he sets the interest rate $r = (1 + r_d)/\phi - 1$, which decreases with ϕ.

The challenge posed by the opioid abuse to a lender is information asymmetry. The lender will have to make inferences based on public data such as aggregate opioid-related drug overdoses. Consider two individuals living in areas with different exposures to the opioid abuse crisis, which, in our setup, can be captured by their repayment probability ϕ_1 and ϕ_2, and $\phi_1 < \phi_2$. Everything else the same and absent of other signals, the lender will approximate each individual's repayment probability with the average payment probability of the area that he resides in. It then follows that individual 1 will be charged a higher interest rate than individual 2 despite that the two look similar in all other aspects.[11]

The discussion so far illustrates why lenders would charge individuals in high opioid exposure areas higher interest rates for a given loan amount. Turning to the lenders' loan making decision, according to Stiglitz and Weiss (1981), credit rationing can arise under certain conditions with information asymmetry. For example, Consider an environment where individuals have different probability distributions of income y, and different addiction or exposure to opioids captured by θ, $F(y, \theta)$, and they need to borrow a fixed amount b. Additionally, there is a fixed cost d associated with each defaulted loan for the lender. This problem maps into that in Stiglitz and Weiss (1981) (see *Alternative Sufficient Conditions for Credit Rationing*, pp. 399), where the expected revenue for lenders as a function of the interest rate charged will be hump shaped due to information asymmetry provided that a small change/rise in interest rate induces a large change/worsening in

[11] Even in perfect information environment, opioid addiction differs from other consumption by lowering abusers' productivity, life time earnings, health conditions, and early deaths, and thus reduce debt borrowing. We thank Thomas Flanagan for the point.

applicant pool. As a result, lenders will not lend if the perceived opioid exposure exceeds certain threshold. In other words, credit rationing arises in those cases.

To summarize, our discussions indicate that individuals in the high-opioid crisis exposure areas are at higher risk of default, that banks operating in those harder-hit areas have riskier consumer loan portfolios, and that lenders are likely to lend less to individuals in those areas if at all and/or charge them higher interest rates to reduce credit risk. These are the hypotheses that we will test in the next sections.

4 Data Sources and Data Collection

We use three types of data: information on opioid crisis intensity and marketing practices; information on consumer credit supply, and local economic and demographic information. Data measuring opioid crisis intensity and marketing practices are at the county by year level. Data measuring credit offers are at the individual/offer by year-month level. In additional analyses testing potential underlying channels for our main results, we use data on consumer loan performance at bank by county by year-month (or county by year-month) level, and bank loan portfolio risk at the bank by year-quarter level.

4.1 Opioid Mortality and Marketing Practices

4.1.1 Opioid Mortality Rates

We obtain restricted-use mortality data from the CDC (the All-County Mortality Micro Data; NCHS, 2020). These data provide the precise cause of every death in every county and hence allow us to accurately identify all opioid-related deaths by location. From this data, we construct the number of opioid-related deaths scaled by the county's population (in 10K) in each year. In some additional analyses, we also differentiate between prescription- and illicit-drugs-related deaths. Prescription-deaths capture the illegal diversion of legally manufactured prescription opioids for non-medical use and unfortunate externalities of medical use of the prescription opioids, while illicit deaths are related to the use of "street drugs," such as heroin or illicitly manufactured fentanyl.[12] A high opioid mortality rate is indicative of a high addiction rate, and public officials also rely on such mortality rates as one of the best metrics to monitor the opioid crisis across regions.[13]

We focus on opioid mortality as our primary measure of opioid abuse. In addition to being comprehensive and comparable across counties, this measurement, in comparison to opioid prescription rates often used in the literature, better captures the progression in the opioid epidemic since 2010, the period of our analyses, that is, the rise in illicit opioid drug abuse.

We supplement the mortality opioid data with opioid prescriptions in some additional analyses. We use the opioid prescribing rates per capita, per county each year derived from the CDC public data.[14] The CDC's prescribing data originates in the IQVIA Transactional Data Warehouse (TDW), which is based on a sample of approximately 59,000 non-hospital retail pharmacies. These pharmacies dispense about 90% of all retail prescriptions in the country. Several prior studies find that opioid prescriptions are a good proxy for opioid addiction and abuse and/or find a positive correlation between rates of prescriptions and subsequent abuse in an area (e.g., Schnell (2019); Ouimet, Simintzi and Ye (2020)).

4.1.2 Opioid Distribution and Marketing

We construct the main opioid marketing instrument based on the non-research transfer marketing information from the pharmaceutical industry to physicians following Hadland, Rivera-Aguirre, Marshall and Cerda (2019). Specifically, we collect data on the number of physicians being marketed opioids by their practice county and by year from 2013 onward from the Centers for Medicare and Medicaid Services Open Payments database.[15]

[12] To construct opioid-related deaths, we follow Cornaggia, Hund, Nguyen and Ye (2021) (Appendix A.1) by identifying drug-related deaths first, i.e., those with underlying ICD-10 cause codes X40-X44 (accidental poisoning), X60-X64 (intentional poisoning), X85 (homicide), and Y10-Y14 (undetermined intent). We then narrow to causes related to opioids, i.e., those with a contributing cause code of T40.0 (opium), T40.1 (heroin), T40.2-T40.3 (prescription), and T40.4 (synthetic opioids, primarily fentanyl). Finally, we use the multiple cause portion of the death certificate and assign to Illicit category all deaths that have opium (T40.0), heroin (T40.1), and synthetic opioids (T40.4) causes and assign the rest (T40.2–T40.3) to the prescription category.

[13] The death data used here are superior to the public CDC data on opioid deaths as the public data omit counties with fewer than 10 drug-poisoning deaths, thus leaving out nearly half the population. This left-tail censoring also creates time series problems as some counties were reported in some years but not others.

[14] See https://www.cdc.gov/drugoverdose/maps/rxrate-maps.html.

[15] Centers for Medicare & Medicaid Services. Open Payments dataset, https://www.cms.gov/openpayments/explore-the-data/dataset-downloads.html, accessed March 12 2022. The database is mandated by the Physician Payments Sunshine Act.

For robustness test, we construct another instrument based on non-research transfer marketing payments from the pharmaceutical industry to physicians again following Hadland, Rivera-Aguirre, Marshall and Cerda (2019). We also construct an opioid marketing instrument based on the aggressiveness of Purdue Pharma's marketing of OxyContin in the pre-crisis era. We hand collect data on all Oxycodone pills distributed to each zip code each year from archived Drug Enforcement Administration (DEA) reports. We then aggregate the data to the county level and compute the county growth rate of Oxycodone pills distributed between 1997 (the year after OxyContin was introduced) and 2002.

4.2 Consumer Credit Supply and Other Consumer Finance Information

4.2.1 Consumer Credit Supply

For credit supply, we use the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File (Mintel/TransUnion Match File) proprietary survey of U.S. consumers merged with TransUnion consumer credit bureau characteristics over 2010 to 2019, which was also de-personalized after the merging process. Each month, Mintel selects about 4,000 consumers from a pool of one million consumers that Mintel acquired from a large survey service provider. Mintel gives each consumer a set of envelopes and asks the consumer to put mail from an array of sectors, including credit offers, into the envelopes and send them back to Mintel weekly during the participating month. Once receiving the envelopes, Mintel records almost all information from the credit offers, whether a consumer receives an offer, and credit terms of the contracts offered, such as interest rates and credit limits.

The Mintel credit offers monthly data were merged with credit bureau information on the consumers from TransUnion and subsequently anonymized to protect the confidentiality of the survey participants. The combined data are the Mintel/TransUnion Match file that we use in our analysis.[16] We focus on credit card offers, which have the best data coverage, and "banks" that are filtered using lender names containing keywords such as "bank," "bancorp," "banco," etc. We keep in our analysis only those credit offers that have non-missing APR purchase rates and limits

[16]The merge is conducted by the vendor for the anonymized file, and we only work with the anonymized file.

for the offers, as well as non-missing consumer characteristics. The consumer credit score and score ranges used in this analysis are from the Mintel/TransUnion Match file.

4.2.2 Other Supplementary Data

Consumer Credit Performance For consumer credit quality/performance, we use the Federal Reserve FR Y-14M regulatory report, collected by the Board of Governors of the Federal Reserve System in pursuance of the annual comprehensive capital analysis and review (CCAR) of large U.S. bank holding companies, as required by the 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act. The monthly report for each account originated and managed by the reporting banks, contains detailed information on borrower characteristics, credit card days past due, loan probability of default (PD), payments, terms, and also purchases. This credit card dataset is very large, having more than 500 million observations per month. We employ a 0.1% random loan-level sample for existing credit card accounts (having being in existence for at least 12 months) that are nationally representative. We work with existing accounts so that we observe their credit behavior and quality as well as their spending patterns.

The banks in the FR Y-14M report dataset are dominant players in the credit cards market, holding a combined market share of over 75% as of December 2019, so the accounts are likely representative of the market as a whole.[17] To remove reporting errors, we exclude from our sample loans that are subject to SOP 03-03 accounting (i.e., it is purchased credit-impaired loan or a purchased loan with evidence of deteriorating credit quality since origination); loans with erroneous credit scores, credit scores are missing or outside the range of 300 to 900; loans with missing or credit limit or APR; and accounts that are deactivated and/or inactive.

Bank-Level Consumer Portfolio Data The quarterly regulatory Consolidated Reports of Condition and Income (Call Reports) help extend our study to bank level. Call Reports are provided by the Federal Financial Institutions Examination Council (FFIEC) Central Data Repository's Public Data Distribution. Every national bank, state member bank, and insured nonmember bank is required by the FFIEC to file a Call Report as of the close of business on the last day of each cal-

[17] This is based on market share assessments of these banks' balances in the FR Y-14M compared to the credit card balances in the Federal Reserve Bank of New York Quarterly Report on Household Debt and Credit as of 2019:Q4 available at https://www.newyorkfed.org/medialibrary/interactives/householdcredit/data.

endar quarter, i.e., the report date. Call Reports provide information on the institution's balance sheet, income statement, and a narrative explaining elements of the financial statements. We focus on nonperforming loans ratios for credit cards and the unsecured consumer segment.

County-Level Expenditure and Other Economic Data We proxy county level consumption by aggregating domestic credit card purchases provided by the FR Y-14M data discussed above to the bank level by county and by year-month. We obtain similar results using data aggregated at the county by year-month level (shown in Appendix Table A6).

We obtain average income from the Bureau of Economic Analysis (BEA), unemployment rate from Bureau of Labor Statistics (BLS), and bank competition in the county measured by the Herfindahl-Hirschman Index (HHI) of deposits based on the FDIC Summary of Deposits data. We obtain additional county demographic information such as population by race, gender, age, educational attainment, and inequality from the U.S. Census Bureau American Community Surveys.

5 Estimation Strategy

We do not observe directly consumers' opioid usage and health status and, therefore, cannot directly test the impact of the opioid usage on credit supply. Instead, we test whether banks are less likely to supply credit or apply more stringent terms to individuals in more opioid-affected areas. However, as mentioned in the Introduction, this approach likely replicates the banks' credit models which also resort to measures of crisis intensity in the individuals' local market of residence to capture risk from the opioid crisis given they face information asymmetry and are unable to (legally) observe and/or target affected individuals. We measure a county's exposure to the opioid crisis by its opioid death rates. For each credit supply variable, we test whether the opioid exposure has any explanatory power in addition to the control variables. The exposure measures are lagged by one year.

Estimating the effects of the opioid crisis on consumers and banks raises endogeneity concerns as common conditions or shocks may drive both the opioid crisis intensity and the credit outcomes. To attenuate these concerns and ensure we identify the causal relationship between opioid epidemic exposure and various consumer credit consequences, we conduct two-stage least square (2SLS) regression analyses that use instrumental variables for the opioid crisis intensity.

Additionally, we introduce an extensive set of control variables that capture heterogeneity in county, consumer, and bank characteristics as relevant in different parts of our analyses. All our controls in all analyses are lagged one period (one year, one quarter, or several months, based on data availability). At the county level, we saturate the model with 11 different controls, comprising indicators of local economic conditions, including median income, income inequality (gini), and unemployment rate, as well as a variety of demographic characteristics such as population density, race, gender, age, and educational attainment composition. We also control for bank's local market concentration (HHI of deposits), to account for potential uneven access to banking services and credit terms. Finally, we include combinations of state, bank, and time fixed effects, pertinent to each dataset and analysis, to account for additional time-varying and unobserved characteristics.

5.1 Instrumental Variable First-Stage Specification

In the first stage across all our analyses, we regress the opioid crisis exposure variable, opioid death rates or opioid prescription rates measured either continuously or as a dummy indicating whether the county is in the nation's top 50 percentile, on the instrument and the same set of controls as those included in the second stage for the corresponding analysis. The general first-stage specification is as follows:

$$\begin{aligned} OpioidExp_{c,t-1} = \gamma_0 + \gamma_1 IV_{c,t-1} + \gamma_2 CountyControls_{s,t-1} + \gamma_3 OtherFE \\ + \gamma_4 OtherConsumer/BankControls_{i,c,t-1} + \mu_{c,t-1}, \end{aligned} \tag{3}$$

where i indicates individual or bank, c county, and t time.

As discussed in Section 4.1.2, the main instrumental variable (IV) we use is *MKTDoctors/1000Pop*, the number of doctors receiving opioid marketing payments from pharmaceutical companies per 1,000 population per year in the main analyses, which is time variant, covering 2013 onward. In robustness tests, we also use as additional IV, *MKTPayments/1000Pop*, the number of non-research marketing payments made to doctors by pharmaceutical companies per 1,000 population per year, also time variant. Finally, we use as an alternative IV, *Purdue MKT (OxyContin Growth '97-'02)*, the growth rate in each county in the distribution of OxyContin pills between 1997 and 2002 for robustness test, which is time invariant.

5.2 Second-Stage Specifications

We next discuss the econometric models for the IV second stage credit outcome analyses. We use $\widehat{OpioidExp}_{c,t-1}$ to denote the predicted value of $OpioidExp_{c,t-1}$ obtained from the first stage.

5.2.1 Consumer Credit Supply

The credit supply Mintel/TransUnion Match file data are at the credit offer by year-month level. Our outcome variables are the bank's willingness to lend to different categories of consumers reflected in the likelihood of unsolicited credit card offers, as well as the credit terms applied to those offers captured by $Y_{i,c,t}$ for consumer i in local market (county) c at time (year-month) t:

$$Y_{i,c,t} = \delta_0 + \delta_1 \widehat{OpioidExp}_{c,t-1} + \delta_2 ConsumerControls_{i,t-1} + \delta_3 CountyControls_{c,t-1} + FE + \xi_{i,c,t}, \tag{4}$$

where $Y_{i,c,t}$ refers to one of the main credit card offer terms such as the $RateSpread$, the difference between the offered credit card APR and one-month Treasury bill, or $Ln(Limit)$, the natural log of the offered credit card limit. In additional analyses, we also analyze *Reward/Promotion*, a binary indicating whether a credit card offer includes rewards and/or promotions, and *Card Offer*, a binary indicating a consumer is receiving a credit card offer in a particular month or not.

Consumer-level controls (measured as of 2-3 months prior to the credit offer) include a very rich set of financial and demographic characteristics. These include credit scores range dummies ($<$580 (left out category), [580,660), [660,720), [720,800), and $\geq$800), the natural log of consumer income, binaries for recent as well as other past delinquency (90 days or more past due) on any of the credits held, other derogatory information such as foreclosures, past bankruptcy filings, previous other credit cards, previous high credit card utilization (80% or higher), as well as the natural log of the number of recent credit inquiries (proxying for consumer credit demand). We also include age range binaries ($<$25 (left out category), [25,44), [45,64), and $\geq$65) to account for potential nonlinearity in credit supply, indicators for homeowner, married, no children, education level (less than college (left out category), having completed some college, college, or higher than college education), and indicators for non-minority or white consumers. Finally, we include all county-level controls (lagged one period) discussed above.

We also include a battery of fixed effects including lender by year-month, state by year-month, lender by state, as well as lender, state, and year-month fixed effects, whenever possible, to capture lender health and business models and practices over time, local market changes over time, bank strategies across states, as well as unobserved factors at the lender, state, or year-month levels. Standard errors are double-clustered at the marketing campaign and year-month level. [18,19]

5.2.2 Other Consumer Finance Outcomes

Consumer Credit Performance For consumer credit performance, we use the FR Y-14M data, where the unit of observation is bank by county by year-month or county by year-month. The outcome variables for consumer credit performance are: average days past due, probability of default (PD), average payment, and average consumer credit score.

Our estimation specification of consumer credit performance for local market (county) c at time t is as follows:

$$Y_{c,t} = \beta_0 + \beta_1 \widehat{OpioidExp}_{c,t-1} + \beta_2 CountyControls_{c,t-1} + FE + \epsilon_{c,t}, \tag{5}$$

where $Y_{c,t}$ is one of the outcome variables. We include the same county by year information (also lagged one period) and fixed effects as those in the credit supply analyses. Standard errors are clustered at the county level.

Bank-Level Consumer Portfolio Risk For bank-level consumer credit risk, we use the regulatory Call Reports data, where the unit of observation is bank by year-quarter. The opioid crisis variables and the instruments here are weighted averages of a bank's exposure to the opioid death rates or opioid marketing practices, across all counties in which the bank operates, using the pro-

[18] Note that we are able to include lender by year-month fixed effects for all our credit card terms analyses as all credit offers are associated with a lender, but not for the regressions looking at the likelihood of getting a credit card offer as not all consumers get an offer from a lender.

[19] A unique strength of the Mintel/TranUnion Match data is that it reports all consumers and their characteristics regardless of whether they received a credit card offer in a particular month, allowing us to study the credit supply at the extensive margin in addition to the intensive margin based on credit card terms for those who did receive an offer.

portion of bank branches in the county as weight.[20] The first stage is modeled as per equation (3) above. The outcome variables here are the bank's non-performing loans for credit card debt or other unsecured consumer loans relative to bank total assets. Specifically, our estimation specification of bank consumer loan portfolio performance for a bank i at time (year-quarter) t follows:

$$Y_{i,t} = \psi_0 + \psi_1 \widehat{OpioidExp}_{i,t-1} + \psi_2 BankControls_{i,t-1} + \psi_3 CountyControls_{c,t-1} \psi_4 FE + \zeta_{i,t}, \quad (6)$$

where $Y_{i,t}$ refers to proxies of bank portfolio performance. Controls for bank characteristics (lagged one period) include tier 1 capital ratio, liquidity ratio, bank profitability, the natural log of bank total assets, and bank age. We also include bank weighted exposures to various economic and demographic county conditions other than the opioid crisis as those used in the credit supply analyses but aggregated at the bank level, based on the shares of bank branches in each county of operation. Standard errors are clustered at the bank level.

5.2.3 Consumer Consumption

For local consumer consumption, we aggregate the Y-14M domestic credit card purchases by bank by county by year-month or county by year-month. Let $Y_{c,t}$ denote the consumer consumption for county c at time t, the estimation equation is as follows,

$$Y_{c,t} = \theta_0 + \theta_1 \widehat{OpioidExp}_{c,t-1} + \theta_2 CountyControls_{c,t-1} + FE + \eta_{c,t}, \quad (7)$$

where the county level controls and fixed effects are the same as those used in the credit supply specification. Standard errors are clustered at the county level.

6 Empirical Results

6.1 Opioid Abuse Intensity over Time and Space

We measure opioid abuse intensity at the county level by opioid-related death rates per 10k county population. Figure 1 presents the evolution of opioid-related overall deaths and when

[20] Branch deposit data are sourced from the FDIC Summary of Deposits.

split by prescription and illicit drugs over time. The figure captures the two important waves in the crisis: the heroin (mostly illicit) overdose wave from 2010 to 2012; and the synthetic (illicitly manufactured) opioid overdose wave from 2013 onward.

As Figure 1 demonstrates, the overall opioid death rates have been moving up steadily over our sample period, driven by rises in the illicit death rates. By comparison, the prescription death rates remain stable at relatively low levels.[21] As noted by prior research, many of the initial users of prescribed opioids progressed to illicit or illegal opioid use. Later, the availability of relatively cheap and easy to produce street drugs such as fentanyl further fueled the surge in illicit opioid use. As a result, the overall opioid deaths accelerated rapidly from 2013 onward, just as illicit opioid deaths started to register high growth.

Figure 2 illustrates changes in consumer demographics in opioid-related deaths over time. Overall, the opioid crisis appears to be widespread among all races, age groups, genders, and people of various education levels. However, we note a few shifts in these demographics over time. First, while we continue to see a rise in white opioid death rates, the rises in death rates are more significant among minorities, particularly Blacks. Second, while all age groups are affected, there is clearly a higher proportion of working age people, and this proportion is consistently increasing over time. Third, both men and women die from overdoses, but men are disproportionately more affected, and the gap between genders increases more in the last illicit wave. Lastly, among people of various educational attainment who die from opioids, we observe a higher percent of deaths among people with lower levels of education (high school or less) and this gap widens significantly in the last illicit wave. We will exploit these heterogeneities in some of our later credit supply analyses to understand whether certain demographic groups are treated differently than others.

Figures 3 provides the geographical distribution of opioid-related death rates using the confidential CDC mortality data across counties in 2019. The darker red indicates areas with higher deaths or prescription rates. We observe stark regional variation in crisis intensity: areas in the middle and north of the country are less affected than areas in the West and the South.

[21] This is likely due to the decline in opioid prescription rates starting in 2012 resulting from policies aimed at reducing opioid abuse.The Prescription Drug Monitoring Programs (PDMPs) are examples of such policies operated by states and established to collect opioid prescription data and facilitate the sharing of this data between providers and authorities, in an attempt to reduce opioid abuses (e.g., Buchmueller and Carey (2018)). We investigate the effects of the opioid-related laws in later sections.

6.2 Opioid Crisis and Marketing/Medical Practices: The Instrument

The construction of our instruments reflects the argument that the geographic differences in opioid abuse are closely related to the differing medical practice of doctors, as well as the differing marketing practices of pharmaceutical companies. Deteriorating economic conditions, by contrast, are not a significant driver for these differences.[22]

Formally, in order for our instrument of local opioid marketing/medical practices to be valid, it must be correlated with opioid abuse intensity. Figure 4 plots the average *MKT Doctors/1000Pop*, the number of doctors in the county who received marketing visits and payments (from pharmaceutical companies) for opioids per 1,000 county population, over 2013-2019. Figure 5 presents binned scatter plots of our opioid intensity measure, *Opioid Death Rate*, against the instrument after controlling for year and state fixed effects.

The opioid intensity measure show a positive correlation with our instrument, as evidenced by both the geographical distribution as well as the scatter plot, which is striking but not surprising. According to Hadland, Krieger and Marshall (2017) and Hadland, Cerdá, Li, Krieger and Marshall (2018), between 2013 and 2015, approximately 1 in 12 U.S. physicians received opioid-related marketing visits and payments; this proportion was even higher for family physicians, among whom 1 in 5 received opioid-related marketing support. Marketing strategies of the pharmaceutical companies include visits and direct payments to the doctors for promotion of opioids as well as more intense early distribution.

Furthermore, Table 2 Panel A for credit supply below more formally discusses the first-stage estimation results for credit supply using Mintel/TransUnion Match File analyses. Those analyses demonstrate a significant positive association between our measures of opioid abuse intensity and the instrument, after controlling for a wide range of consumer and county characteristics as well as location and time fixed effects. Moreover, the weak identification and underidentification tests suggest that the instrument is relevant and valid.

Having established that our instrument satisfies the relevancy requirement, we now turn to

[22] See Maclean, Mallatt, Ruhm and Simon (2020), Ouimet, Simintzi and Ye (2020), Currie and Schwandt (2021), and papers cited therein for detailed discussion.

discussing whether it also satisfies the exclusion requirement. There are reasons to believe that marketing of opioids should not have a direct causal effect on consumer financial outcomes other than through its influence on the opioid prescriptions and deaths. Neither consumers nor banks have any control over the opioid marketing in their area, nor is it reasonable to assume that they would relocate just to be in an area with more aggressive opioid marketing. Further, more marketing of opioids alone, if it does not lead to any changes in opioid prescriptions and deaths, it is unlikely to affect in any way consumer credit outcomes. Finally, as mentioned in the Introduction, several studies in prior literature show that demand-side factors alone, such as physical pain, depression despair, and social isolation due to poor economies can only explain a small fraction of the increase in opioid use and deaths. Moreover, despite the fact that some economic changes over the past few decades may be related in some cases to opioid overdose deaths, such an impact on the rise in overall opioid use remains modest.[23] We confirm in Table 1 Panel B that there exists little correlation between our instrument, *MKT Doctors/1000Pop*, and various key economic and other county characteristics, including income, unemployment rates, labor force participation rates, house price indices, average consumer credit score, and poverty rates.

6.3 Main Results

6.3.1 Consumer Credit Supply

Our theory in Section 3 suggests that banks reduce their credit card supply to consumers in counties with high opioid crisis intensity. We test this hypothesis by examining both bank credit card offers terms, credit supply at intensive margin, and the likelihood of a consumer receiving credit card offers, credit supply at extensive margin. We use the Mintel/TransUnion Match File, which includes direct measures of bank credit supply as banks send unsolicited offers to the prospective credit card consumers.

Table 1 Panel A presents summary statistics for the key variables used in this part of the analyses. We note that consumers in the study have relatively sound financial profiles, with a mean credit score of 703, and an average income of $57,411. In other details, we find that 21%

[23] See, among many others, Cutler and Glaeser (2021), Alpert, Evans, Lieber and Powell (2022), and papers reviewed in Maclean, Mallatt, Ruhm and Simon (2020).

of the consumers have had at least one 90+ days past due delinquency on any credit product, 7% have filed for bankruptcy in the past, and 2% have had credit card utilization rate at 80% or higher in the past. Demographically, the average consumer is 50 years old, 75% of consumers are homeowners, 31% are married, and 41% have no children. During the period of our study, county overall opioid death averaged 1.2 per 10,000 population while illicit opioid deaths averaged 0.86 per 10,000 population. The opioid prescription rates average 0.72 per capita.

Tables 2 report the IV 2SLS regression estimates for the effects of the opioid crisis on consumer credit card terms, where Panel A shows the first-stage IV results, and Panel B shows the second-stage IV estimates, when using *MKTDoctors/1000Pop* instrument. As above, for brevity, we only include the coefficients of interest. The key dependent variables are either *Rate Spread*, the APR credit card spread, or *Limit* expressed as either (*Ln(Limit)*), the natural log of the offered credit card limit or (*Limit($)*), the actual limit in dollar value. The main independent variables are the two opioid intensity measures both lagged one year, corresponding to continuous opioid deaths rates or indicators for high opioid abuse marked at the top 50th percentile in different specifications. As discussed in Section 5, we control for consumer credit quality in many ways, including credit score ranges, income, past delinquency, past derogatory filings, past bankruptcy filings, past high credit utilization, as well as for credit demand based on consumer credit inquiries and other personal characteristics as of 2-3 months prior to the credit offer. We also control for a rich set of economic and demographic county characteristics, plus numerous fixed effects to isolate as well as possible the effects studied. Thus, we include: lender-year-month, state-year-month, lender-state, lender, state, and year-month fixed effects, to absorb variation in lender and state conditions over time, or lender over state as well as to account for other unobserved factors at the lender, state, or time levels.

In all cases, the IV first-stage estimates indicate that our instruments are significantly positively associated with higher opioid crisis intensity, while the IV first-stage statistics show that instruments are relevant and valid.[24] The IV second-stage estimates further show that consumers residing in counties more affected by opioid abuse experience significantly lower credit supply at

[24] We check the first stage statistics in all our IV 2SLS analyses that we use in this paper, and all are in line with expectations. For brevity, we do not report these in all tables, but they are available from the authors upon request.

the intensive margin.[25] For instance, individuals living in counties with opioid death rates in the nation's top 50th percentile receive, on average, a credit card interest rate that is 1.2 percentage points higher, and a credit limit that is \$194 lower. These numbers are economically significant, as they amount to a 7 percent (= 1.2/17) increase in interest rate and a 17 percent reduction in credit limit for an average borrower.

6.3.1.1 Using Alternative Opioid Death Measures

Given the changes over time in drugs responsible for opioid deaths, with illicit drugs becoming more prominent in recent years than prescription drugs, Table 3 reiterates our main results for credit supply terms for consumers when looking separately at rates of prescription and illicit opioid deaths. Panel A reports the first-stage results where we show that the instrument continues to work well for both measures. Panel B reports IV second-stage results when using *MKTDoctors/1000Pop* as instrument for opioid abuse intensity. We find significant increases in credit card spreads and lower credit card limits from both types of death rates, however, magnitudes and significance are much larger for the illicit opioid deaths when measured as whether the county is in the nation's top 50th percentile or not.

6.3.1.2 Using Opioid Prescription Rate

An alternative measure of opioid exposure that has been used in the literature is opioid prescription rate, which played an important role prior to 2014, i.e., during the first and the second waves of the opioid crisis. In Table 4, we repeat our analysis using county opioid prescription rates, either continuous or as an indicator of whether it exceeds the nation's median rate. Panel A confirms that our instrument is positively significantly associated with the opioid prescription rate as well. Then, as indicated in Panel B, we see statistically significant and economically important negative effect on credit supply, though the effects are somewhat smaller than our benchmark estimates.

[25] Appendix Table A3 Panel C reaches similar conclusions using OLS estimations.

6.3.1.3 Using Different Instruments

We next repeat our benchmark analyses using two alternative instruments: the marketing payments per 100 county population and the growth rates in each county in the distribution of OxyContin pills bewteen 1997 and 2002.

We report the first and second stage results in Table 5 Panel A and Panel B, respectively. Again, we continue to see opioid abuses having a large and significant effect on local credit supply and the effects are particularly large in magnitude when we use the second instrument, the growth rates of the distribution of OxyContin pills from 1997 and 2002.

6.3.1.4 Alternative Identification Strategies

A potential concern with our benchmark analyses is that our results could be prone to self-selection bias if consumers are not randomly assigned across counties, and the opioid crisis determinants at the county level may affect credit terms. To help dispel the competing explanation that our results may spuriously reflect differences in the characteristics of high- and low-opioid crisis counties rather than the opioid crisis intensity per se, we conduct several additional analyses.

First, we conduct a univariate analysis based on several propensity score matching (PSM) techniques in Table A2 Panel A. We match counties in the 25th percentile of the distribution each year in terms of opioid intensity with other counties similar in terms of economic and demographic characteristics as used in our main analysis based on predicted propensity scores. We use several matching techniques, including one-to-one matching without replacement, matching each treated county (high opioid group) to the nearest untreated (control, low opioid group) county each year. This technique ensures we do not have multiple control counties assigned to the same treated one, which can lead to a smaller control group than the treated group. We also use one-to-one matching with replacement, which differs in that each treated county is matched to the nearest control county even if the latter is used more than once. Additionally, we use nearest-neighbor matching with n=2, n=3, and n=5 with replacement, which matches each high opioid county with the two, three, or five low opioid counties with the closest propensity scores, respectively. We calculate the opioid crisis effect on credit card terms as the mean difference between high-opioid counties' terms and those of their matched low-opioid peers. All differences show significantly harsher credit card terms in high-opioid counties relative to the control group.

Second, we use IV 2SLS regression analysis based on constrained samples comprising counties in the top 25th percentile of the distribution each year in terms of opioid intensity with other low opioid death counties similar in characteristics using one-to-one matching without and with replacement and report results in Table A2 Panels B and C.

Finally, in another approach as reported in Table A2 Panel D, we match high opioid counties in the top 25th percentile of the distribution with their neighboring counties that are in the low opioid remaining group and again run IV 2SLS regressions analysis using this constrained sample. Neighboring counties are assumed to have very similar economic and other conditions, making the two groups more comparable. Despite the significant loss in the number of observations, in all these additional regression analyses, we continue to find significantly harsher credit card terms (higher rate spread and lower limits) for consumers in highly affected opioid counties.

6.3.1.5 Other Robustness Tests

We conduct additional robustness tests and report the results in the Appendix Table A3. First, we add nine more county-level controls including county labor force participation rate, average credit score, air pollution, house price growth rate, percent of school dropouts, the percentage of a county's population claiming affiliation with an organized religion, and the relative strength of the Democratic/Republican party as captured by county presidential election/voting outcomes, poverty rate, as well as percent of population in poor health (Panel A). Next, we use alternative opioid death rates based on multiple death causes instead of single death causes as in the benchmark (Panel B). We also conduct simple OLS regressions (Panel C); exclude counties with zero opioid-related deaths (Panel D); and, finally, we exclude Florida from the analysis as Florida was an epicenter for the opioid drug distribution. In all of these analyses, we continue to find significantly adverse effects on consumer credit supply from opioid epidemic exposure both in credit card interest rates as well as the credit card limits offered by banks.

6.4 Consumer Heterogeneity Tests

Higher-risk borrowers can be more easily affected by external shocks, and we conjecture that banks may exercise caution toward the more vulnerable categories of consumers in highly opioid-affected areas. Moreover, our earlier Figure 2 about the evolution of the crisis by demographics showed stark and disproportionately higher opioid death rates in the recent illicit opioid waves for low education people (important to note because education tends to be highly correlated with consumer income and credit score), minorities particularly Blacks, males, and younger and/or working-age people. The richness of our credit supply data allows us to test whether our main findings may differ across these characteristics. Specifically, we analyze interactions between the opioid crisis intensity and consumer high credit risk indicators, while continuing to use *MKTDoctors/1000Pop* as an instrument for opioid abuse intensity. Results from the IV 2SLS second stage on high risk consumers (credit score below 620) and minorities are reported in Table 6; and results on other consumer characteristics such as past deep delinquency (90 days past due), low income ($<$30K), and younger consumers ($<$ 25 years old) are in Tables A4 and A5 in the Appendix.

We consistently observe that banks apply additionally harsher credit card terms for riskier consumers, as proxied by their credit score and past delinquency history, in highly opioid-affected counties. Also importantly, within a county, minorities, particularly Blacks, receive worse credit terms than others (about 1.6 percentage points higher interest rate and about $350 decline in credit card limit offered). Low-income individuals, those with income less than $30k are also treated much more harshly by lenders. Young people are also charger higher rates in high exposure areas, however, the effects on their credit limits are negative but not statistically significant.

6.5 Credit Card Rewards and Likelihood of Credit Card Offers

The Mintel dataset allows us to measure another element of credit pricing, that is, offers of rewards/promotions, in addition to credit supply on the extensive margin, credit card offer likelihood. We repeat our analyses using credit card rewards and credit card offer likelihood as our dependent variables and report the IV 2SLS second stage results in Table 7. Note that for credit card rewards, we use the same offer-level sample as above, while for likelihood of credit card offer, we use an extended larger sample that includes consumers with and without offers in each month. Our analyses reveal that individuals in higher exposure counties are less likely to receive credit card rewards and promotions by 4 percentage points. Importantly, credit card offer likelihood also declines significantly (by 10 percentage points) in counties with higher opioid abuse.

6.6 Effectiveness of Recent Opioid Policies

Given the severity of the opioid crisis and its adverse economic impact, a number of opioid-related laws and regulations were enacted in recent years in an effort to combat the opioid epidemic. The existing studies that attempt to estimate the implications of those regulations either yield mixed results or only consider one such law at a time, making it difficult to draw policy conclusions. For example, Kaestner and Engy (2019) find that the Prescription Drug Monitoring Programs (PDMPs) reduce prescription rates, but do not help reduce opioid deaths or improve socioeconomic outcomes. In contrast, Cornaggia, Hund, Nguyen and Ye (2021) find that adoption of PDMPs reduces opioid deaths and also partially reverses some negative effects on municipal finance. Doleac and Mukherjee (2019) find increased opioid abuse after increased access to Naloxone (which reverses opioid overdose), likely due to increasing risk taken by opioid addicts given they know there is an antidote in place to save their lives.

We add to this debate by investigating the effects of six prominent opioid-related laws on consumers and consumer finance outcomes, out of which three are *opioid supply-oriented laws* and the other three are *demand-oriented opioid laws*. Table A7 in the Appendix shows descriptions of all these laws. We focus on the impact on consumer credit supply, as this is the margin that has the most implications on local economic recovery.

Of the *supply-related laws*, the state ”Opioid Limiting Law” targets opioids prescriptions. For instance, certain states limit prescriptions for first-time users or for acute or postoperatory pain or other uses or set other limits on the number of prescriptions or overall quantity of opioids that can be prescribed by physicians to a patient. The ”Opioid PDMP Law” collect and track opioid prescriptions and connect prescribers, dispensers, law enforcement, and Medicare authorities. Some states mandate the use of PDMPs by prescribers while others make it voluntary. We focus on the mandatory PDMPs given prior research finds these to be more likely to affect behavior. The

”Triplicate Prescription Law” requires that three copies of an opioid prescription be issued: The prescriber keeps one copy, another is kept by the pharmacist, while the third is sent to a state agency by the pharmacist. Alpert, Evans, Lieber and Powell (2022) show how strict monitoring of opioid prescriptions via special prescription documentation in triplicate requirement substantially reduces opioid use and related deaths in those states once epidemic unfolds.

Among the *demand-oriented laws,* the ”Naloxone Law” increases access to and allows the prescribing and dispensing of Naloxone (an opioid receptor antagonist that reverses opiate overdose) by various third parties to users with documented risk factors for overdose (Davis and Carr (2015)). The ”Good Samaritan Law,” provides immunity to drug users for certain drug crimes when they call for help for a person experiencing a drug overdose. Lastly, the ”Medical Marijuana Permitting Law.” Initial studies showed a decline in overdoses in medical marijuana permitting states, but later studies documented a reversal increasing rather than decreasing opioid overdose deaths (e.g., Shover, Davis, Gordon and Humphreys (2019)).[26]

We take advantage of the staggered implementation of the four state-level opioid laws, ”Opioid Limiting Law,” ”Opioid PDMP Law,” ”Nalaxone Law,” and ”Good Samaritan Law,” by running a difference-in-difference (DID) regression specification to evaluate the effectiveness of the laws and their influence on consumers and consumer finance. For the ”Triplicate Prescription Law” and ”Medical Marijuana Permitting Law,” we use fixed effects and/or sample splits.

We first examine the effects of opioid laws on prescription and opioid mortality rates, including total, prescription mortality, and illicit mortality rates, and report results in Table 8 Panel A using county-level regressions over 2010-2019, while including all county controls from our main specifications and additional fixed effects. The fixed effects include county, state, and year for the effects of opioid-time-varying laws, and only year fixed effects for the state time-invariant ones.

Conditional on a strong set of controls for local markets and time, we uncover very different impacts among the *supply-oriented* and *demand-oriented opioid laws.* Specifically, all *supply-related laws* have some beneficial effects in reducing opioid prescriptions and prescription opioid death rates, with the opposite impact on the opioid illegal and, hence, total deaths. These results sug-

[26]The ”Good Samaritan Law” and ”Medical Marijuana Permitting Law” data are from the Opioid Environment Policy Scan (OEPS) from University of Chicago.

gest that the laws passed do not help dissuade illegal drug activities. An exception is the "Triplicate Prescription Law," which attenuates opioid deaths from both prescription and illegal sources. Turning to the three *demand-oriented laws,* only the "Medical Marijuana Permitting Law" was able to reduce both the opioid prescription rates and the opioid prescription related death rates. These results establish that not all laws are the same, consistent with the mixed findings on deaths in prior research.[27]

Table 8 Panel B conducts a horse race among the effects of different state laws on consumer credit supply. We show the effects of time-varying state laws in Panel B1, and sample splits for the time-invariant laws in Panels B2 and B3. Our key dependent variables are interest rate spreads and credit card limits, while we also include our main opioid intensity measures, all consumer and county controls, and fixed effects as in our main analyses. Same as above, we instrument opioid intensity with *MKTDoctors/1000Pop*, and report IV 2LS second stage estimates in all cases.

Table 8 Panel B1 shows that the *supply-related laws* — the "Opioid Prescription Limiting Law" and the mandatory "Opioid PDMP Law" — yield positive effects on consumer credit supply reversing partially the negative consequences of the opioid crisis, while the *demand-related laws* — the "Naloxone Law" and the "Good Samaritan Law" — have either no effects or even negative effects on credit supply for consumers. Panels B2 and B3 indicate no negative effect on rates though negative effects on credit limits on consumers in states that implemented the *supply-related law* "Triplicate Prescription Law." By comparison, in states that did not implement the law, the negative effects show up in both dimensions and are much larger. We also find that only states that implemented the *demand-related* "Medical Marijuana Permitting Law" yield negative credit supply effects.

To summarize, the *supply-related laws* (the "Opioid Prescription Limiting Law," the mandatory "Opioid PDMP Law," and the "Triplicate Prescription Law") all tend to have positive reversal effects on consumer market credit supply, while the *demand-related laws* ("Naloxone Law," "Good Samaritan Law," "Medical Marijuana Permitting Law") appear to help less or even induce some detrimental effects on consumer credit, and potentially intensify the opioid crisis.[28] Importantly,

[27] Results are similar in a sample that starts earlier in 2007 instead of 2010.

[28] The different effects are likely due to the different nature and intent of the laws, and are somewhat consistent with prior research.

we found that the *supply-related laws* that do have beneficial effects on reducing opioid prescriptions and deaths also tend to exhibit mitigating effects in consumer credit supply.

6.6.1 Possible Underlying Mechanisms for Credit Supply

To understand our credit supply results, we next investigate consumer credit performance as well as bank portfolio risk and how they vary with their exposure to the opioid epidemic.

6.6.1.1 Consumer Credit Performance

For consumer credit performance, we use information from FR Y14-M on credit cards accounts' days past due, bank-estimated loan probability of default (PD), the monthly payments made by consumers, as well as their refreshed credit scores. We aggregate the information to the bank-county-year-month level to arrive at averages for the bank-county for each given year-month.

The results are reported in Table 9 Panel A. We observe that borrowers in high opioid exposure counties tend to have longer days of past due, higher bank-assessed loan probability of default (PD), lower monthly payments, and lower updated credit scores. For example, the average loan PD increases by 1.2 percentage points and the average consumer refreshed credit score decreases by 16 points (or a 2% decrease relative to the mean of 745) in high- versus low-opioid affected areas. These results suggest higher credit risk associated with consumers living in areas with high opioid exposure. Those people are either more likely to abuse opioids if they live in the high-exposure counties or may be more financially vulnerable to opioid abuse in those counties. As we discussed in the Introduction and the Literature Review, opioid abuse reduces individuals' employment and earnings potential as well as firms' hiring. This labor channel alone would lead to enhanced credit risk, according to the model presented earlier in Section 3. Most importantly, the evidence here suggests that credit card borrowers in highly exposed areas pose significantly higher credit risk for the lenders, which may explain some of their cautious credit supply behavior. In the Appendix Table A6 Panel A we repeat our analyses using a county-year-month sample, and our results continue to hold.

6.6.1.2 Bank Consumer Loan Portfolio Performance

Given that consumers in areas hard-hit by opioids are more likely to default on their financial obligations, we next test whether banks more exposed to the opioid crisis via their local branch network or operations suffer more from nonperforming loans across their consumer loan portfolios. Specifically, we test whether exposed banks that operate in only one county and likely to have a harder time diversifying their risk exposure from the opioid crisis, may suffer from credit risk in their portfolios. Our estimation results are reported in Table 9 Panel B where we examine credit card nonperforming loans ratio as well as noperforming loans ratios for unsecured consumer credit using IV 2SLS analysis and the same instrument we use above. Our second stage IV estimates show that banks confined to more severely affected counties report higher non-performing loans in credit card products as well as total unsecured consumer loans. This evidence further helps corroborate our story that banks experience more materialized credit risk in their loan portfolios, hence the decline in credit supply to opioid-affected areas.

6.6.2 The Welfare Implications of the Opioid Crisis — Consumer Spending

Before we conclude, we reconfirm our main credit supply effects using the supervisory FR Y-14M credit card dataset and also explore the likely possible macro real effects of the opioid crisis, in both cases using the same IV 2SLS analysis employed throughout our study. In these analyses we use a bank-county-year-month sample. We construct two aggregate measures of consumption: total purchases per county population and total purchases relative to credit limit.

Our estimation results are reported in Table 10. Panel A reports effects of the opioid crisis intensity on elements of credit supply, including average cycle APR, natural log of average credit card limit, and percent of accounts with rewards and promotions. Panel B reports effects on consumer spending proxied by the credit card purchases made by consumers as provided by FR Y-14M. Our second stage IV estimates in Panel A reconfirm that credit supply declines in counties more affected by the opioid crisis as evidenced by higher cycle APRs, lower credit card limits, and less accounts with rewards. Effects are also economically meaningful.

Our analyses reveal that individuals in higher (top 50th percentile) versus lower opioid abuse exposure (lower 50th percentile) counties pay about 2.1 percentage points higher APR, have lower average credit limits by about 9.7 percentage points, and are less likely to receive credit card rewards and promotions by 11 percentage points. Importantly, credit card offer likelihood also declines significantly (by 10 percentage points) in counties with higher opioid abuse.

Table 10 Panel B finds that counties with higher opioid exposure incur significant declines in consumer credit card spending. For example, the total purchases per population decline by about 4.3 percentage points in higher versus lower opioid death exposure counties. These effects are also confirmed using other proxies for consumer spending, including the total purchases per limit and the average consumer purchase.

These effects are even larger when re-estimating the effects using an aggregated county-year-month sample but without the lender year-month fixed effects as shown in Appendix Table A6 Panel C. These results indicate that the credit policy adopted by banks - targeting high opioid-exposure locations - to deal with the repercussion of the opioid pandemic has important welfare implications.

7 Conclusions

The opioid epidemic in the U.S. has left far-reaching and lingering consequences on the health and social conditions of U.S. local communities for over two-and-a-half decades. In this paper, we discover unfavorable credit supply consequences of this crisis on consumers: banks are reluctant to lend in areas with significant exposure to opioid abuse. They are less likely to send credit offers in the highly exposed areas; however, when they do still solicit consumers for credit in those areas, the offers have much higher interest rates, lower credit limits, and less rewards/promotions. The credit supply constriction seems to harm harder the riskier consumers, the minorities (particularly Blacks), low-income, and younger consumers.

The wave of laws and regulations passed to reduce the devastating effects of the opioid crisis on communities raises a question whether the legislative effort helped mitigate some of the negative effects uncovered in the study. Our analysis of six different opioid-related laws (three *supply-related* and three *demand-related laws*) suggests different effects across supply- and demand-oriented laws in mitigating both the crisis and credit supply effects on consumers. The *opioid supply-oriented laws* (”Opioid Prescription Limiting Law,” the mandatory ”Opioid PDMP Law,” and the ”Triplicate Prescription Law”) all appear to mitigate some of the negative impacts of the opioid epidemic on consumers and their credit supply, while the *demand-related laws* are less beneficial or can even aggravate the opioid crisis.

From a policy standpoint, the cautious behavior of banks appears to be partially justified by the relatively higher credit risk in the highly opioid-affected areas. The reduced consumer credit supply, nevertheless, could create a negative feedback loop depriving the opioid-affected regions of the much-needed liquidity for recovery. Indeed, we find that the opioid-crisis induced credit supply contraction has important welfare consequences: consumer spending sharply decreases in hardly-hit local markets. This latter may suggest important macro-policy implications given that consumer spending accounts for the vast majority of US gross domestic product and economic growth. Thus, it is natural to ask: where should we go from here i.e., ”quo vadis.” These findings here may prove useful for policymakers to better understand the impact of the opioid crisis and formulate adequate policies concerning consumers to help recovery efforts, enhance welfare, and restore growth and resilience in the opioid-affected consumer markets. One possible policy may involve programs that jointly target both opioid addiction treatment and credit repair and assistance via financial education and counseling without stigma, which may help for consumers and communities affected by the opioid addiction regain financial stability, resilience, and well being.

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Figure 1 : Opioid-Related Death Rates Over Time

This line chart depicts the time trend of total opioid-related death rates, illicit opioid-related death rates, and prescription opioid-related death rates per 10k population. Data sources: CDC/NCHS, National Center for Health Statistics, Mortality, restrictive version for 2010-2019, and the public version for 2020.

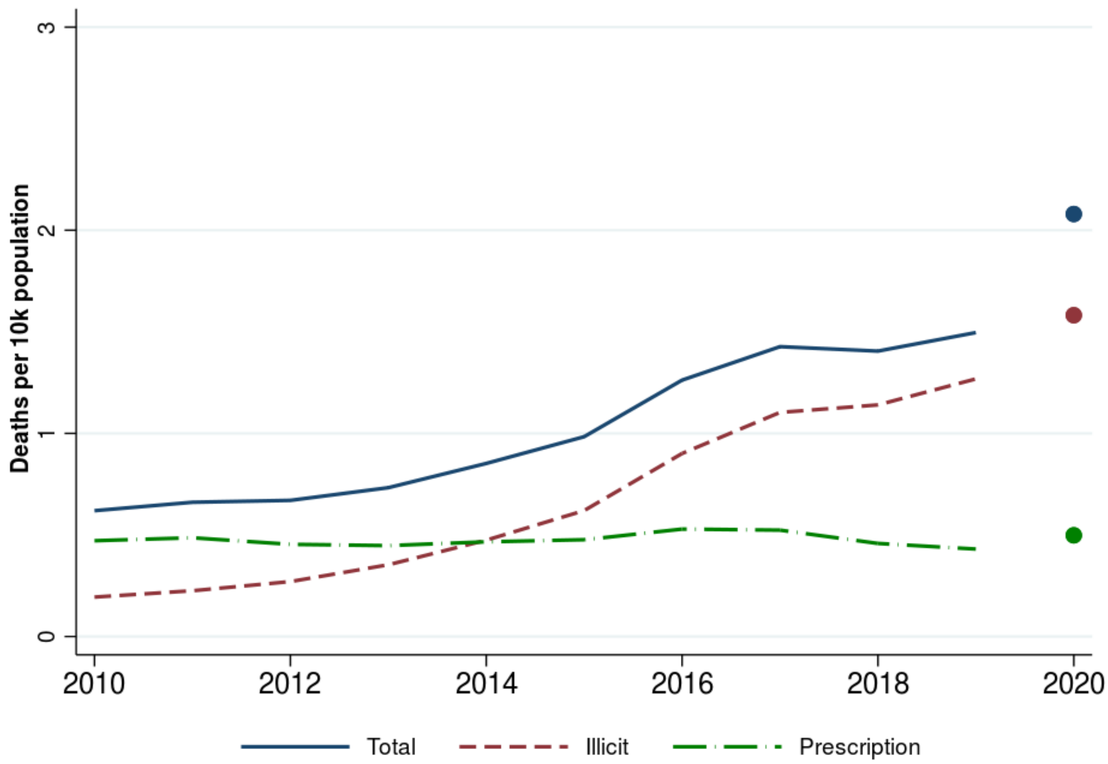
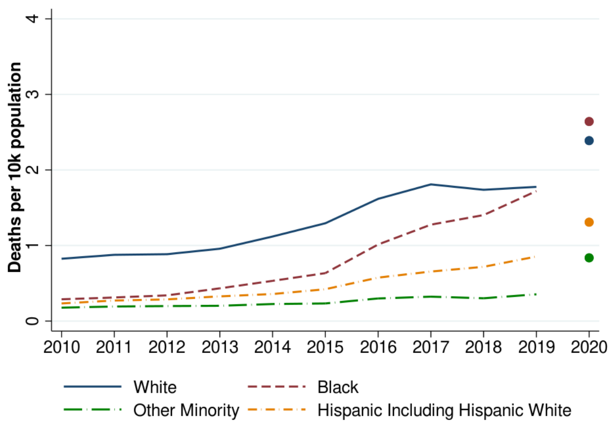


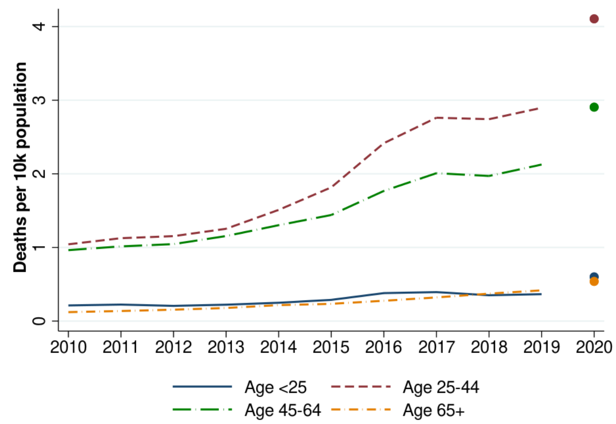
Figure 2 : Opioid Death Rates by Consumer Demographics

This figure plots overall opioid-related death rates per 10K population by consumer demographics (age groups, gender, race groups, and education groups) over time. Rates are constructed relative to their respective population. Data sources: CDC/NCHS, National Center for Health Statistics, Mortality, restrictive version for 2010-2019, and the public version for 2020. The public version doesn't contain information by education.

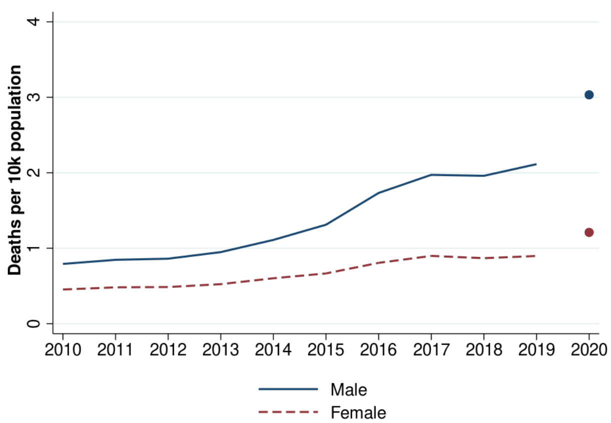
Panel A. Opioid Death Rates by Consumer Race



Panel B. Opioid Death Rates by Consumer Age



Panel C. Opioid Death Rates by Consumer Gender



Panel D. Opioid Death Rates by Consumer Education

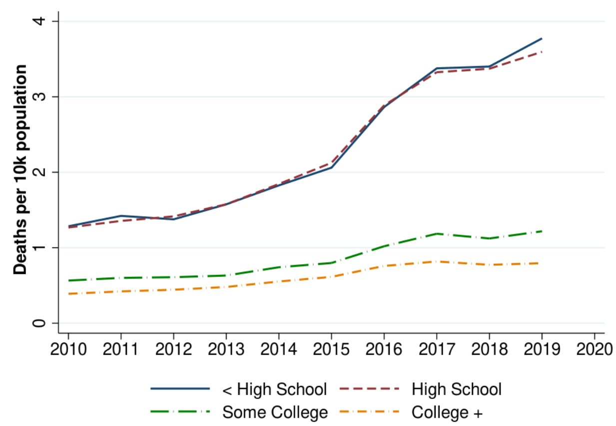


Figure 3 : Opioid-Related Death Rates across U.S. Counties

This figure presents the geographical distribution of opioid-related death rates (per 10K population) across U.S. counties for year 2019. Darker red colors represent higher death rates. Data sources: CDC/NCHS, National Center for Health Statistics, Mortality.

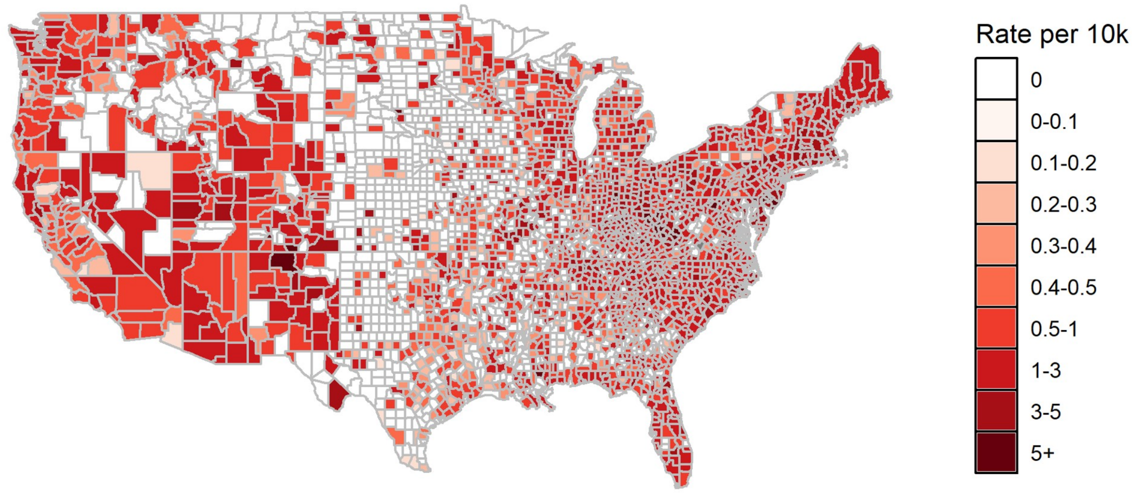


Figure 4 : Instrument "MKT Doctors/1000Pop" across U.S. Counties

This figure presents the geographical distribution of physicians receiving pharmaceutical industry marketing for opioids across U.S. counties over 2013-2019. The figure presents 10 categories that were obtained based on an equal deciles' methodology, with darker colors representing higher marketing rates; 1 indicates that the counties' marketing rates ranked in the bottom decile of the country, while 10 indicates that the counties' marketing rates ranked in the top decile of the nation. Thus, darker colors show higher opioid marketing intensity. Data sources: Open Payments Database and Hadland, Rivera-Aguirre, Marshall and Cerda (2019).

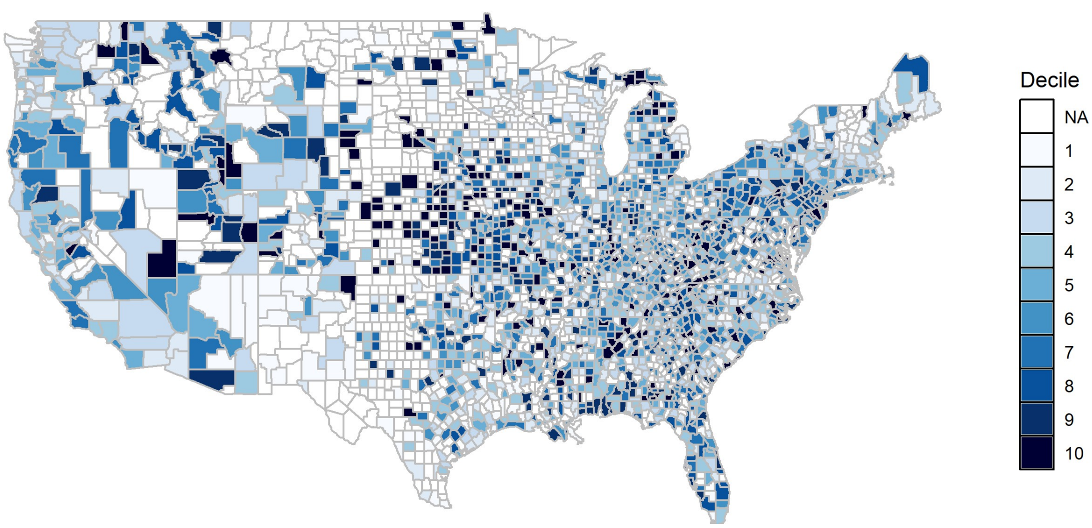


Figure 5 : Validating the Instrument: Relevancy

This figure provides binned scatter plot of opioid-related deaths per 10K population versus pharmaceutical industry opioid drug marketing (doctors receiving marketing payments per 1,000 people, *MKT Doctors/1000Pop*) after taking out the state and year fixed effect. Data sources: CDC/NCHS, National Center for Health Statistics, Mortality, CDC/IQVIA Xponent, Hadland, Rivera-Aguirre, Marshall and Cerda (2019), Open Payments Database, U.S. Drug Enforcement Administration (DEA) and Cornaggia, Hund, Nguyen and Ye (2021).

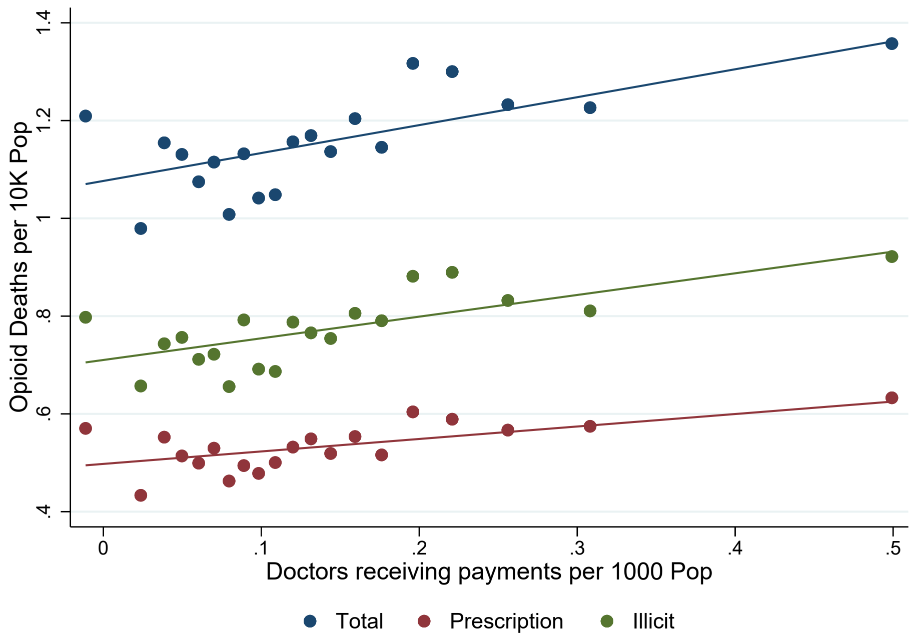


Table 1: Summary Statistics

This table reports in Panel A summary statistics (mean, p50, p25, p75, and number of observations) for the key variables in our analyses. Variable definitions and data sources are in Appendix Table A1. The sample is based on the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card supply to consumers. The data are focused on institutions identified as "banks" in the Mintel/TransUnion Match File. All demographic attributes are from the Mintel. Panel B shows correlations of our instrumental variable (*MKT Doctors/1000Pop* with county economic and other characteristics.

Panel A: Mintel/TransUnion Match File Variables						
	mean	p50	std	p25	p75	N
Dependent Variables						
Rate Spread	17.305	15.760	5.076	12.970	22.770	197,371
Ln(Limit)	6.447	6.217	0.776	6.217	6.909	197,371
Limit ($)	941.145	500.000	1170.751	500.000	1000.000	197,371
Rewards/Promo	0.900	1.000	0.300	1.000	1.000	197,371
Credit Card Offer	0.564	1.000	0.496	0.000	1.000	392,101
Key Independent Variables						
Opioid Death Rate	1.212	0.916	1.025	0.526	1.573	197,371
High Opioid Death Rate	0.513	1.000	0.500	0.000	1.000	197,371
Prescription Opioid Death Rate	0.500	0.416	0.393	0.229	0.650	197,371
Illicit Opioid Death Rate	0.864	0.542	0.943	0.258	1.126	197,371
Opioid Prescription Rate	0.721	0.684	0.295	0.505	0.869	197,350
Instrumental Variables						
MKT Doctors/1000Pop	0.140	0.120	0.093	0.072	0.188	197,371
MKTPayments/1000Pop	0.542	0.417	0.459	0.201	0.752	197,371
Purdue MKT (Oxycontin Growth '97-'02)	6.020	5.211	3.510	3.760	7.315	369,169
Consumer Controls						
Consumer Credit Score	702.980	699.000	92.653	633.000	782.000	197,371
Credit Score_580_660	0.267	0.000	0.442	0.000	1.000	197,371
Credit Score_660_720	0.209	0.000	0.406	0.000	0.000	197,371
Credit Score_720_800	0.243	0.000	0.429	0.000	0.000	197,371
Credit Score_800plus	0.194	0.000	0.395	0.000	0.000	197,371
Deep_Delinq	0.213	0.000	0.410	0.000	0.000	197,371
Recent_Delinq	0.085	0.000	0.278	0.000	0.000	197,371
Other_Derogatory	0.235	0.000	0.424	0.000	0.000	197,371
Bankruptcy_Filer	0.067	0.000	0.251	0.000	0.000	197,371
High_Util ($\geq$80%)	0.024	0.000	0.155	0.000	0.000	197,371
Ln(1+ No Credit Inquiries)	0.336	0.000	0.517	0.000	0.693	197,371
Has_Prior_Cards	0.940	1.000	0.237	1.000	1.000	197,371
Consumer Age	49.779	50.000	15.706	37.000	61.000	197,371
Age_25to44	0.355	0.000	0.479	0.000	1.000	197,371
Age_45to64	0.418	0.000	0.493	0.000	1.000	197,371
Age_65plus	0.186	0.000	0.389	0.000	0.000	197,371
Married	0.310	0.000	0.462	0.000	1.000	197,371
No_Kids	0.406	0.000	0.491	0.000	1.000	197,371
White	0.410	0.000	0.492	0.000	1.000	197,371
Miss_Race	0.501	1.000	0.500	0.000	1.000	197,371
Educ: Some_College	0.105	0.000	0.307	0.000	0.000	197,371
Educ: College	0.122	0.000	0.328	0.000	0.000	197,371
Educ: Post_College	0.058	0.000	0.234	0.000	0.000	197,371
Miss Educ	0.317	0.000	0.465	0.000	1.000	197,371
Homeowner	0.753	1.000	0.431	1.000	1.000	197,371
Ln(Consumer Income)	10.958	11.082	0.821	10.532	11.379	197,371

Table 1: Summary Statistics (cont.)

This table reports in Panel A summary statistics (mean, p50, p25, p75, and number of observations) for the key variables in our analyses. Variable definitions and data sources are in Appendix Table A1. The sample is based on the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card supply to consumers. The data are focused on institutions identified as "banks" in the Mintel/TransUnion Match File. All demographic attributes are from the Mintel. Panel B shows correlations of our instrumental variable (*MKT Doctors/1000Pop* with county economic and other characteristics.

Panel A: Mintel/TransUnion Match File Variables (cont.)						
	mean	p50	std	p25	p75	N
County Controls						
Ln(County Income)	16.922	17.040	1.493	15.871	17.979	197,371
County Unemployment Rate	4.900	4.633	1.580	3.800	5.700	197,371
County Bank HHI	0.174	0.144	0.107	0.114	0.189	197,371
County Population Density	1882.788	688.603	5495.129	255.714	1671.863	197,371
County Race HHI	0.679	0.668	0.197	0.540	0.795	197,371
County % Male	0.491	0.490	0.010	0.485	0.495	197,371
County % Age_25_44	0.263	0.262	0.032	0.242	0.284	197,371
County % Age_45_64	0.265	0.265	0.024	0.249	0.281	197,371
County % Age_65plus	0.144	0.139	0.037	0.121	0.160	197,371
County % High Education ($\geq$ College)	0.601	0.606	0.089	0.543	0.662	197,371
County Inequality: Gini Coefficient	0.457	0.457	0.034	0.434	0.479	197,371

Panel B: Correlations of Instrument with County-Level Conditions	
MKT Doctors/1000Pop	Correlation Coefficient
County Personal Income	-0.018
County per Capita Income	-0.001
County HPI Growth	-0.038
County Labor Participation Rate	-0.023
County Unemployment Rate	-0.068
County Average FICO Score	0.025
County Poverty Rate	0.019
County Crime Rate	-0.008
County Population Density	0.008
County Population	-0.028
County Race HHI	-0.023
County % Male	-0.122
County Average Age	0.117
County % High Education ($\geq$ College)	0.033
County Inequality: Gini Coefficient	0.122

Table 2: Effects of the Opioid Crisis on Credit Card Supply to Consumers

This table reports regression estimates from IV 2SLS regressions (equations (3) and (4)) using the "Mkt Doctors/1000Pop" instrument for explaining the relationship between opioid crisis intensity (*Opioid Death Rate* and *High Opioid Death Rate*), based on data from CDC) and bank credit card terms: rate spread and credit card limit. Panel A reports the first-stage IV and Panel B reports second-stage IV estimates from offer-level regressions. All variables are constructed using the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card mail offers. The data are focused on lenders identified as "banks" in the Mintel/TransUnion Match File. Demographic attributes are from Mintel. Consumer controls include: credit score ranges, indicators for past deep delinquency, recent delinquency, past derogatory filings such as foreclosure and collections, past bankruptcy filings, past high utilization ($\geq$ 80%), number of credit inquiries, past credit cards, consumer age ranges, married, indicator for no kids, White, education indicators, homeowner, and consumer income. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions include *State × Year-Month, Lender × Year-Month, Lender × State, Lender, State,* and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by Marketing Campaign and Year-Month and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: IV First Stage

Dependent Variables: Model:	Opioid Death Rate (1)	High Opioid Death Rate (2)
Mkt Doctors/1000Pop$_{c,t-1}$	1.0349***	0.4511***
	(21.65)	(12.85)
Fit statistics		
Observations	197,371	197,371
Adj. R^2	0.559	0.421
Fixed effects		
State × Year-Month	✓	✓
Lender × Year-Month	✓	✓
Lender × State	✓	✓
Lender, State, Year-Month	✓	✓
Consumer & County controls	✓	✓

Panel B: IV Second Stage

Dependent Variables: Model:	Rate Spread (1)	Ln(Limit) (2)	Limit ($) (3)	Rate Spread (4)	Ln(Limit) (5)	Limit ($) (6)
Opioid Death Rate$_{c,t-1}$	0.5191***	-0.0720***	-84.4863***			
	(4.95)	(-3.58)	(-2.77)			
High Opioid Death Rate$_{c,t-1}$				1.1909***	-0.1652***	-193.8267***
				(4.92)	(3.58)	(-2.77)
Fit statistics						
Observations	197,371	197,371	197,371	197,371	197,371	197,371
Adj. R^2	0.317	0.157	0.083	0.311	0.154	0.081
IV first-stage statistics						
KP rk Wald F-stat (Weak-ID)	1787***	1787***	1787***	1786***	1786***	1786***
KP rk LM-stat (Under-ID)	1782***	1782***	1082***	1087***	1087***	1087***
Fixed effects						
State × Year-Month	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓	✓	✓

Table 3: Using Prescription and Illicit Opioid Deaths

This table reports regression estimates from IV 2SLS regressions (equations (3) and (4)) using the "Mkt Doctors/1000Pop" instrument for explaining the relationship between opioid crisis intensity (*Prescription Opioid Death Rate, High Prescription Death Rate* and *Illicit Death Rate, High Illicit Opioid Death Rate*), based on data from CDC) and bank credit card terms: rate spread and credit card limit. Panel A reports the first-stage IV and Panel B reports second-stage IV estimates from offer-level regressions. All variables are constructed using the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card mail offers. The data are focused on lenders identified as "banks" in the Mintel/TransUnion Match File. Demographic attributes are from Mintel. Consumer controls include: credit score ranges, indicators for past deep delinquency, recent delinquency, past derogatory filings such as foreclosure and collections, past bankruptcy filings, past high utilization ($\geq$ 80%), number of credit inquiries, past credit cards, consumer age ranges, married, indicator for no kids, White, education indicators, homeowner, and consumer income. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions include *State* × *Year-Month, Lender* × *Year-Month, Lender* × *State, Lender, State,* and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by Marketing Campaign and Year-Month and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: IV First Stage

Dependent Variables:	Prescription Opioid Death Rate	High Prescription Opioid Death Rate	Illicit Opioid Death Rate	High Illicit Opioid Death Rate
Model:	(1)	(2)	(3)	(4)
Mkt Doctors/1000Pop$_{c,t-1}$	0.6190***	0.8977***	0.6316***	0.2549***
	(25.96)	(27.88)	(14.37)	(8.46)
Fit statistics				
Observations	197,371	197,371	197,371	197,371
Adj. R^2	0.429	0.329	0.615	0.491
Fixed effects				
State × Year-Month	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓

Panel B: IV Second Stage

Dependent Variables:	Rate Spread	Ln(Limit)	Rate Spread	Ln(Limit)	Rate Spread	Ln(Limit)	Rate Spread	Ln(Limit)
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Prescription Opioid Death Rate$_{c,t-1}$	0.8679***	-0.1204***						
	(4.96)	(-3.59)						
High Prescription Opioid Death Rate$_{c,t-1}$			0.5984***	-0.0830***				
			(4.96)	(-3.59)				
Illicit Opioid Death Rate$_{c,t-1}$					0.8505***	-0.1180***		
					(4.91)	(-3.57)		
High Illicit Opioid Death Rate$_{c,t-1}$							2.1072***	-0.2922***
							(4.83)	(-3.55)
Fit statistics								
Observations	197,371	197,371	197,371	197,371	197,371	197,371	197,371	197,371
Adj. R^2	0.321	0.159	0.321	0.160	0.308	0.152	0.285	0.139
Fixed effects								
State × Year-Month	✓	✓	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓	✓	✓	✓	✓

Table 4: Using Opioid Prescription Rate

This table reports regression estimates from IV 2SLS regressions (equations (3) and (4)) using the ”Mkt Doctors/1000Pop” instrument for explaining the relationship between opioid crisis intensity (*Opioid Prescription Rate* and *High Opioid Prescription Rate*), based on data from CDC) and bank credit card terms: rate spread and credit card limit. Panel A reports the first-stage IV and Panel B reports second-stage IV estimates from offer-level regressions. All variables are constructed using the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card mail offers. The data are focused on lenders identified as ”banks” in the Mintel/TransUnion Match File. Demographic attributes are from Mintel. Consumer controls include: credit score ranges, indicators for past deep delinquency, recent delinquency, past derogatory filings such as foreclosure and collections, past bankruptcy filings, past high utilization ($\geq$ 80%), number of credit inquiries, past credit cards, consumer age ranges, married, indicator for no kids, White, education indicators, homeowner, and consumer income. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions include *State* × *Year-Month, Lender* × *Year-Month, Lender* × *State, Lender, State,* and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by Marketing Campaign and Year-Month and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: IV First Stage

Dependent Variables:	Opioid Prescription Rate	High Opioid Prescription Rate
Model:	(1)	(2)
Mkt Doctors/1000Pop$_{c,t-1}$	0.9671***	1.3144***
	(55.93)	(44.64)
Fit statistics		
Observations	197,367	197,367
Adj. R^2	0.739	0.538
Fixed effects		
State × Year-Month	✓	✓
Lender × Year-Month	✓	✓
Lender × State	✓	✓
Lender, State, Year-Month	✓	✓
Consumer & County controls	✓	✓

Panel B: IV Second Stage

Dependent Variables:	Rate Spread	Ln(Limit)	Rate Spread	Ln(Limit)
Model:	(1)	(2)	(3)	(4)
Opioid Prescription Rate$_{c,t-1}$	0.5578***	-0.0769***		
	(4.99)	(-3.59)		
High Opioid Prescription Rate$_{c,t-1}$			0.4104***	-0.0565***
			(4.99)	(-3.58)
Fit statistics				
Observations	197,367	197,367	197,367	197,367
Adj. R^2	0.325	0.162	0.325	0.162
Fixed effects				
State × Year-Month	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓

Table 5: Using Different Instrumental Variables (IVs)

This table reports regression estimates from IV 2SLS regressions (equations (3) and (4)) using two alternative instrumental variables (IVs), "Mkt Payments/1000Pop" and "High Purdue Mkt" for explaining the relationship between opioid crisis intensity (*Opioid Death Rate* and *High Opioid Death Rate*), based on data from CDC) and bank credit card terms: rate spread and credit card limit. Panel A reports the IV estimates using "Mkt Payments/1000Pop" as instrument and Panel B reports IV estimates using "High Purdue Mkt" as instrument from offer-level regressions. All variables are constructed using the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card mail offers. The data are focused on lenders identified as "banks" in the Mintel/TransUnion Match File. Demographic attributes are from Mintel. Consumer controls include: credit score ranges, indicators for past deep delinquency, recent delinquency, past derogatory filings such as foreclosure and collections, past bankruptcy filings, past high utilization ($\geq 80\%$), number of credit inquiries, past credit cards, consumer age ranges, married, indicator for no kids, White, education indicators, homeowner, and consumer income. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions include *State* × *Year-Month, Lender* × *Year-Month, Lender* × *State, Lender, State,* and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by Marketing Campaign and Year-Month and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Using "Mkt Payments/100Pop" as IV

Dependent Variables: Model:	Opioid Death Rate (1)	High Opioid Death Rate (2)	Rate Spread (3)	Ln (Limit) (4)	Rate Spread (5)	Ln (Limit) (6)
Mkt Doctors/1000Pop$_{c,t-1}$	0.3004***	0.1095***				
	(24.67)	(19.73)				
Opioid Death Rate$_{c,t-1}$			0.2814***	-0.0311**		
			(4.00)	(-2.31)		
High Opioid Death Rate$_{c,t-1}$					0.7723***	-0.0854**
					(3.99)	(-2.31)
Fit statistics						
Observations	197,371	197,371	197,371	197,371	197,371	197,371
Adj. R^2	0.564	0.422	0.323	0.162	0.319	0.161
Fixed effects						
State × Year-Month	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓	✓	✓

Panel B: Using "High Purdue Mkt" as IV

Dependent Variables: Model:	Opioid Death Rate (1)	High Opioid Death Rate (2)	Rate Spread (3)	Ln (Limit) (4)	Rate Spread (5)	Ln (Limit) (6)
High Purdue Mkt$_c$	0.0512***	0.0079***				
	(14.81)	(3.46)				
Opioid Death Rate$_{c,t-1}$			0.7834***	-0.1224*		
			(2.89)	(-1.95)		
High Opioid Death Rate$_{c,t-1}$					5.0599**	-0.7904*
					(2.37)	(-1.77)
Fit statistics						
Observations	369,162	369,162	369,162	369,162	369,162	369,162
Adj. R^2	0.544	0.343	0.250	0.097	-0.115	-0.101
Fixed effects						
State × Year-Month	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓
Lender, State	✓	✓	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓	✓	✓

Table 6: Heterogeneous Effects for High Credit Risk and Minority Consumers

This table examines how the effects of opioid crisis intensity on bank credit card terms differ by consumer credit risk and race using interactions of consumer "High Credit Risk" (Credit Score <620) with opioid intensity in Panel A and interactions of minority groups (Black, Hispanic, Other) and opioid intensity in Panel B. We report estimates from IV 2SLS regressions (equations (3) and (4)) using the "Mkt Doctors/1000Pop" as an instrument for opioid crisis intensity (*Opioid Death Rate* and *High Opioid Death Rate*), based on data from CDC). All variables are constructed using the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card mail offers. Consumer controls include: credit score ranges, indicators for past deep delinquency, recent delinquency, past derogatory filings such as foreclosure and collections, past bankruptcy filings, past high utilization ($\geq$ 80%), number of credit inquiries, past credit cards, consumer age ranges, married, indicator for no kids, White, education indicators, home-owner, and consumer income. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. Variables are defined in Appendix Table A1. Standard errors are clustered by Marketing Campaign and Year-Month and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: High Credit Risk (Credit Score <620)

Dependent Variables:	Rate Spread	Ln(Limit)	Limit ($)	Rate Spread	Ln(Limit)	Limit ($)
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Opioid Death Rate$_{c,t-1}$ x High Credit Risk$_{i,c,t-1}$	0.1320***	-0.0150***	-9.2690**			
	(9.38)	(-5.87)	(-2.42)			
High Opioid Death Rate$_{c,t-1}$ x High Credit Risk$_{i,c,t-1}$				2.9878***	-0.3405***	-212.6968**
				(9.45)	(-5.96)	(-2.49)
Opioid Death Rate$_{c,t-1}$	0.2567**	-0.0374*	-64.5647*			
	(2.11)	(-1.69)	(-1.94)			
High Opioid Death Rate$_{c,t-1}$				0.6788**	-0.0958*	-153.6938**
				(2.46)	(-1.92)	(-2.06)
High Credit Risk$_{i,c,t-1}$	0.3853**	-0.0463	-121.2126**	0.4633***	-0.0550*	-125.8480***
	(2.22)	(-1.46)	(-2.56)	(2.80)	(-1.84)	(-2.81)
Fit statistics						
Observations	197,371	197,371	197,371	197,371	197,371	197,371
Adj. R^2	0.208	0.118	0.063	0.196	0.115	0.108
Fixed effects						
State × Year-Month	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓	✓	✓

Panel B: Black, Hispanic, Other Minority Consumers

Dependent Variables:	Rate Spread	Ln(Limit)	Limit ($)	Rate Spread	Ln(Limit)	Limit ($)
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Opioid Death Rate$_{c,t-1}$ x Black$_{i,c,t}$	0.0657***	-0.0126***	-14.7536**			
	(2.81)	(-2.81)	(-2.17)			
Opioid Death Rate$_{c,t-1}$ x Hispanic$_{i,c,t}$	-0.0259	-0.0053	-6.9868			
	(-1.32)	(-1.40)	(-1.22)			
Opioid Death Rate$_{c,t-1}$ x Other$_{i,c,t}$	-0.0124	0.0074	13.9453			
	(-0.36)	(1.11)	(1.38)			
High Opioid Death Rate$_{c,t-1}$ x Black$_{i,c,t}$				1.6060***	-0.2992***	-350.4262**
				(3.08)	(-3.01)	(-2.32)
High Opioid Death Rate$_{c,t-1}$ x Hispanic$_{i,c,t}$				-0.5629	-0.0961	-127.482
				(-1.45)	(-1.29)	(-1.13)
High Opioid Death Rate$_{c,t-1}$ x Other$_{i,c,t}$				-0.1696	0.1553	302.4677
				(-0.21)	(1.01)	(1.3)
Opioid Death Rate$_{c,t-1}$	0.4823***	-0.0616***	-73.6077**			
	(4.30)	(-2.87)	(-2.26)			
High Opioid Death Rate$_{c,t-1}$				1.0878***	-0.1411***	-169.3513**
				(4.25)	(-2.89)	(-2.29)
Black$_{i,c,t}$	-0.5181*	0.1201**	145.4275*	-0.5337**	0.1189**	143.5116*
	(-1.81)	(2.19)	(1.75)	(-2.01)	(2.35)	(1.87)
Hispanic$_{i,c,t}$	0.4932***	-0.0009	5.3688	0.4526***	-0.0109	-7.9967
	(2.75)	(-0.03)	(0.10)	(3.07)	(-0.39)	(-0.19)
Other$_{i,c,t}$	0.288	-0.0702	-112.593	0.2283	-0.056	-90.9313
	(0.87)	(-1.11)	(-1.18)	(0.77)	(-0.99)	(-1.06)
Fit statistics						
Observations	197,371	197,371	197,371	197,371	197,371	197,371
Adj. R^2	0.316	0.156	0.082	0.311	0.153	0.079
Fixed effects						
State × Year-Month	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓	✓	✓

Table 7: Additional Analyses: Credit Card Rewards and Likelihood of Credit Card Offer

This table reports regression estimates from IV 2SLS regressions (equations (3) and (4)) using the "Mkt Doctors/1000Pop" instrument for explaining the relationship between opioid crisis intensity (*Opioid Death Rate* and *High Opioid Death Rate*), based on data from CDC) and two additional bank credit card elements: rewards/promotions and likelihood of a credit card offer. Panel A reports second-stage IV estimates for credit card rewards/promotions from offer-level data, while Panel B reports estimates for the likelihood credit card offer using an extended sample covering all mailings of consumers with and without credit card offers in each month. All variables are constructed using the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card mail offers. The data are focused on lenders identified as "banks" in the Mintel/TransUnion Match File. Demographic attributes are from Mintel. Consumer controls include: credit score ranges, indicators for past deep delinquency, recent delinquency, past derogatory filings such as foreclosure and collections, past bankruptcy filings, past high utilization ($\geq$ 80%), number of credit inquiries, past credit cards, consumer age ranges, married, indicator for no kids, White, education indicators, homeowner, and consumer income. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions in Panel A include *State* × *Year-Month, Lender* × *Year-Month, Lender* × *State, Lender, State,* and *Year-Month* fixed effects. Panel B Panel A includes *State* × *Year-Month, State,* and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by Marketing Campaign (State) and Year-Month in Panels A(B) and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: IV 2LS for Credit Card Rewards/Promotions

Dependent Variables:	Opioid Death Rate	High Opioid Death Rate	Rewards/ Promotions	Rewards/ Promotions
Model:	(1)	(2)	(3)	(4)
Mkt Doctors/1000Pop$_{c,t-1}$	1.0349***	0.4511***		
	(21.65)	(12.85)		
Opioid Death Rate$_{c,t-1}$			-0.0173**	
			(-2.38)	
High Opioid Death Rate$_{c,t-1}$				-0.0396**
				(-2.37)
Fit statistics				
Observations	197,371	197,371	197,371	197,371
Adj. R^2	0.559	0.421	0.057	0.055
Fixed effects				
State × Year-Month	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓

Panel B: IV 2SLS for Likelihood of Credit Card Offer

Dependent Variables:	Opioid Death Rate	High Opioid Death Rate	Credit Card Offer	Credit Card Offer
Model:	(1)	(2)	(3)	(4)
Mkt Doctors/1000Pop$_{c,t-1}$	11.1551***	0.5140**		
	(3.01)	(2.42)		
Opioid Death Rate$_{c,t-1}$			-0.0046***	
			(4.70)	
High Opioid Death Rate$_{c,t-1}$				-0.1005***
				(-4.70)
Fit statistics				
Observations	392,101	392,101	392,101	392,101
Adj. R^2	0.547	0.403	0.115	0.112
Fixed effects				
State × Year-Month	✓	✓	✓	✓
State, Year-Month	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓

Table 8: Opioid Supply and Opioid Demand Laws

This table examines the impact of state opioid laws on opioid prescription and deaths in Panel A (using a county-year level sample), and on consumer credit supply in Panel B (using our main offer-level sample). We cover 3 opioid-supply oriented laws (Opioid Limiting Law, PDMP Law, Triplicate Prescription Law) and 3 demand/user oriented laws(Naloxone Law, Good Samaritan Law, Medical Marijuana Permitting Law). All laws are time variant during our sample period except for "Triplicate Prescription Law" and "Medical Marijuana Permitting Law." Panel B reports estimates from IV 2SLS regressions (equations (3) and (4)) using "Mkt Doctors/1000Pop" as an instrument for opioid crisis intensity (*Opioid Death Rate* and *High Opioid Death Rate*)). Variables used in Panel B are constructed using the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card mail offers. The data are restricted to lenders identified as "banks." Consumer controls include credit score ranges, indicators for past deep delinquency, recent delinquency, past derogatory filings such as foreclosure and collections, past bankruptcy filings, past high utilization ($\geq$ 80%), number of credit inquiries, past credit cards, consumer age ranges, married, indicator for no kids, White, education indicators, homeowner, and consumer income. County controls include county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. Standard errors are clustered by Marketing Campaign and Year-Month; and t-statistics are in parentheses. Variables are defined in Appendix Table A1. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Effects of *"Opioid Supply and Opioid Demand Laws"* on Opioid Prescriptions and Deaths

Dependent Variables:	Opioid Prescription Rate	Opioid Death Rate	Opioid Prescription Death Rate	Opioid Illicit Death Rate	Opioid Prescription Rate	Opioid Death Rate	Opioid Prescription Death Rate	Opioid Illicit Death Rate
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Opioid Supply Laws:								
Opioid Limiting Law$_s$ x Post$_{s,t}$	-0.0297***	0.2317***	-0.0400***	0.2941***				
	[-5.10]	[10.78]	[-2.84]	[16.39]				
Opioid PDMP Law$_s$ x Post$_{s,t}$	-0.0757***	0.1754***	-0.0785***	0.3011***				
	[-17.04]	[7.73]	[-4.54]	[18.49]				
Triplicate Prescription Law$_s$					-0.1215***	-0.3287***	-0.2054***	-0.1699***
					[-19.85]	[-25.37]	[-23.46]	[-17.62]
Opioid Demand Laws:								
Nalaxone Law$_s$ x Post$_{s,t}$	0.001	0.017	0.0213	[0.007]				
	[0.27]	[0.95]	[1.59]	[-0.56]				
Samaritean Law$_s$ x Post$_{s,t}$	-0.0128***	0.0360**	0.0026	0.0334***				
	[-3.64]	[2.12]	[0.21]	[2.66]				
Medical Marijuana Permitting Law$_s$					-0.0701***	0.0554***	-0.0450***	0.1106***
					[-13.81]	[4.23]	[-5.21]	[11.16]
Fit statistics								
Observations	27,955	30,563	30,563	30,563	28,052	30,565	30,565	30,565
Adj. R^2	0.866	0.488	0.394	0.474	0.295	0.136	0.063	0.193
Fixed effects								
County, State, Year-Month	✓	✓	✓	✓	✓	✓	✓	✓
County controls	✓	✓	✓	✓	✓	✓	✓	✓

Panel B: Effects of Opioid Laws on Credit Card Terms

Panel B1: Time-Variant *"Opioid Supply and Opioid User Laws"*

Dependent Variables:	Rate Spread	Ln(Limit)	Rate Spread	Ln(Limit)
Model:	(1)	(2)	(3)	(4)
Opioid Supply Laws:				
Opioid Limiting Law$_s$ x Post$_{s,t}$	-0.2280***	0.0198*	-0.1073***	0.0046
	(-4.16)	(1.89)	(-3.28)	(0.74)
Opioid PDMP Law$_s$ x Post$_{s,t}$	-0.2263***	0.0379***	-0.1661***	0.0304***
	(-3.90)	(3.42)	(-3.42)	(3.29)
Opioid Demand Laws:				
Nalaxone Law$_s$ x Post$_{s,t}$	0.0772**	0.0084	-0.0192	0.0204***
	(2.47)	(1.40)	(-0.49)	(2.76)
Samaritean Law$_s$ x Post$_{s,t}$	0.0538*	-0.0108*	0.0938***	-0.0158**
	(1.67)	(-1.74)	(2.66)	(-2.35)
Opioid Crisis Variables:				
Opioid Death Rate$_{c,t-1}$	0.4783***	-0.0599***		
	(3.99)	(-2.62)		
High Opioid Death Rate$_{c,t-1}$			1.0462***	-0.1310***
			(3.98)	(-2.62)
Fit statistics				
Observations	197,448	197,448	197,448	197,448
Adj. R^2	0.322	0.161	0.318	0.160
Fixed effects				
State × Year-Month	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓

Table 8: Opioid Supply and Opioid User Laws (cont.)

This table conducts a horse race to examine the impact of 6 different opioid state laws in the US on opioid prescription and deaths in Panel A (using a county-year level sample), and on consumer credit supply in Panel B (using our main offer-level sample). We cover 3 opioid-supply oriented laws (Opioid Limiting Law, PDMP Law, Triplicate Prescription Law) and 3 demand/user oriented laws(Naloxone Law, Good Samaritan Law, Medical Marijuana Permitting Law). All laws are time variant, except for "Triplicate Prescription Law" and "Medical Marijuana Permitting Law", which are time-invariant over our sample period. Panel B reports regression estimates from IV 2SLS regressions (equations (3) and (4)) using the "Mkt Doctors/1000Pop" as an instrument for opioid crisis intensity (*Opioid Death Rate* and *High Opioid Death Rate*), based on data from CDC). All variables used in Panel B are constructed using the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card mail offers. The data are focused on lenders identified as "banks" in the Mintel/TransUnion Match File. Demographic attributes are from Mintel. Consumer controls include: credit score ranges, indicators for past deep delinquency, recent delinquency, past derogatory filings such as foreclosure and collections, past bankruptcy filings, past high utilization ($\geq$ 80%), number of credit inquiries, past credit cards, consumer age ranges, married, indicator for no kids, White, education indicators, homeowner, and consumer income. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. In Panel A using a county-year sample, regressions include *County, State,* and *Year* fixed effects in columns 1-4 and Year fixed effects in columns 5-8. In Panel B, using our offer-level sample, all regressions include *State* × *Year-Month, Lender* × *Year-Month, Lender* × *State, Lender, State,* and *Year-Month* fixed effects. Standard errors are double-clustered by Marketing Campaign and Year-Month and t-statistics are reported in parentheses. Variables are defined in Appendix Table A1. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel B2: *Opioid Supply Law*: "Triplicate Prescription Law" (Time-Invariant)

	Triplicate Prescription Law?							
	Yes		No		Yes		No	
Dependent Variables:	Rate Spread	Ln(Limit)	Rate Spread	Ln(Limit)	Rate Spread	Ln(Limit)	Rate Spread	Ln(Limit)
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Opioid Death Rate$_{c,t-1}$	0.2384	-0.0611**	0.6990***	-0.0814***				
	(1.56)	(-2.05)	(4.48)	(-2.76)				
High Opioid Death Rate$_{c,t-1}$					0.4216	-0.1080**	1.9144***	-0.2229***
					(1.56)	(-2.05)	(4.41)	(-2.74)
Fit statistics								
Observations	58,762	58,762	138,352	138,352	58,762	58,762	138,352	138,352
Adj. R^2	0.321	0.161	0.308	0.155	0.320	0.160	0.286	0.146
Fixed effects								
State × Year-Month	✓	✓	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓	✓	✓	✓	✓

Panel B3: *Opioid Demand Law*: "Medical Marijuana Permitting Law" (Time-Invariant)

	Medical Marijuana Permitting Law?							
	Yes		No		Yes		No	
Dependent Variables:	Rate Spread	Ln(Limit)	Rate Spread	Ln(Limit)	Rate Spread	Ln(Limit)	Rate Spread	Ln(Limit)
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Opioid Death Rate$_{c,t-1}$	0.4240***	-0.0707***	0.3554	-0.0242				
	(4.77)	(-4.14)	(0.76)	(-0.27)				
High Opioid Death Rate$_{c,t-1}$					1.1621***	-0.1937***	0.5663	-0.0385
					(4.74)	(-4.13)	(0.76)	(-0.27)
Fit statistics								
Observations	133,304	133,304	63,829	63,829	133,304	133,304	63,829	63,829
Adj. R^2	0.311	0.153	0.347	0.176	0.302	0.147	0.347	0.176
Fixed effects								
State × Year-Month	✓	✓	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓	✓	✓	✓	✓

Table 9: Possible Underlying Mechanisms using Additional Datasets

This table reports regression estimates from IV 2SLS regressions (equations (3) and (4)) using the "Mkt Doctors/1000Pop" instrument for explaining the relationship between opioid crisis intensity and consumer credit card behavior and/or quality in Panel A and bank credit card and unsecured consumer portfolio quality in Panel B. Opioid crisis intensity is measured as *Opioid Death Rate* and *High Opioid Death Rate*, based on data from CDC. Consumer credit card behavior and/or quality is measured several ways as: Ln(Avg Days Past Due), Avg Loan Probability of Default (PD), Ln(Avg Payment), and Avg Updated Consumer Credit Score). Bank credit card portfolio quality is measured as the nonperforming loans ratios of NPL Credit Cards and NPL Unsecured Consumer Credit. The analysis in Panel A uses aggregated bank-county-year-month data from the supervisory FR Y-14M credit card dataset based on a 0.1% random sample for existing consumer accounts (loan age $\geq$ 12 months). Analysis in Panel B uses public bank-quarter data from the FFIEC Call Reports. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions include *State* × *Year-Month*, *Lender* × *Year-Month*, *Lender* × *State*, *Lender*, *State*, and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by County and Year-Month and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: IV 2SLS Effects: Effects on Credit Card Consumer Credit Behavior and/or Quality

Dependent Variables:	Opioid Death Rate	High Opioid Death Rate	Ln(Avg Days Past Due)	Avg Prob Default (PD)	Ln(Avg Payment)	Avg Credit Score	Ln(Avg Days Past Due)	Avg Prob Default (PD)	Ln(Avg Payment)	Avg Credit Score
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Mkt Doctors/1000Pop$_{c,t-1}$	0.5578***	0.0904***								
	(61.99)	(22.65)								
Opioid Death Rate$_{c,t-1}$			0.0860***	0.0020***	-0.1391***	-2.6294***				
			(8.10)	(2.61)	(-9.46)	(-4.03)				
High Opioid Death Rate$_{c,t-1}$							0.5305***	0.0124***	-0.8584***	-16.2190***
							(7.69)	(2.59)	(-8.82)	(-3.97)
Fit statistics										
Observations	1,009,322	1,009,322	1,009,313	694,562	1,009,138	1,009,322	1,009,313	694,562	1,009,138	1,009,322
Adj. R^2	0.050	0.050	0.088	0.002	0.090	0.017	0.002	0.001	0.072	0.009
Fixed effects										
State × Year-Month	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
County controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Panel B: IV 2SLS Effects on Bank Credit Card Portfolio Quality

Dependent Variables:	NPL Credit Cards	NPL Unsecured Consumer Credit	NPL Credit Cards	NPL Unsecured Consumer Credit
Model:	(1)	(2)	(3)	(4)
Opioid Death Rate$_{b,t-1}$	1.3449**	1.5780**		
	(2.20)	(2.35)		
High Opioid Death Rate$_{b,t-1}$			1.2325***	1.7757***
			(3.71)	(4.07)
Fit statistics				
Observations	16,866	16,866	16,866	16,866
Adj. R^2	0.750	0.750	0.708	0.709
Fixed effects				
Lender, Year-Quarter	✓	✓	✓	✓
Lender & County controls	✓	✓	✓	✓

Table 10: Possible Macro Real Effects of The Opioid Crisis - Consumer Spending

This table reports regression estimates from IV 2SLS regressions (equations (3) and (4)) using the "Mkt Doctors/1000Pop" instrument for explaining the relationship between opioid crisis intensity and consumer credit card terms to consumers in Panel A, and consumer credit card spending in Panel B. Opioid crisis intensity is measured as *Opioid Death Rate* and *High Opioid Death Rate*, based on data from CDC. Credit terms are measured several ways as: Avg Cycle APR, Ln(Avg Limit), and Pct Rewards (percent of accounts with rewards). Consumer spending is measured as Total Purchase/Pop, Total Purchase/Limit, or Ln(Avg Purchase). All analyses in this table use aggregated bank-county-year-month data from the supervisory FR Y-14M credit card dataset based on a 0.1% random sample for existing consumer accounts (loan age $\geq$ 12 months). Analysis in Panel B uses public bank-quarter data from the FFIEC Call Reports. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions include *State* × *Year-Month*, *Lender* × *Year-Month*, *Lender* × *State*, *Lender*, *State*, and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by County and Year-Month in Panel A and clustered by Lender in Panel B, and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: IV 2SLS Effects: Reconfirm Results for Credit Card Terms

Dependent Variables:	Avg Cycle APR	Ln(Avg Limit)	Pct Cards w/ Rewards	Avg Cycle APR	Ln(Avg Limit)	Pct Cards w/ Rewards
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Opioid Death Rate$_{c,t-1}$	0.3433***	-0.0158*	-0.0178***			
	(5.30)	(-1.89)	(-4.12)			
High Opioid Death Rate$_{c,t-1}$				2.1138***	-0.0973*	-0.1099***
				(5.17)	(-1.88)	(-4.06)
Fit statistics						
Observations	1,008,285	1,009,322	1,009,322	1,008,285	1,009,322	1,009,322
Adj. R^2	0.001	0.055	0.002	0.001	0.048	0.001
Fixed effects						
State × Year-Month	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓
County controls	✓	✓	✓	✓	✓	✓

Panel B: IV 2SLS Effects on Consumer Spending

Dependent Variables:	Total Purchase /Pop	Total Purchase /Limit	Ln (Avg Purchase)	Total Purchase /Pop	Total Purchase /Limit	Ln (Avg Purchase)
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Opioid Death Rate$_{c,t-1}$	-0.0070***	-0.0149***	-0.0920**			
	(-6.90)	(-6.14)	(-2.40)			
High Opioid Death Rate$_{c,t-1}$				-0.0431***	-0.0922***	-0.5705**
				(-6.65)	(-5.95)	(-2.39)
Fit statistics						
Observations	1,008,631	1,008,631	1,004,460	1,008,631	1,008,631	1,004,460
Adj. R^2	0.021	0.001	0.151	0.010	0.001	0.142
Fixed effects						
State × Year-Month	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓
County controls	✓	✓	✓	✓	✓	✓

Internet Appendix: Supplementary Materials and Analyses

Table A1: Variable Definitions and Sources

This table provides definitions and data sources for the variables used in the analysis. Panel A shows variables used in all analyses, including opioid intensity measures from the Centers for Disease Control and Prevention (briefly noted in tables and below as CDC), instrumental variables from several sources, and county characteristics from several sources noted below. Panel B shows additional variables from the anonymized FBRNY Consumer Credit Panel/Equifax dataset (FRBNY CCP). Panel C shows additional variables from the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File (briefly noted in tables and below as Mintel/TransUnion Match File). Consumer demographic attributes are from the Mintel/TransUnion Match File. Panel D shows additional variables from the public bank FFIEC Call Reports data and FDIC Summary of Deposits (SoD). Panel E provides summary statistics for the Call Reports analysis.

Variable	Definition	Source
Key Independent Variables		
Opioid Death Rate	Opioid deaths per 10K SEER population in the county, lagged one year. Bank-level analysis uses a weighted measure using the fraction of bank branches in the county as a weight.	CDC/NCHS, National Center for Health Statistics
High Opioid Death Rate	Indicator for high total opioid death rate in the county in the top 50th percentile lagged 1 year. Bank-level analysis uses a weighted measure using the fraction of bank branches in the county as a weight.	CDC/NCHS, National Center for Health Statistics
Prescription Opioid Death Rate	Opioid deaths due to prescription opioids per 10K SEER population in the county, lagged 1 year.	CDC/NCHS, National Center for Health Statistics
Illicit Opioid Death Rate	Opioid deaths due to illicit opioids per 10K SEER population in the county, lagged 1 year.	CDC/NCHS, National Center for Health Statistics
Opioid Prescription Rate	Opioid prescriptions per capita in the county, lagged one year. Bank-level analysis uses a weighted measure using the fraction of bank branches in the county as a weight.	CDC/IQVIA Xponent
High Opioid Prescription Rate	Indicator for high prescription opioid death rate in the county in the top 50th percentile lagged 1 year. Bank-level analysis uses a weighted measure using the fraction of bank branches in the county as a weight.	CDC/IQVIA Xponent
Instrumental Variables		
MKT Doctors/1000Pop	Number of doctors in the county who received marketing payments from pharmaceutical companies to prescribe opioids per 1,000 county population each year. Bank-level analysis uses a weighted measure using the fraction of bank branches in the county as a weight.	Hadland et al. (2019), Open Payments Database
High Purdue MKT (OxyContinGrowth '97-'02)	Indicator for counties in the upper 50th percentile of the distribution of the percentage change in the quantity of OxyContin distributed by Purdue Pharma between 1997 and 2002. Bank-level analysis uses a weighted measure using the fraction of bank branches in the county as a weight.	DEA, Cornaggia et al. (2021)
Purdue MKT (OxyContin Growth '97-'02)	Percentage change in the quantity of OxyContin distributed by Purdue Pharma in the county between 1997 and 2002. Bank-level analysis uses a weighted measure using the fraction of bank branches in the county as a weight.	DEA, Cornaggia et al. (2021)
County Characteristics		
Ln(County Income)	Natural log of county income, lagged 1 year.	Bureau of Economic Analysis
County Unemployment Rate	County unemployment rate lagged 1 quarter.	Haver Analytics/BLS
County Bank HHI	Bank HHI of deposits at the county level.	FDIC Summary of Deposits (SoD)
County Population Density	County population density.	U.S. Census Bureau
County Race HHI	County HHI for population races.	U.S. Census American Community Surveys
County % Male	County percent of male population.	U.S. Census American Community Surveys
County % Age_25_44	County percent population ages 25-44.	U.S. Census American Community Surveys
County % Age_45_64	County percent population ages 45-64.	U.S. Census American Community Surveys
County % Age_65plus	County percent population ages 65 and above.	U.S. Census American Community Surveys
County % High Education ($\geq$ College)	County percent of population with higher education.	U.S. Census American Community Surveys
County Inequality: Gini Coefficient	County inequality proxied by the Gini Coefficient.	U.S. Census American Community Surveys

Table A1: Variable Definitions and Sources (cont.)

Variable	Definition	Source
Key Dependent Variables		
Rate Spread	The APR Spread over the one-month Treasury bonds.	Mintel/TransUnion Match File
Ln(Limit)	Natural log of credit card limit in the offer.	Mintel/TransUnion Match File
Limit ($)	Credit card limit in the offer in dollars.	Mintel/TransUnion Match File
Card Offer	Dummy for a credit card offer, and zero otherwise.	Mintel/TransUnion Match File
Consumer Characteristics		
Consumer Credit Score	Credit score, as of 2-3 months prior to the offer.	Mintel/TransUnion Match File
Credit Score_Less580	Credit score range: less than 580 or 300-580, as of 2-3 months prior to the offer.	Mintel/TransUnion Match File
Credit Score_580_660	Credit score range: 580-660, as of 2-3 months prior to the offer.	Mintel/TransUnion Match File
Credit Score_660_720	Credit score range: 660-720, as of 2-3 months prior to the offer.	Mintel/TransUnion Match File
Credit Score_720_800	Credit score range: 720-800, as of 2-3 months prior to the offer.	Mintel/TransUnion Match File
Credit Score_800plus	Credit score range: greater or equal to 800.	Mintel/TransUnion Match File
Deep_Delinq	Indicator for consumers with past deep delinquency 90 days past due or more on their loans, as of 2-3 months prior to the offer.	Mintel/TransUnion Match File
Recent_Delinq	Indicator for consumers with recent delinquency 90 days past due or more on their loans, as of 2-3 months prior to the offer.	Mintel/TransUnion Match File
Other_Derogatory	Indicator for consumers with past derogatory filings such as foreclosure, collections etc., as of 2-3 months prior to the offer.	Mintel/TransUnion Match File
Bankruptcy_Filer	Indicator for consumers with past bankruptcy filings, as of 2-3 months prior to the offer.	Mintel/TransUnion Match File
High_Util ($\geq$80%)	Indicator for consumers with high credit card utilization in the past (80% or more), as of 2-3 months prior to the offer.	Mintel/TransUnion Match File
Ln(1+ No Credit Inquiries)	Natural log of one plus number of credit inquiries by the consumer, as of 2-3 months prior to the offer.	Mintel/TransUnion Match File
Has_Prior_Cards	Indicator for consumers who have prior credit cards, as of 2-3 months prior to the offer.	Mintel/TransUnion Match File
Consumer Age	Consumer age.	Mintel/TransUnion Match File
Age_Less25	Consume age below 25.	Mintel/TransUnion Match File
Age_25to44	Consumer age range 25 to 44.	Mintel/TransUnion Match File
Age_45to64	Consumer age range 45 to 64.	Mintel/TransUnion Match File
Age_65plus	Consumer age 65 and above.	Mintel/TransUnion Match File
Married	Indicator for married consumers, as of 2-3 months prior to the offer.	Mintel/TransUnion Match File
No_Kids	Indicator if the consumer has no kids, as of 2-3 months prior to the offer.	Mintel/TransUnion Match File
White	Indicator for White or non-minority consumers.	Mintel/TransUnion Match File
Miss_Race	Indicator for missing/unreported race.	Mintel/TransUnion Match File
Educ: Some_College	Indicator for education: some college.	Mintel/TransUnion Match File
Educ: College	Indicator for education: college.	Mintel/TransUnion Match File
Educ: Post_College	Indicator for education: post-college.	Mintel/TransUnion Match File
Miss Educ	Indicator for missing/unreported education.	Mintel/TransUnion Match File
Homeowner	Indicator for homeowners, as of 2-3 months prior to the offer.	Mintel/TransUnion Match File
Ln(Consumer Income)	Natural log of consumer annual income, as of 2-3 months prior to the offer.	Mintel/TransUnion Match File

Table A2: More Identification: Propensity Score Matching (PSM) & Contiguous Counties

This table reports estimates from both univariate results and IV 2SLS regression results (equations (3) and (4)) using the "Mkt Doctors/1000Pop" instrument for explaining the relationship between opioid crisis intensity (*Opioid Death Rate* and *High Opioid Death Rate*), based on data from CDC) and bank credit card terms: rate spread and credit card limit. Panel A reports univariate evidence and Panels B and C report second-stage IV regression estimates from PSM analyses, where counties with a high opipid death rate (top 25%) are matched using several techniques (1:1 matching without replacement, 1:1 matching with replacement, nearest neighbor (n=2), nearest neighbor (n=3), and nearest neighbor (n=5)) to counties with a low opioid death rate, based on similar characteristics, including the instrument "Mkt Doctors/1000Pop". Finally, Panel D reports IV regression estimates when using contiguous counties only to the counties with a high opipid death rate (top 25%). All variables are constructed using the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card mail offers. The data are focused on lenders identified as "banks" in the Mintel/TransUnion Match File. Demographic attributes are from Mintel. Consumer controls include: credit score ranges, indicators for past deep delinquency, recent delinquency, past derogatory filings such as foreclosure and collections, past bankruptcy filings, past high utilization ($\geq$ 80%), number of credit inquiries, past credit cards, consumer age ranges, married, indicator for no kids, White, education indicators, homeowner, and consumer income. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions include *State × Year-Month, Lender × Year-Month, Lender × State, Lender, State,* and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by Marketing Campaign and Year-Month and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Univariate Evidence using Different PSM Methods

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	Rate Spread				Ln(Limit)			
PSM Estimation (common support)	Treated	Control	Difference	t-stat	Treated	Control	Difference	t-stat
1:1 Matching without replacement	17.46	17.24	0.22	7.11***	6.425	6.44	-0.015	-3.18***
1:1 Matching with replacement	17.46	16.98	0.48	4.16***	6.425	6.53	-0.105	-5.85***
Nearest neighbor (n=2)	17.46	17.2	0.26	3.01***	6.425	6.48	-0.055	-4.18***
Nearest neighbor (n=3)	17.46	17.25	0.21	2.88***	6.425	6.469	-0.044	-3.88***
Nearest neighbor (n=5)	17.46	17.23	0.23	3.76***	6.425	6.459	-0.034	-3.56***

Panel B: IV 2SLS with PSM Sample (1:1 Matching without replacement)

Dependent Variables:	Opioid Death Rate	High Opioid Death Rate	Rate Spread	Ln (Limit)	Rate Spread	Ln (Limit)
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Mkt Doctors/1000Pop$_{c,t-1}$	0.5168***	0.2672***				
	(6.83)	(6.93)				
Opioid Death Rate$_{c,t-1}$			1.0998***	-0.2700***		
			(3.84)	(-4.80)		
High Opioid Death Rate$_{c,t-1}$					2.1276***	-0.5222***
					(3.86)	(-4.84)
Fit statistics						
Observations	100,576	100,576	100,576	100,576	100,576	100,576
Adj. R^2	0.471	0.298	0.263	0.027	0.271	0.046
Fixed effects						
State × Year-Month	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓	✓	✓

Table A2: Propensity Score Matching (PSM) & Contiguous Counties (cont.)

This table reports estimates from both univariate results and IV 2SLS regression results (equations (3) and (4)) using the "Mkt Doctors/1000Pop" instrument for explaining the relationship between opioid crisis intensity (*Opioid Death Rate* and *High Opioid Death Rate*), based on data from CDC) and bank credit card terms: rate spread and credit card limit. Panel A reports univariate evidence and Panels B and C report second-stage IV regression estimates from PSM analyses, where counties with a high opipid death rate (top 25%) are matched using several techniques (1:1 matching without replacement, 1:1 matching with replacement, nearest neighbor (n=2), nearest neighbor (n=3), and nearest neighbor (n=5)) to counties with a low opioid death rate, based on similar characteristics, including the instrument "Mkt Doctors/1000Pop". Finally, Panel D reports IV regression estimates when using contiguous counties only to the counties with a high opipid death rate (top 25%). All variables are constructed using the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card mail offers. The data are focused on lenders identified as "banks" in the Mintel/TransUnion Match File. Demographic attributes are from Mintel. Consumer controls include: credit score ranges, indicators for past deep delinquency, recent delinquency, past derogatory filings such as foreclosure and collections, past bankruptcy filings, past high utilization ($\geq$ 80%), number of credit inquiries, past credit cards, consumer age ranges, married, indicator for no kids, White, education indicators, homeowner, and consumer income. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions include *State* × *Year-Month*, *Lender* × *Year-Month*, *Lender* × *State*, *Lender*, *State*, and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by Marketing Campaign and Year-Month and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel C: IV 2SLS with PSM Sample (1:1 Matching with replacement)

Dependent Variables: / Model:	Opioid Death Rate (1)	High Opioid Death Rate (2)	Rate Spread (3)	Ln (Limit) (4)	Rate Spread (5)	Ln (Limit) (6)
Mkt Doctors/1000Pop$_{c,t-1}$	0.4591***	0.1398**				
	(3.19)	(2.31)				
Opioid Death Rate$_{c,t-1}$			2.5353***	-0.1241**		
			(7.48)	(-2.36)		
High Opioid Death Rate$_{c,t-1}$					8.3256***	-0.4074**
					(6.16)	(-2.31)
Fit statistics						
Observations	101,145	101,145	101,145	101,145	101,145	101,145
Adj. R^2	0.531	0.449	0.001	0.170	0.474	0.136
Fixed effects						
State × Year-Month	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓	✓	✓

Panel D: IV 2SLS using Contiguous Counties Only

Dependent Variables: / Model:	Opioid Death Rate (1)	High Opioid Death Rate (2)	Rate Spread (3)	Ln (Limit) (4)	Rate Spread (5)	Ln (Limit) (6)
Mkt Doctors/1000Pop$_{c,t-1}$	0.9774***	0.3058***				
	(7.44)	(7.42)				
Opioid Death Rate$_{c,t-1}$			1.0145***	-0.1402***		
			(4.76)	(-3.48)		
High Opioid Death Rate$_{c,t-1}$					3.2420***	-0.4481***
					(4.78)	(-3.49)
Fit statistics						
Observations	64,276	64,276	64,276	64,276	64,276	64,276
Adj. R^2	0.601	0.366	0.278	0.131	0.284	0.139
Fixed effects						
State × Year-Month	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓	✓	✓

Table A3: Additional Tests to Support the Main Findings

This table reports robustness checks for explaining the relationship between opioid crisis intensity (*Opioid Death Rate* and *High Opioid Death Rate*), based on data from CDC) and bank credit card terms: rate spread and credit card limit. Panel A reports results when additionally including more county-level controls; Panel B reports results when using multiple death causes rather than underlying death cause for construction of our opioid intensity death measures; Panel C reports results using OLS estimates instead of IV estimates; Panel D reports results when excluding counties with ”zero deaths”; and Panel D reports results when excluding the states of Florida. We report in all cases other than Panel C regression estimates from IV 2SLS regressions (equations (3) and (4)) using the ”Mkt Doctors/1000Pop” as an instrument for opioid intensity. All variables are constructed using the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card mail offers. The data are focused on lenders identified as ”banks” in the Mintel/TransUnion Match File. Demographic attributes are from Mintel. Consumer controls include: credit score ranges, indicators for past deep delinquency, recent delinquency, past derogatory filings such as foreclosure and collections, past bankruptcy filings, past high utilization ($\geq$ 80%), number of credit inquiries, past credit cards, consumer age ranges, married, indicator for no kids, White, education indicators, homeowner, and consumer income. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions include *State* × *Year-Month, Lender* × *Year-Month, Lender* × *State, Lender, State,* and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by Marketing Campaign and Year-Month and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: IV 2SLS with Even More County-Level Controls

Dependent Variables:	Rate Spread	Ln(Limit)	Rate Spread	Ln(Limit)
Model:	(1)	(2)	(3)	(4)
Opioid Death Rate$_{c,t-1}$	0.4728***	-0.0648***		
	(4.27)	(-3.06)		
High Opioid Death Rate$_{c,t-1}$			1.1738***	-0.1610***
			(4.25)	(-3.05)
Additional Controls				
County Labor Participation Rate$_{c,t-1}$	0.5144	-0.4368***	0.4620	-0.4296***
	(1.15)	(-5.10)	(1.04)	(-5.04)
County Avg Credit Score$_{c,t-1}$	-0.0001	0.0038**	-0.0001	
	(2.28)	(-0.44)	(2.29)	(-0.46)
County Air Pollution$_{c,t-1}$	-0.0510***	0.0041*	-0.0555***	0.0047*
	(-4.23)	(1.76)	(-4.31)	(1.90)
County Δ HPI$_{c,t-1}$	-0.0078**	0.0021***	-0.0076**	0.0020***
	(-2.14)	(2.97)	(-2.08)	(2.92)
County % School Dropouts$_{c,t-1}$	-1.7398***	-0.0433	-0.9908*	-0.1460
	(-3.60)	(-0.47)	(-1.81)	(-1.40)
County % Religious Pop$_{c,t-1}$	-0.0011	0.0365*	-0.1161	0.0523***
	(-0.01)	(1.70)	(-1.18)	(2.79)
County Politics$_{c,t-1}$	0.0039	-0.0004	0.0011	0.0000
	(0.29)	(-0.15)	(0.08)	(0.00)
County Poverty Rate$_{c,t-1}$	0.5590	-0.0576	1.5609***	-0.1950*
	(0.88)	(-0.47)	(2.65)	(-1.73)
County % Poor Health Pop$_{c,t-1}$	-0.0087*	0.0018**	-0.0151***	0.0026***
	(-1.95)	(2.06)	(-2.98)	(2.73)
Fit statistics				
Observations	195,004	195,004	195,004	195,004
Adj. R^2	0.319	0.158	0.312	0.154
Fixed effects				
State × Year-Month	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓

Table A3: Additional Tests to Support the Main Findings (cont.)

This table reports robustness checks for explaining the relationship between opioid crisis intensity (*Opioid Death Rate* and *High Opioid Death Rate*), based on data from CDC) and bank credit card terms: rate spread and credit card limit. Panel A reports results when additionally including more county-level controls; Panel B reports results when using multiple death causes rather than underlying death cause for construction of our opioid intensity death measures; Panel C reports results using OLS estimates instead of IV estimates; Panel D reports results when excluding counties with "zero deaths"; and Panel D reports results when excluding the states of Florida. We report in all cases other than Panel C regression estimates from IV 2SLS regressions (equations (3) and (4)) using the "Mkt Doctors/1000Pop" as an instrument for opioid intensity. All variables are constructed using the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card mail offers. The data are focused on lenders identified as "banks" in the Mintel/TransUnion Match File. Demographic attributes are from Mintel. Consumer controls include: credit score ranges, indicators for past deep delinquency, recent delinquency, past derogatory filings such as foreclosure and collections, past bankruptcy filings, past high utilization ($\geq$ 80%), number of credit inquiries, past credit cards, consumer age ranges, married, indicator for no kids, White, education indicators, homeowner, and consumer income. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions include *State × Year-Month*, *Lender × Year-Month*, *Lender × State*, *Lender*, *State*, and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by Marketing Campaign and Year-Month and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel B: IV 2SLS - Alternative Opioid Death Rate based on Multiple Death Causes

Dependent Variables:	Rate Spread	Ln(Limit)	Rate Spread	Ln(Limit)
Model:	(1)	(2)	(3)	(4)
Opioid Death Rate$_{c,t-1}$	0.5069***	-0.0703***		
	(4.94)	(-3.58)		
High Opioid Death Rate$_{c,t-1}$			1.2413***	-0.1722***
			(4.91)	(-3.57)
Fit statistics				
Observations	197,398	197,398	197,398	197,398
Adj. R^2	0.317	0.157	0.310	0.154
Fixed effects				
State × Year-Month	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓

Panel C: Results using OLS Method

Dependent Variables:	Rate Spread	Rate Spread	Rate Spread	Rate Spread	Ln(Limit)	Ln(Limit)	Ln(Limit)	Ln(Limit)
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Opioid Death Rate$_{c,t-1}$	0.0216**				-0.0026			
	(2.27)				(-1.24)			
High Opioid Death Rate$_{c,t-1}$		0.0184				-0.0076**		
		(1.28)				(-2.28)		
Opioid Illicit Death Rate$_{c,t-1}$			0.0263**				-0.0045*	
			(2.34)				(-1.88)	
High Opioid Illicit Death Rate$_{c,t-1}$				0.0298*				-0.0088**
				(1.84)				(-2.28)
Fit statistics								
Observations	370802	370802	370802	370802	370802	370802	370802	370802
Adj. R^2	0.662	0.662	0.662	0.662	0.428	0.428	0.428	0.428
Fixed effects								
State × Year-Month	✓	✓	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓	✓	✓	✓	✓

Table A3: Additional Tests to Support the Main Findings (cont.)

This table reports robustness checks for explaining the relationship between opioid crisis intensity (*Opioid Death Rate* and *High Opioid Death Rate*), based on data from CDC) and bank credit card terms: rate spread and credit card limit. Panel A reports results when additionally including more county-level controls; Panel B reports results when using multiple death causes rather than underlying death cause for construction of our opioid intensity death measures; Panel C reports results using OLS estimates instead of IV estimates; Panel D reports results when excluding counties with "zero deaths"; and Panel D reports results when excluding the states of Florida. We report in all cases other than Panel C regression estimates from IV 2SLS regressions (equations (3) and (4)) using the "Mkt Doctors/1000Pop" as an instrument for opioid intensity. All variables are constructed using the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card mail offers. The data are focused on lenders identified as "banks" in the Mintel/TransUnion Match File. Demographic attributes are from Mintel. Consumer controls include: credit score ranges, indicators for past deep delinquency, recent delinquency, past derogatory filings such as foreclosure and collections, past bankruptcy filings, past high utilization ($\geq$ 80%), number of credit inquiries, past credit cards, consumer age ranges, married, indicator for no kids, White, education indicators, homeowner, and consumer income. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions include *State* × *Year-Month, Lender* × *Year-Month, Lender* × *State, Lender, State,* and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by Marketing Campaign and Year-Month and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel C: Results using OLS Method (cont.)

Dependent Variables:	Rate Spread	Ln(Limit)	Rate Spread	Ln(Limit)
Model:	(1)	(2)	(3)	(4)
Opioid Prescription Rate$_{c,t-1}$	0.1934***	-0.0227***		
	(5.53)	(-3.36)		
High Opioid Prescription Rate$_{c,t-1}$			0.1142***	-0.0130***
			(6.71)	(-3.45)
Fit statistics				
Observations	369,263	369,263	369,263	369,263
Adj. R^2	0.662	0.428	0.662	0.428
Fixed effects				
State × Year-Month	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓

Panel D: IV 2SLS Excluding Counties with "Zero Deaths"

Dependent Variables:	Rate Spread	Ln(Limit)	Rate Spread	Ln(Limit)
Model:	(1)	(2)	(3)	(4)
Opioid Death Rate$_{c,t-1}$	0.4682***	-0.0718***		
	(4.42)	(-3.54)		
High Opioid Death Rate$_{c,t-1}$			1.0678***	-0.1639***
			(4.40)	(-3.54)
Fit statistics				
Observations	194,293	194,293	194,293	194,293
Adj. R^2	0.317	0.157	0.312	0.154
Fixed effects				
State × Year-Month	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓

Table A3: Additional Tests to Support the Main Findings (cont.)

This table reports robustness checks for explaining the relationship between opioid crisis intensity (*Opioid Death Rate* and *High Opioid Death Rate*), based on data from CDC) and bank credit card terms: rate spread and credit card limit. Panel A reports results when additionally including more county-level controls; Panel B reports results when using multiple death causes rather than underlying death cause for construction of our opioid intensity death measures; Panel C reports results using OLS estimates instead of IV estimates; Panel D reports results when excluding counties with "zero deaths"; and Panel D reports results when excluding the states of Florida. We report in all cases other than Panel C regression estimates from IV 2SLS regressions (equations (3) and (4)) using the "Mkt Doctors/1000Pop" as an instrument for opioid intensity. All variables are constructed using the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card mail offers. The data are focused on lenders identified as "banks" in the Mintel/TransUnion Match File. Demographic attributes are from Mintel. Consumer controls include: credit score ranges, indicators for past deep delinquency, recent delinquency, past derogatory filings such as foreclosure and collections, past bankruptcy filings, past high utilization ($\geq$ 80%), number of credit inquiries, past credit cards, consumer age ranges, married, indicator for no kids, White, education indicators, homeowner, and consumer income. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions include *State* × *Year-Month, Lender* × *Year-Month, Lender* × *State, Lender, State,* and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by Marketing Campaign and Year-Month and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel E: IV 2SLS Excluding Florida

Dependent Variables:	Rate Spread	Ln(Limit)	Rate Spread	Ln(Limit)
Model:	(1)	(2)	(3)	(4)
Opioid Death Rate$_{c,t-1}$	0.7523***	-0.1003***		
	(5.79)	(-4.04)		
High Opioid Death Rate$_{c,t-1}$			1.8456***	-0.2461***
			(5.72)	(-4.02)
Fit statistics				
Observations	182,900	182,900	182,900	182,900
Adj. R^2	0.308	0.153	0.293	0.146
Fixed effects				
State × Year-Month	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓

Table A4: Additional Heterogeneous Effects for High Risk and Minority Consumers

This table examines how the effects of opioid crisis intensity on bank credit card terms (rate spread and credit card limit) differ by consumer credit risk using interactions of consumer "High Credit Risk" and opioid intensity. We define "High Credit Risk" as either "Subprime" (Credit Score <620) in Panel A or "Deep Delinquency" past 90+ days past due (DPD)) in Panel B. We report regression estimates from IV 2SLS regressions (equations (3) and (4)) using the "Mkt Doctors/1000Pop" as an instrument for opioid crisis intensity (*Opioid Death Rate* and *High Opioid Death Rate*), based on data from CDC). All variables are constructed using the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card mail offers. The data are focused on lenders identified as "banks" in the Mintel/TransUnion Match File. Demographic attributes are from Mintel. Consumer controls include: credit score ranges, indicators for past deep delinquency, recent delinquency, past derogatory filings such as foreclosure and collections, past bankruptcy filings, past high utilization ($\geq$ 80%), number of credit inquiries, past credit cards, consumer age ranges, married, indicator for no kids, White, education indicators, homeowner, and consumer income. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions include *State × Year-Month, Lender × Year-Month, Lender × State, Lender, State,* and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by Marketing Campaign and Year-Month and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Deep Delinquency (90+ DPD)

Dependent Variables:	Rate Spread	Ln(Limit)	Limit ($)	Rate Spread	Ln(Limit)	Limit ($)
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Opioid Death Rate$_{c,t-1}$ x High Credit Risk$_{i,c,t-1}$	0.1509***	-0.0136***	-4.8549			
	(11.08)	(-5.31)	(-1.26)			
High Opioid Death Rate$_{c,t-1}$ x High Credit Risk$_{i,c,t-1}$				3.1775***	-0.2894***	-110.594
				(11.25)	(-5.48)	(-1.39)
Opioid Death Rate$_{c,t-1}$	0.1864	-0.0440**	-79.9785**			
	(1.62)	(-2.03)	(-2.46)			
High Opioid Death Rate$_{c,t-1}$				0.4822*	-0.1050**	-183.0233**
				(1.85)	(-2.16)	(-2.50)
High Credit Risk$_{i,c,t-1}$	-0.2803*	-0.0379	-153.6166***	-0.0931	-0.0529**	-154.4175***
	(-1.72)	(-1.24)	(-3.34)	(-0.65)	(-1.98)	(-3.83)
Fit statistics						
Observations	197,371	197,371	197,371	197,371	197,371	197,371
Adj. R^2	0.278	0.141	0.08	0.268	0.138	0.077
Fixed effects						
State × Year-Month	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓	✓	✓

Panel B: Minority Consumers

Dependent Variables:	Rate Spread	Ln(Limit)	Limit ($)	Rate Spread	Ln(Limit)	Limit ($)
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Opioid Death Rate$_{c,t-1}$ x Minority$_{i,c,t}$	0.0176	-0.0058**	-6.3736*			
	(1.32	(-2.26)	(-1.65)			
High Opioid Death Rate$_{c,t-1}$ x Minority$_{i,c,t}$				0.4314	-0.1316**	-146.0764*
				(1.5)	(-2.40)	(-1.76)
Opioid Death Rate$_{c,t-1}$	0.4902***	-0.0625***	-74.0231**			
	(4.43)	(-2.95)	(-2.30)			
High Opioid Death Rate$_{c,t-1}$				1.1179***	-0.1429***	-169.0837**
				(4.42)	(-2.96)	(-2.31)
Minority$_{i,c,t}$	0.068	0.0287	35.6529	0.0599	0.0258	32.7751
	(0.48)	(1.06)	(0.87)	(0.48)	(1.08)	(0.90)
Fit statistics						
Observations	197,371	197,371	197,371	197,371	197,371	197,371
Adj. R^2	0.317	0.157	0.083	0.312	0.154	0.081
Fixed effects						
State × Year-Month	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓	✓	✓

Table A5: Additional Heterogeneous Effects for Low Income and Young Consumers

This table examines how the effects of opioid crisis intensity on bank credit card terms differ by consumer income and age using interactions of consumer low income (≤\$30k) with opioid intensity in Panel A and young (≤25 yrs) with opioid intensity in Panel B. In all cases, we report IV 2SLS regression estimates (equations (3) and (4)) using "Mkt Doctors/1000Pop" as an instrument for opioid crisis intensity. All variables are constructed using the anonymized Mintel Comperemedia Inc. Direct Mail Monitor Data and TransUnion LLC Match File for analyzing credit card mail offers. The data are focused on lenders identified as "banks" in the Mintel/TransUnion Match File. Demographic attributes are from Mintel. Consumer controls include: credit score ranges, indicators for past deep delinquency, recent delinquency, past derogatory filings such as foreclosure and collections, past bankruptcy, past high utilization (≥ 80%), number of credit inquiries, past credit cards, consumer age ranges, married, indicator for no kids, White, education indicators, homeowner, and consumer income. County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions include *State* × *Year-Month*, *Lender* × *Year-Month*, *Lender* × *State*, *Lender*, *State*, and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by Marketing Campaign and Year-Month and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: Low Income (≤\$30k) Consumers

Dependent Variables:	Rate Spread	Ln(Limit)	Limit (\$)	Rate Spread	Ln(Limit)	Limit (\$)
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Opioid Death Rate$_{c,t-1}$ x Low Income$_{i,c,t-1}$	0.0445***	-0.0062**	-4.2787			
	(2.78)	(-2.03)	(-0.92)			
High Opioid Death Rate$_{c,t-1}$ x Low Income$_{i,c,t-1}$				1.2101***	-0.1701**	-130.927
				(3.30)	(-2.43)	(-1.24)
Opioid Death Rate$_{c,t-1}$	0.4627***	-0.0673***	-83.8340***			
	(4.26)	(-3.24)	(-2.66)			
High Opioid Death Rate$_{c,t-1}$				1.0367***	-0.1507***	-187.9986***
				(4.22)	(-3.22)	(-2.65)
Low Income$_{i,c,t-1}$	-0.2939	0.0424	9.2884	-0.3751*	0.0542	24.324
	(-1.48)	(1.11)	(0.16)	(-1.93)	(1.46)	(0.43)
Fit statistics						
Observations	197,371	197,371	197,371	197,371	197,371	197,371
Adj. R^2	0.314	0.153	0.081	0.305	0.148	0.078
Fixed effects						
State × Year-Month	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓	✓	✓

Panel B: Young (≤25 yrs) Consumers

Dependent Variables:	Rate Spread	Ln(Limit)	Limit (\$)	Rate Spread	Ln(Limit)	Limit (\$)
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Opioid Death Rate$_{c,t-1}$ x Young$_{i,c,t}$	0.0627*	-0.0072	-7.7118			
	(1.72)	(-1.03)	(-0.73)			
High Opioid Death Rate$_{c,t-1}$ x Young$_{i,c,t}$				1.8895**	-0.2259	-247.88
				(2.18)	(-1.37)	(-0.99)
Opioid Death Rate$_{c,t-1}$	0.5106***	-0.0705***	-82.6125***			
	(4.85)	(-3.50)	(-2.71)			
High Opioid Death Rate$_{c,t-1}$				1.1798***	-0.1623***	-189.9956***
				(4.93)	(-3.56)	(-2.75)
Young$_{i,c,t}$	0.5136	-0.0845	-80.6218	0.2715	-0.0521	-43.159
	(1.21)	(-1.04)	(-0.65)	(0.60)	(-0.60)	(-0.33)
Fit statistics						
Observations	197,371	197,371	197,371	197,371	197,371	197,371
Adj. R^2	0.315	0.157	0.083	0.306	0.152	0.08
Fixed effects						
State × Year-Month	✓	✓	✓	✓	✓	✓
Lender × Year-Month	✓	✓	✓	✓	✓	✓
Lender × State	✓	✓	✓	✓	✓	✓
Lender, State, Year-Month	✓	✓	✓	✓	✓	✓
Consumer & County controls	✓	✓	✓	✓	✓	✓

Table A6: Extra Results for Mechanisms, Credit, & Spending (County-Year-Month)

This table reports regression estimates from IV 2SLS regressions (equations (3) and (4)) using the "Mkt Doctors/1000Pop" instrument for explaining the relationship between opioid crisis intensity and consumer credit card behavior and/or quality in Panel A, bank credit card terms to consumers in Panel B, and consumer credit card spending in Panel C. Opioid crisis intensity is measured as *Opioid Death Rate* and *High Opioid Death Rate*, based on data from CDC. Consumer credit card behavior and/or quality is measured several ways as: Ln(Avg Days Past Due), Avg Loan Probability of Default (PD), Ln(Avg Payment), and Avg Updated Consumer Credit Score). Credit terms are measured several ways as: Avg Cycle APR, Limit/Pop, and Pct Rewards (percent of accounts with rewards). Consumer spending is measured as Total Purchase/Pop or Total Purchase/Limit. All these analyses use aggregated bank-county-year-month data from the supervisory FR Y-14M credit card dataset based on a 0.1% random sample for existing consumer accounts (loan age $\geq$ 12 months). County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions include *State × Year-Month, Lender × Year-Month, Lender × State, Lender, State,* and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by County and Year-Month and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A: IV 2SLS Effects: Effects on Credit Card Consumer Credit Behavior and/or Quality

Dependent Variables:	Opioid Death Rate	High Opioid Death Rate	Ln(Avg Days Past Due)	Avg Prob Default (PD)	Ln(Avg Payment)	Avg Credit Score	Ln(Avg Days Past Due)	Avg Prob Default (PD)	Ln(Avg Payment)	Avg Credit Score
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Mkt Doctors/1000Pop$_{c,t-1}$	0.4388***	0.0669***								
	(17.92)	(6.04)								
Opioid Death Rate$_{c,t-1}$			0.2367***	0.0034***	-0.6148***	-7.1076***				
			(5.84)	(2.40)	(-11.01)	(-5.33)				
High Opioid Death Rate$_{c,t-1}$							1.5526***	0.0233***	-3.6161***	-46.6208***
							(4.32)	(2.23)	(-6.11)	(-4.12)
Fit statistics										
Observations	119,482	119,096	119,482	119,482	119,096	119,482	118,823	118,823	119,482	119,482
Adj. R^2	0.048	0.052	0.019	0.006	0.060	0.080	0.004	0.001	0.010	0.020
Fixed effects										
State × Year-Month	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State, Year-Month	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
County controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Panel B: IV 2SLS Effects: Reconfirm Results for Credit Card Terms

Dependent Variables:	Avg Cycle APR	Ln(Avg Limit)	Pct Cards w/ Rewards	Avg Cycle APR	Ln(Avg Limit)	Pct Cards w/Rewards
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Opioid Death Rate$_{c,t-1}$	0.4674***	-0.0832***	-0.0913***			
	(4.81)	(-6.09)	(-9.76)			
High Opioid Death Rate$_{c,t-1}$				3.0659***	-0.5456***	-0.5992***
				(3.85)	(-4.42)	(-5.37)
Fit statistics						
Observations	119,482	119,482	119,482	119,482	119,482	119,482
Adj. R^2	0.004	0.086	0.009	0.001	0.003	0.001
State × Year-Month	✓	✓	✓	✓	✓	✓
State, Year-Month	✓	✓	✓	✓	✓	✓
County controls	✓	✓	✓	✓	✓	✓

Table A6: Extra Results on Mechanisms, Credit, & Spending (County-Year-Month) (cont.)

This table reports regression estimates from IV 2SLS regressions (equations (3) and (4)) using the "Mkt Doctors/1000Pop" instrument for explaining the relationship between opioid crisis intensity and consumer credit card behavior and/or quality in Panel A, bank credit card terms to consumers in Panel B, and consumer credit card spending in Panel C. Opioid crisis intensity is measured as *Opioid Death Rate* and *High Opioid Death Rate*, based on data from CDC. Consumer credit card behavior and/or quality is measured several ways as: Ln(Avg Days Past Due), Avg Loan Probability of Default (PD), Ln(Avg Payment), and Avg Updated Consumer Credit Score). Credit terms are measured several ways as: Avg Cycle APR, Ln(Avg Limit), and Pct Rewards (percent of accounts with rewards). Consumer spending is measured as Total Purchase/Pop, Total Purchase/Limit, or Ln(Avg Purchase). All these analyses use aggregated county-year-month data from the supervisory FR Y-14M credit card dataset based on a 0.1% random sample for existing consumer accounts (loan age $\geq$ 12 months). County controls include: county income, unemployment rate, bank market concentration, population density, percent of males, race concentration, percent of people in various age ranges, percent of people with higher education, and inequality. All regressions include *State* × *Year-Month, Lender* × *Year-Month, Lender* × *State, Lender, State,* and *Year-Month* fixed effects. Variables are defined in Appendix Table A1. Standard errors are double-clustered by County and Year-Month and t-statistics are reported in parentheses. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel C: IV 2SLS Effects on Consumer Spending

Dependent Variables:	Total Purchase /Pop	Total Purchase /Limit	Ln (Avg Purchase)	Total Purchase /Pop	Total Purchase /Limit	Ln (Avg Purchase)
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Opioid Death Rate$_{c,t-1}$	-0.1244***	-0.0145***	-0.3960***			
	(-10.93)	(-6.57)	(-9.02)			
High Opioid Death Rate$_{c,t-1}$				-0.8162***	-0.0950***	-2.1450***
				(-5.56)	(-4.60)	(-6.09)
Fit statistics						
Observations	119,482	119,482	117,142	119,482	119,482	117,142
Adj. R^2	0.113	0.012	0.112	0.030	0.003	0.032
Fixed effects						
State × Year-Month	✓	✓	✓	✓	✓	✓
State, Year-Month	✓	✓	✓	✓	✓	✓
County controls	✓	✓	✓	✓	✓	✓

Table A7: Summary of Opioid-Related State Laws

This table summarizes six state policies and laws aimed at reducing opioid abuse and opioid-related harm. We separate them into *supply-related* and *demand-related* laws.

Name	Description	Implementing States & First Year Implemented	Source
Supply-Related Laws			
"Opioid Limiting Law"	Limits prescriptions to a 4-, 5-, or 7-day supply for first time users or for acute or postoperatory pain or other uses or set other limits on the number of prescriptions or overall quantity of opioids that can be prescribed by physicians to a patient.	2016: AZ, CT, ME, MA, NE, NH, NY, NC, PA, RI; 2017: AK, CO, DE, HI, ID, KY, LA, MI, MN, MO, NV, NJ, OH, UT, VT, VA, WA; 2018: FL, OK, SC, TN, WV.	The Ballotpedia, Opioid Prescription Polcies by States, the National Conference of State Legislators (NCSL), Individual State Websites & Custodio, Cvijanovic and Wiedemann (2021)
Mandatory "Opioid PDMP Law"	The Prescription Drug Monitoring Program (PDMP) collects and tracks opioid prescriptions and connect prescribers, dispensers, law enforcement, and Medicare authorities. The mandatory law requires that prescribers must access the PDMP system before prescribing an opioid as interpreted by the Prescription Drug Abuse Policy System (PDAPS).	2012: KY, NM, WV; 2013: NY, TN, VT; 2014: GA, IN, MA; 2015: CT, NJ, NV, OH, OK, VA; 2016: NH, RI.	The Opioid Environment Policy Scan (OEPS), University of Chicago
"Triplicate Prescription Law"	Requires three copies of an opioid prescription issued and kept by, respectively, the prescriber, the pharmacist, and a state agency that maintains a database from these forms to monitor and investigate prescribing irregularities and diversion.	States with active triplicate programs at the time of OxyContin's launch in 1996: CA, ID, IL, NY, and TX.	Alpert, Evans, Lieber and Powell (2022)
Demand-Related Laws			
"Naloxone Law"	Increases access to and allows the prescribing and dispensing of Naloxone (an opioid receptor antagonist that reverses opiate overdose) by various third parties to users with documented risk factors for overdose.	Passed law before 2010: CA, CT, NM, NY; in 2010: IL, WA; 2012: MA, RI; 2013: CO, DC, KY, MD, NJ, NC, OK, OR, VT, VA; 2014: DE, GA, ME, MI, MN, OH, PA, TN, UT, WI; 2015: AL, AR, FL, ID, IN, LA, MS, NE, NV, NH, ND, SC, TX, WV; 2016: AK, AZ, HI, IA, MO, SD; 2017: KS, MT, WY.	The Opioid Environment Policy Scan (OEPS), University of Chicago
"Good Samaritan Law"	Provides immunity to drug users for certain drug crimes when they call for help for a person experiencing a drug overdose, again potentially helping reduce deaths.	Any Samaritan Law started before 2010: AK, KS, ME, MD, NM, OK, TX, WY; in 2010: WA; 2011: CT; NY; 2012: CO, FL, IL, MA, RI; 2013: CA, DE, DC, NJ, NC, VT; 2014: GA, IN, LA, MN, PA, UT, WI; 2015: AL, AR, HI, KY, MS, NV, NH, ND, TN, VA, WV; 2016: OH, OR; 2017: MI, MO, MT, NE, SC, SD; 2018: AZ, ID, IA.	The Opioid Environment Policy Scan (OEPS), University of Chicago
"Medical Marijuana Permitting Law"	Accepts and legalizes marijuana for medical purposes.	Law in effect during our sample period (2010-2019): AK, AZ, AR, CA, CO, CT, DE, DC, FL, HI, IL, ME, MD, MA, MI, MN, MT, NV, NH, NJ, NM, NY, OH, OR, PA, RI, VT, WA.	The Opioid Environment Policy Scan (OEPS), University of Chicago

EXHIBIT 196

The Economic Impact of the Opioid Epidemic

Drug abuse doesn't have just a human cost. There's also an economic cost.

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Although the recent COVID-19 pandemic was severe, with a death toll of 1.2 million, the opioid epidemic that began in the late 1990s remains the longest ongoing health crisis in the U.S. Between 1999 and 2020, more than 564,000 people died from opioid overdoses, surpassing total deaths from auto accidents during the same period (Figure 1). In 2017 alone, 2.1 million people were diagnosed with opioid-related disorder.[1] Even more worryingly, the death rate from opioid overdoses skyrocketed after 2012.

There is growing evidence that the opioid epidemic has harmed many aspects of the real economy, including the labor market, consumer finance, and municipal finance. According to analyses from the Council of Economic Advisers' 2019 report,[2] the annual (nominal) economic cost of the opioid epidemic, including the cost of lives lost, is estimated at about $700 billion (roughly 3.4 percent of GDP) in 2018 alone, and over $2.5 trillion from 2015 to 2018.

*See **Isolating the Causes.***

Federal, state, and local governments have implemented regulations to tackle the opioid crisis by curbing both their supply and their demand. Prior studies have mostly focused on state and local laws. Unfortunately, these studies have found that regulations have had limited success in reducing either the death rate or the associated economic harm.

In this article, we review the history of the opioid crisis in the U.S., its economic impact, and the many government policies designed to contain the epidemic.

FIGURE 1

COVID-19 Was More Deadly, but the Opioid Epidemic Is the Bigger Ongoing Health Crisis

Economic Cost
including lives lost

3.4%
of GDP in 2018

$2.5+
trillions, 2015–2018

Data Source: *Economic Report of the President* (March 2019).

Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics, Mortality.

Isolating the Causes

Isolating the causality effects of opioid abuse on the real economy is a challenge because the opioid crisis may be an effect rather than a cause of local adverse economic conditions. Researchers address this challenge by relying on instruments that capture supply-side factors, given that prescription opioids are involved in at least 40 percent of all opioid overdoses in the country. Moreover, the majority of illegitimate-drug users start on their road to addiction by taking opioids prescribed by their physician, even if many progress to illicit opioids.

The instruments used by researchers include the intensity of local opioid distribution channels (for example, the per capita morphine milligram equivalent [MME] of strong types of opioids distributed by retail pharmacies); marketing efforts by the pharmaceutical industry that target physicians, such as the number (per county and per year) of physicians being marketed opioids; and Purdue Pharma's heterogeneous marketing efforts across different geographies of reformulated OxyContin in the first wave of the crisis, as proxied by growth in the distribution of OxyContin.

A Brief History of the Opioid Epidemic

The ongoing opioid epidemic in the U.S. has occurred in three waves. It started with technological innovations and aggressive marketing practices, followed by a burst of illegal activities in the second and third waves (Figure 2).

The first wave began with Purdue Pharma's introduction of OxyContin in 1996 and ended in 2010. It coincided with a massive increase in the use of prescribed opioids and limited regulation of prescriptions.

OxyContin is a painkiller designed to be released slowly into the body so that it provides patients longer relief from pain with less of the potential for addiction. Between 1997 and 2002, Purdue Pharma increased its marketing and promotion budget for OxyContin by almost 800 percent, under the marketing slogan "The One to Start With and the One to Stay With." Physicians who cared about treating pain-impaired patients were persuaded by this highly effective marketing campaign that the new opioids were safer than older ones.

But the benefits were too good to be true. Pain rebounded sooner and stronger than expected. Patients' drug tolerance built up, which led to opioid abuse. Some people began crushing the pills and ingesting the medication all at once to get around the medication's slow time release. By 2004, OxyContin had become the opioid most associated with addiction.[3]

The second wave of the opioid crisis dates from 2010 to 2013 and was characterized by a rise in heroin use and associated deaths. Two forces triggered the second wave. First, a reformulation of OxyContin in August 2010 made the drug crush-resistant and harder to snort or inject. Unfortunately, addiction is hard to stop once it gets started. This reformulation compelled many OxyContin addicts to switch to heroin, which they could more easily snort or inject. Second, government policies restricted the supply of opioid prescriptions. A more limited supply drove up prices and simultaneously made it harder for addicts to access OxyContin. Heroin became relatively cheaper and easier to access, prompting many OxyContin addicts to switch to heroin.[4]

The third and current wave started in 2013, when deaths related to the use of fentanyl surged. (Fentanyl is more potent than heroin but cheaper to produce and transport.)[5]

Earlier opioid deaths occurred mostly among White, less-educated, prime-age males, as documented by researchers who argue that economic misfortune played an important role in the epidemic.[6] This view, however, has been challenged, especially because the crisis has grown to affect an increasingly broad spectrum of the population, as can be seen when we chart the opioid-related death rate of each demographic group relative to their respective population (Figure 3).

Starting with the third wave in 2014, opioid-related death rates increased disproportionately among Black Americans, whose death rate has ranked first among all races in the last several years; among prime-age male workers, particularly those between ages 25 and 44; and among people with no more than a high school education.

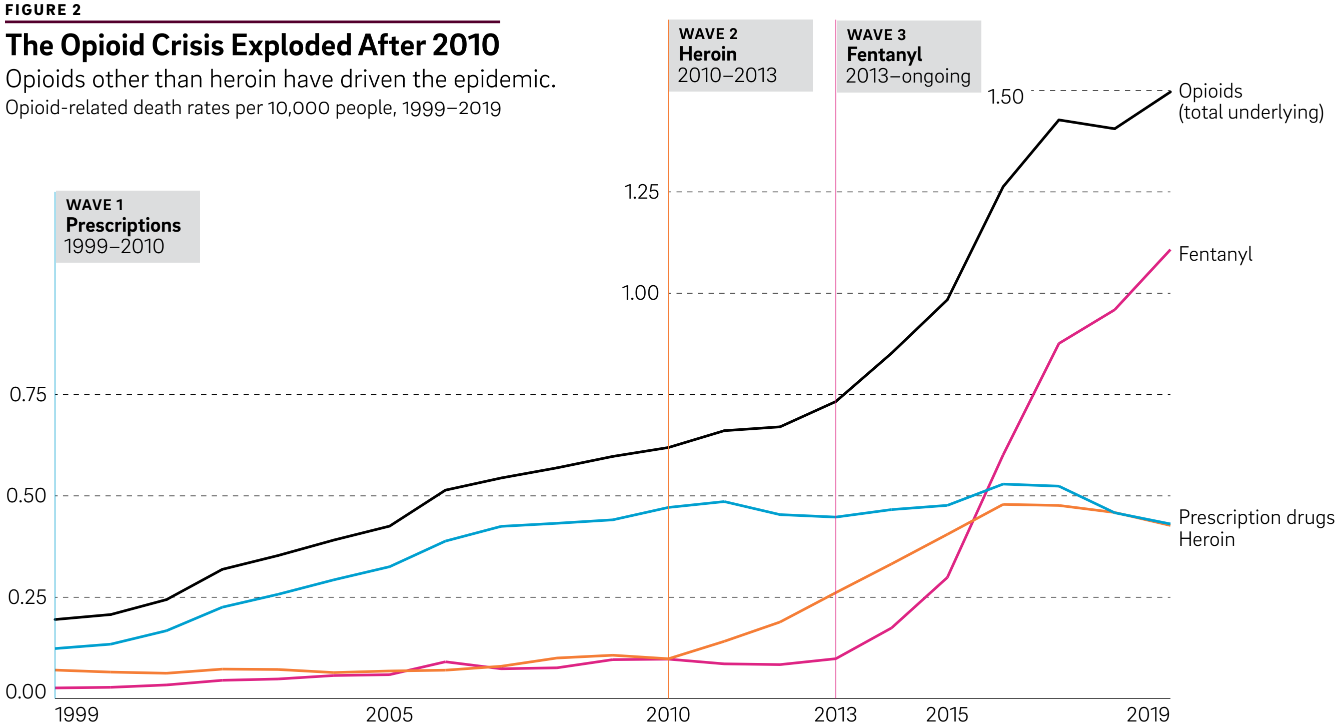
Researchers have concluded that changes in demand-side factors alone—including physical pain, depression, despair, and social isolation—explain only a small fraction of the increase in opioid use and deaths. Moreover, there doesn't appear to be a substantial link between local economic downturns and rising working-age mortality from drug overdoses, opioids or otherwise.[7] Instead, researchers have identified supply-side factors as the primary explanation for the recent opioid epidemic.

FIGURE 2

The Opioid Crisis Exploded After 2010

Opioids other than heroin have driven the epidemic.

Opioid-related death rates per 10,000 people, 1999–2019



Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics, Mortality.

The Opioid Epidemic's Effect on the Real Economy

The medical profession has long documented that drug addiction often leads to unsound decisions due to "reinforcer pathology," which increases an individual's overvaluation of short-term rewards and undervaluation of long-term negative consequences. (Other causes of unsound decisions include impulsivity, nonconformity to rules, and cognitive issues.)[8] These unsound decisions in turn render addicts less employable and lead to financial difficulties. Indeed, researchers have identified the detrimental effects of the opioid crisis on many aspects of the real economy, such as the labor market, the housing market, consumer finance, and municipal finance.

Researchers have found that the opioid epidemic has particularly harmed the labor market and firm production. For the labor market, workers who reported misuse of prescription drugs, including opioids, were more likely to report workday absenteeism and more days of absenteeism than workers who didn't report prescription drug misuse.[9] And counties in which more per capita opioid pain medication had been prescribed had lower labor force participation rates, lower employment-to-population ratios, higher disability insurance claiming rates, and higher unemployment rates.[10]

Meanwhile, firm growth is negatively affected by exposure to opioid-affected areas, because the eroding labor market conditions force firms to invest more in technology and to substitute capital for relatively scarce labor.[11] There are also negative impacts on small-firm formation and survival.[12] And opioid use reduces net firm entry and results in a shift in industrial composition due to labor supply issues in affected areas, driving long-term stagnation and fiscal difficulties.[13]

Researchers have also found that the opioid epidemic adversely affected consumer finance. Using data from a U.S. lender, one researcher documented an increase in consumer defaults in subprime auto loans due to local-market opioid abuse.[14] Other researchers, using a nationally representative data set that covers both subprime and prime borrowers as well as a wide range of credit products, revealed unfavorable credit consequences for consumers living in—and for banks operating in—highly exposed areas.[15] Specifically, low-credit-score consumers in areas with greater exposure to the opioid crisis were more likely to default on their loan obligations, including credit card debt, auto loans, and first mortgages. Single-branch banks also experienced more credit card defaults and nonperforming loans when they operated in counties more exposed to opioid abuse. As a result, lenders contracted the credit supply for consumers in these areas by applying stricter credit terms and reducing credit offers, particularly to those with lower credit scores.

Researchers have also found that the opioid epidemic harmed municipal finance. For example, local opioid abuse negatively affects municipal bonds, which in turn impedes a municipality's ability to provide necessary public services and infrastructure.[16] Other researchers have identified lower housing values in areas more affected by the opioid epidemic, which have negative implications for local government finance.[17] And the more opioids distributed by a dispensary, the lower the value of surrounding homes.[18]

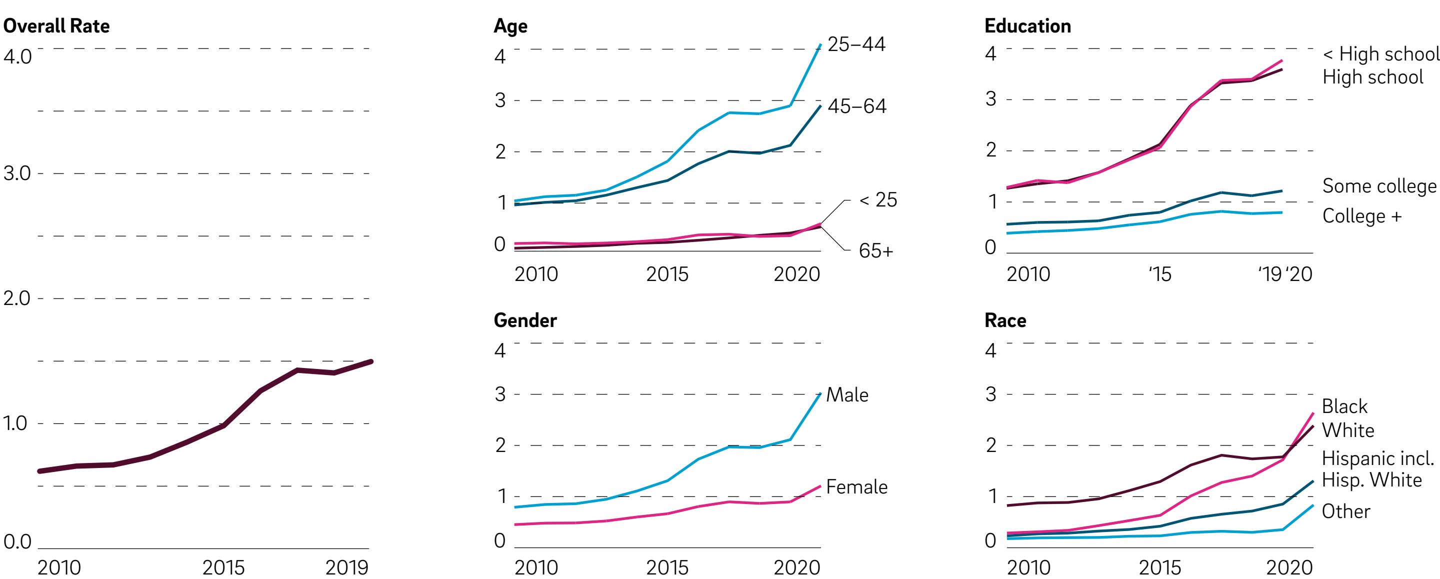
The Limits of the Law

Federal, state, and local policymakers have introduced many opioid-related laws and regulations to combat the opioid epidemic. In this article, we focus on state and local laws, as do

FIGURE 3

Opioid Death Rates Differ by Demographic Group

Opioid-related overall death rates per 10,000 people by consumer demographics, 2010–2020



Note: Rates are constructed relative to their respective population.

Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics, Mortality.

most previous studies.[19] Broadly speaking, we can divide these regulations into two groups: those that aim to restrict opioid supply and those that aim to restrict opioid demand. However, none of these laws have been very successful at curbing opioid use and abuse.

On the supply side, some states limit opioid prescriptions to four-, five-, or seven-day supplies when used to treat acute or postoperative pain for first-time users. As of 2018, 32 states also limited the number of prescriptions or the overall quantity of opioids that physicians may prescribe to a patient.

To varying degrees, states have also implemented a prescription drug monitoring program (PDMP), which uses an electronic database to track controlled-substance prescriptions within that state. PDMPs provide health authorities timely information about prescribing and patient behaviors that contribute to the epidemic; these data facilitate a nimble and targeted response. Some states mandate the use of PDMPs by prescribers; others make it voluntary. As noted earlier, the opioid crisis began when some doctors overprescribed opioids, sometimes illegally, so the information collected is also used by licensing boards to identify doctors, dentists, and pharmacists who may be inappropriately prescribing or dispensing these highly abusable drugs.

Additionally, states with triplicate prescription laws require that physicians write prescriptions on special triplicate forms for all Schedule II drugs, including opioids.[20] In triplicate prescribing, the physician keeps one copy of the prescription for five years and sends two copies with the patient to the pharmacist. The pharmacist keeps one copy and forwards the third copy to a specified state agency. The state agency uses these prescriptions to track the physician's prescribing practices and the patient's use of controlled substances.[21]

On the demand side, states have implemented access laws for naloxone, which reverses an opioid overdose. The level of naloxone access varies by state. The most generous laws include a standing order that allows any resident to obtain the drug at a local pharmacy with no justification. The less-generous third-party prescription laws, by comparison, allow a resident who is not at risk of overdose to purchase naloxone for use on someone else.[22] As of August 2020, all 50 states and the District of Columbia have some form of a naloxone access law.

Good Samaritan laws offer legal protection to people who give reasonable assistance to those who are, or whom they believe to be, injured, ill, in peril, or otherwise incapacitated. Such laws vary from state to state. Although they don't limit opioid addiction, they may reduce fatal opioid overdoses by allowing people to help an addict without fearing legal consequences related to drug use and possession.

Finally, in 37 states and the District of Columbia, medical marijuana permitting laws legalize the medical use of cannabis with a doctor's recommendation. Recreational use of cannabis has been legalized in 21 states and the District of Columbia. The legalization of marijuana use, either medically or recreationally, may have spillover effects on opioid usage. Cannabis could offer an alternative to opioids for treating chronic pain and therefore reduce opioid overdoses and deaths. Additionally, cannabis might help people with opioid use disorder curb their addiction.

Evidence of the effectiveness of these laws, whether they target supply or demand, has been mixed. Two researchers found that PDMPs reduce prescription rates but do not reduce opioid deaths or improve socioeconomic outcomes.[23] However, other researchers have found that a state's implementation of a PDMP reduces opioid deaths and partially reverses some negative effects on municipal finance in that state.[24] Two other researchers found evidence of increased opioid abuse after easier access to naloxone. This is likely due to increased risk-taking by addicts, given that they know there is an antidote in place to save their lives.[25]

When the three authors of this article, along with one other researcher, examined six state-level opioid-related laws, they found that all laws except the naloxone laws help reduce opioid prescription rates, with the strongest effects in states with triplicate prescription, PDMP, and medical marijuana permitting laws.[26] However, the effects on opioid deaths were more complicated. These researchers also found that, in terms of credit supply, a few of the laws—specifically, laws that limit opioid prescriptions, the mandatory PDMPs, and triplicate prescription laws—tend to improve consumer access to credit, while others—specifically, the naloxone, Good Samaritan, and medical marijuana permitting laws—appear to help less or even harm consumer access to credit. These laws may even intensify the opioid crisis.

To understand the impact or lack of impact of these antiopioid regulations, one researcher built a model of how consumers who use opioids for nonmedical reasons choose between legitimate prescriptions and illicitly manufactured opioids.[27] He demonstrated that the price gap between prescribed opioids and illicitly manufactured opioids is a critical determinant of whether the regulations reduce or increase the use of opioids and by how much. As a result, policies aimed at reducing prescription opioid consumption can lead to increased mortality in the short run due to widespread substitution with illicit opioids.

Conclusion

The opioid crisis has multiple and complex dimensions, as its evolution over the last few decades has demonstrated. Despite this complexity, we can safely conclude that (1) the crisis has negative economic outcomes; (2) the crisis has become less driven by opioid prescriptions, thanks to the many state laws and regulations that target the supply and prescription of opioids; and (3) designing effective policies that curb demand for opioids remains a challenge.

Notes

1 See, among others, Quinones (2015), the Centers for Disease Control and Prevention (2021), and the Centers for Disease Control and Prevention (2022).

2 Economic Report of the President (2019).

3 See Alpert, Evans, Lieber, and Powell (2022) and Cutler and Glaeser (2021), among others, for more details.

4 National Institute on Drug Abuse (2018) and Unick, Rosenblum, Mars, and Ciccarone (2014).

5 See the review article by Maclean, Mallatt, Ruhm, and Simon (2020), the article by Cutler and Glaeser (2021), and the papers cited within.

6 See Case and Deaton (2015) and Krueger (2017).

7 See Ruhm (2019), Cutler and Glaeser (2021), and McGranahan and Parker (2021).

8 See Bickel, Athamneh, Snider, et al. (2020).

9 See Van Hasselt, Keyes, Bray, and Miller (2015).

10 See Krueger (2017), Harris, Kesslery, Murray, and Glenn (2020), Park and Powell (2021), Aliprantis, Fee, and Schweitzer (2022), and Beheshti (forthcoming).

11 See Ouimet, Simintzi, and Ye (2020).

12 See Rietveld and Patel (2021) and Sumell (2020).

13 See Langford and Feldman (2021).

14 See Jansen (2019).

15 See Agarwal, Li, Roman, and Sorokina (2022).

16 See Cornaggia, Hund, Nguyen, and Ye (2021).

17 See Custodio, Cvijanovic, and Wiedemann (2021).

18 See D'Lima and Thibodeau (2022).

19 See Congressional Budget Office (2022) for a summary of federal interventions.

20 Drugs are classified as Schedule II drugs if they are determined to have a high potential for misuse, dependence, and addiction. Schedule II drugs have some accepted medical uses, although the uses vary depending on the type of drug.

21 With some exceptions, refills are not permitted for medications prescribed under this system.

22 Because naloxone remains a prescription drug as categorized by the U.S. Food and Drug Administration, standing orders and third-party prescriptions are enabled only when a state's surgeon general writes a prescription for all residents of that state.

23 See Kaestner and Engy (2019).

24 See Cornaggia, Hund, Nguyen, and Ye (2021).

25 See Doleac and Mukherjee (2019).

26 See Agarwal, Li, Noman, and Sorokina (2022).

27 See Mulligan (2022).

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EXHIBIT 197

NBER WORKING PAPER SERIES

PRESCRIPTION DRUG MONITORING PROGRAMS, OPIOID ABUSE, AND CRIME

Dhaval Dave
Monica Deza
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Working Paper 24975
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ABSTRACT

We study the spillover effects of prescription drug monitoring programs (PDMPs) on crime, and in the process inform how policies that restrict access to Rx opioids per se within the healthcare system would impact broader non-health domains. In response to the substantial increase in opioid use and misuse in the United States, PDMPs have been implemented in virtually all states to collect, monitor, and analyze prescription opioid data with the goal of preventing misuse and the diversion of controlled substances. Using information on offenses known to law enforcement and arrests from the Uniform Crime Reports (UCR), combined with a difference-in-differences empirical strategy, we find that PDMPs reduced overall crime by 5%. These reductions in crime are associated with both violent and property crimes. This decrease in crime is also reflected by a decrease in crime-related arrests as well as drug-related arrests. Overall, these results provide additional evidence that PDMPs are an effective social policy tool to mitigate some of the negative consequences of opioid misuse, and more broadly indicate that opioid policies can have important spillover effects into other non-health related domains such as crime.

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1. Introduction

The prescribing behavior of physicians has fueled the opioid crisis (Kolodny et al. 2015). In addition to the availability of new drugs (for instance, market entry of OxyContin in 1996) and aggressive pharmaceutical marketing efforts over the 1990s, the concern that pain was being undertreated led to more aggressive pain management standards, and state medical boards liberalized rules governing the prescription of opioid analgesics for chronic non-cancer pain. As a result, total opioid prescriptions filled increased from 107 million in 1992 to 274 million in 2012 (Pezalla et al. 2017). Though opioid prescribing has since fallen, the volume of prescriptions remains more than two times higher than in 1992. The proper use of opioids can mitigate the burden of acute pain, such as post-surgical pain (Manchikanti et al. 2010), and indeed a substantial portion of outpatient opioid prescribing can be traced to a hospital procedure (Brummett et al. 2017). However, while expanded availability and access to prescription (Rx) opioids has benefitted many, it has also led to unintended consequences in the form of addiction and the diversion of these drugs for non-medical purposes.

Overdose deaths from opioid analgesics have increased seven-fold since 1999,[1] with economic costs of the opioid epidemic exceeding $500 billion annually (Council of Economic Advisors 2017).[2] Though the crisis has shifted in recent years with an upsurge in overdose deaths related to non-prescription opioids such as heroin or illicit fentanyl, prescription opioids continue to play a role as four out of five new heroin users started out by misusing prescription opioids (Jones et al. 2013).

[1] Authors' calculations based on age-adjusted death rates from CDC Wonder.

[2] The CEA found that previous estimates of the economic cost of opioid abuse (for instance, Florence et al. 2016) were considerably understated due to the underestimation of the value of the lives lost due to opioid-related overdoses.

In order to restrain the diversion of Rx opioids for non-medical use and address the role played by physician prescribing, a popular state-level intervention has been to implement Prescription Drug Monitoring Programs (PDMPs). PDMPs are statewide databases that track the prescribing and dispensing of controlled substances, and thus provide key information to physicians and pharmacists on the patient's prescription history. While individuals can obtain Rx drugs for non-medical use through several sources including theft, street purchases, and from a friend or relatives, physicians remain the leading source for those who are at highest risk of overdose (Jones, Paulozzi, and Mack 2014). Notably, individuals may obtain excessive Rx opioids through their own prescriptions, often times from multiple providers without the prescribers being aware of the other prescriptions, a practice known as "doctor shopping". Doctor shopping can also be an important indirect source for the user by making up an essential part of supply for street dealers (Inciardi et al. 2009).[3] PDMPs can help identify patients who may be doctor shopping, misusing Rx drugs, or are at risk of overdose. Also, PDMPs can help identify patients that would benefit from timely treatment interventions.

Currently all states and D.C. have an operational PDMP, though utilization of these programs by providers largely remains voluntary and the systems vary based on their comprehensiveness and degree of integration. In many states where providers have discretion in whether or not to refer to the PDMP prior to prescribing an opioid (or another controlled substance), utilization rates tend to be quite low, hovering between 14-25% (Alexander et al. 2015), and unsurprisingly PDMPs are found to have limited to no effect on opioid misuse. A growing number of states have enhanced and modernized their programs, instituting universal registration and mandatory-access provisions and requiring providers to register on and query the

[3] Numerous additional problems have also been identified with how opioids are prescribed, including overlapping or early refill of prescriptions, dose escalation, and high daily dose rates (Mack et al. 2015).

PDMP prior to prescribing any controlled substance. Several individual state audit studies have shown that mandatory access PDMPs have effectively increased utilization and query rates.[4] There is an emerging consensus that these stricter programs have also led to robust reductions in opioid misuse and related negative consequences. Mandatory-access PDMPs have reduced opioid misuse among Medicare Part D participants (Buchmueller and Carey 2018), and also reduced opioid misuse and opioid-related mortality among adults in the general population (Ali et al. 2017; Grecu, Dave, and Saffer 2019).[5] The CDC, U.S. Government Accountability Office, and the President's Commission on opioid abuse have all stressed the importance of states mandating PDMP use among licensed prescribers, as an integral part of a comprehensive strategy to combat opioid misuse (U.S. GAO 2009; Christie et al. 2017).[6]

What remains unclear are the potential spillovers from these interventions, and any resulting success in reducing Rx drug misuse, on other outcomes. Opioid misuse has been linked with many adverse consequences including: higher health care costs (White et al. 2005), lower worker productivity (Hansen et al. 2011), more suicides (Borgschulte et al, 2018), and a complementary increase in cocaine and marijuana use (Grecu, Dave and Saffer 2019). Given the links between drug misuse, mental health, and crime, policies that lead to changes in Rx opioid abuse may also generate spillover effects on criminal behaviors, which could have substantial economic effects.[7]

[4] For instance, the number of prescriber and pharmacist PDMP registrations increased by 77% and 680% respectively, existing but inactive accounts decreased by 50%, and queries increased from an average of 11,000 per month to 1.2 million per month, following New York's enactment of mandated use in August 2013. Enrollment in the PDMP database in Kentucky increased by 264% (and multiple provider episodes – "doctor shopping" – decreased by 52%) and queries in Ohio increased by 505% (and multiple provider episodes decreased over 40%) following the enactment of mandatory access PDMP provisions). See Grecu et al. (2018) and http://www.namsdl.org/library/27CD066B-AF5B-BF3E-9B06857DF279C60A/.

[5] Note that these studies also found that merely having an operational PDMP without mandated access is largely ineffective.

[6] See: https://www.cdc.gov/drugoverdose/policy/index.html.

[7] Florence et al. (2016) estimate criminal justice costs of about $8 billion annually related to Rx opioid abuse.

We provide some of the first evidence on the impact of PDMPs on an important societal outcome, crime. Our study also speaks to the larger and complex question of how policies that restrict access to Rx opioids per se within the healthcare system can have a broader impact on societal outcomes such as crime. While restricting Rx opioids can reduce Rx opioid misuse, leading to a potential decrease in crime, if individuals substitute to other illicit drugs or more dangerous supply channels then such policies could actually generate unintended costs through greater engagement in crime and violence. Given the growing literature on the impact of PDMPs on the misuse of opioids, and the well-documented link between substance misuse and crime (Carpenter 2007; Pedersen and Skardhamar 2010), such policies could have a considerable external impact on crime. Moreover, given the substantial costs associated with crime in general, and the fact that crime associated with opioid use is particularly costly (Hansen et al. 2011), if there are spillovers on criminal engagement, then they are likely to be of an order of magnitude that is economically significant.

Many states have yet to enact stringent provisions to their PDMPs, and some providers resist using the PDMP due to time constraints, learning costs, and because often times these databases are not well-integrated into the electronic medical records of the medical practice (Grecu et al. 2019).[8] There have also been some drawbacks associated with PDMPs, which include additional costs to the healthcare system and compliance difficulties (Islam and McRae 2014, Stucke et al. 2018). Hence, the overall value of these programs is still actively debated, despite recommendations from policymakers and public health organizations urging states to

[8] For instance, challenges by some MA physician and dentist groups to the breadth of circumstances proposed for PDMP queries have contributed to a 2-year delay in the final implementation of a legally-required mandate (Haffajee et al. 2015).

adopt these provisions. Failure to account for potential crime costs associated with these programs – either positive or negative – can substantially skew the cost-benefit calculus.

While a few studies have imputed the criminal justice cost burden associated with Rx opioid misuse (Hansen et al. 2011; Florence et al. 2016), these have been based on a descriptive apportionment approach and not meant to be interpreted as causal estimates. We provide one of the first studies to specifically inform the causal link between Rx opioid misuse and crime. In particular, we exploit variation in the timing of the implementation of PDMPs and enhanced mandatory access provisions across states, within a difference-in-differences research design. We find consistent evidence that the mandatory provisions are associated with a significant reduction on the order of about 5% for overall crime, driven by decreases in both violent and property crimes.

The remainder of the paper proceeds as follows. The next section briefly provides some background on the previous literature and the pathways through which Rx opioid misuse, and PDMPs, could impact crime. Section 3 describes the data sources, followed by a discussion of the empirical methods in Section 4. We present the results and robustness checks in Section 5, and the concluding section summarizes our findings and places them in context along with some policy implications.

2. Background

2.1 PDMPs and Opioid misuse

A large literature has studied the effects of PDMPs, which can be separated into earlier studies that used data predating most of the mandatory access provisions and more recent work that has specifically assessed the effectiveness of voluntary vs. mandatory access PDMPs. Many of the studies based on older data, or data which do not differentiate between voluntary and mandatory access programs, find very limited or nil effects of the programs on measures of opioid use and misuse (McDonald, Carlson, and Izrael, 2012; Reifler et al., 2012; Jena et al. 2014; Haegerich et al. 2014). These inconsistent and limited effects are likely driven by the low provider query rates in states that do not mandate PDMP use. As stressed in the GAO report (U.S. GAO 2009), in order for PDMPs to work to their fullest potential, prescribers and dispensers must refer to the data prior to prescribing and filling a prescription.[9]

The recent wave of studies has moved this literature forward by specifically disentangling the effects of voluntary vs. the more recent mandatory access PDMP provisions. They find robust evidence of significant declines in opioid misuse and related adverse health consequences from mandatory access PDMPs but generally not from programs with no utilization mandates. For instance, Buchmueller and Carey (2018) find that mandatory access PDMPs significantly reduced measures of misuse, including excessive quantity and doctor shopping behaviors, among the Medicare Part D population. Their results reflect a 5-6% decline in the share of opioid takers with overlapping claims (multiple scripts for the same drug at a point in time) and with more

[9] PDMPs are enacted and operationalized at the state-level; thus, each state follows its own mode of monitoring and enforcing that healthcare providers are utilizing the PDMP where mandated. Different state agencies may be responsible for administering the PDMP, including substance abuse or consumer protection or licensing agencies. In the majority of states (36 states), however, PDMPs are administered either by the state's board of pharmacy or the department of health (Grecu et al. 2019). The state's appropriate licensing board – typically the medical board and/or the board of pharmacy – has the authority to impose (or refer to the appropriate licensing agency to impose) disciplinary actions that can include revocation, suspension, or non-renewal of the provider's license for inappropriate prescribing of opioids and failure to register on and refer to the PDMP. Any licensed prescriber who fails to register on the PDMP and query the system, or fails to submit the accurate prescribing information or inappropriately prescribes controlled substances, is also subject to other civil or criminal penalties as defined in each state's legislation, which can vary across states. Referral to law enforcement agencies, however, is generally confined to cases wherein physicians are prescribing for diversion purposes; a warning or license suspension (following multiple warnings) is relatively more typical for non-compliance with PDMP mandates. States can also conduct frequent and automated analyses of their PDMP – generating reports on providers who exhibit problematic prescribing and dispensing – and use this information to investigate further and impose warnings and disciplinary actions as necessary. Disciplinary actions can result from such regular audits as well as from complaints originating from dispensers, law enforcement, or consumers regarding any inappropriate prescribing. States also can establish a Medicaid Fraud Control Unit to investigate suspicious behavior based on PDMP information.

than a seven-month supply, and an 8-16% drop in doctor shopping behavior (share of individuals obtaining opioids from five or more prescribers and pharmacies).

Ali et al. (2017), based on self-reported information from the National Surveys of Drug Use and Health, also find a significant drop in doctor shopping (defined in their data as obtaining Rx drugs from two or more doctors) and a reduction in the number of days of misuse at the intensive margin (by about 42% relative to the mean).[10] Grecu, Dave, and Saffer (2019) assess the effects of PDMPs on substance use disorder treatment admission flows stemming from various Rx drugs and on mortality from drug poisonings. They also confirm the broader findings and find statistically and economically significant reductions in these measures of misuse, with the largest effects concentrated on Rx opioid misuse and among young adults ages 18-24 (32% decline in treatment admissions and 26% decline in opioid-related mortality).[11] Kaestner and Ziedan (2019) provide evidence of a significant first-stage with respect to prescribing patterns, and show that the adoption of a modern PDMP system accessible to all users is associated with a 4-8% decrease in retail opioid prescriptions.

2.2 Substance misuse, PDMPs and Crime

Most of the studies that have evaluated the impact of PDMPs have assessed measures of Rx drug misuse or associated health indicators, and at best assessed spillovers into the use of other drugs. Given the robust and consistent findings from this literature that certain forms of PDMPs have been highly effective, it is plausible that the reduction in Rx opioid misuse may also impact criminal behaviors. Broadly, substance use can affect crime through three pathways,

[10] They do not report marginal effects, but find approximately a 24% decline in the odds of doctor shopping associated with the must-access PDMP policies relative to voluntary PDMPs.
[11] The effectiveness of mandatory access PDMPs is driven by the sharp increase in utilization and query rates. For instance, the number of registered prescribers and pharmacists increased by 77% and 680% respectively, existing but inactive accounts decreased by 50%, and queries increased from an average of 11,000 per month to 1.2 million per month, following New York's enactment of mandated use in August 2013 (see: http://www.pewtrusts.org/~/media/assets/2016/12/prescription_drug_monitoring_programs.pdf).

including a pharmacological effect by affecting aggression or violent tendencies, an economic effect whereby drug users may resort to income-generating crime in order to finance their drug use habit, and/or a "systemic" effect as participants interact in illicit markets that inherently tend to resort to a high degree of violence and criminal activity in their sales and distribution networks (Corman and Mocan 2000).[12] These channels also point to important effects on both violent and property (income-generating) crime.

Various prescription drugs, including certain opioids and others that are likely to be misused, have been linked to reports of violence towards others. Based on data on adverse drug events reported to the FDA, Moore et al. (2010) find that many anti-depressants, sedatives, and drugs for attention deficit hyperactivity disorder are associated with serious acts of violence; oxycodone, an opioid, was among the top 20 Rx drugs associated with violence-related adverse drug events.[13] Opioid-dependent fathers tend to be more violent towards their intimate partners (Moore et al. 2011), and behavioral symptoms of Rx drug misuse can include excessive mood swings and hostility.[14]

If PDMPs are effective in reducing opioid misuse, and effective in reducing the use of other complementary substances such as cocaine and alcohol (which have also been linked to aggression and violence; Davis 1996; Corman and Mocan 2000), then we may see a reduction in violent crime. Decreased use and misuse of addictive substances, and better mental health, have generally been linked to lower rates of both property and violent crime (Grogger and Willis, 2000; DeSimone, 2007; Cuellar et al., 2004; Markowitz, 2005; Marcotte and Markowitz, 2011;

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[12] Violence occurs in drug markets partly because consumers and suppliers are not able to rely on contracts and the court system to resolve disputes.

[13] Number of violence cases for oxycodone was over 4 times greater than for all other evaluated drugs, adjusting for the volume of reports.

[14] See https://www.mayoclinic.org/diseases-conditions/prescription-drug-abuse/symptoms-causes/syc-20376813.

Fryer et al. 2013).[15] Though these studies focused on illicit drugs such as cocaine and heroin, the broader causal link underscored here may also carry over to Rx opioids.

More specific to Rx opioid misuse, doctor shopping has been found to be a significant source of diversion (Simeone 2017), including sourcing street dealers. Underground drug markets are particularly associated with violent crime as well as property crime. In this context, mandatory PDMPs represent an adverse supply shock not just for those who may be accessing opioids for non-medical use through the healthcare system but also for those who may be obtaining Rx opioids on the street. To the extent that this may lead to further declines in Rx drug misuse, criminal activity – both income-generating and violent crime – may decline.

On the other hand, disruptions to access of Rx drugs may also generate perverse or even no effects on crime through potential substitution and compensatory behaviors and generate important dynamics in the market response. For instance, in the context of methamphetamines, large supply-side disruptions have not been found to have any major effects on violent or property crime, and any transient changes in prices and indicators of misuse returned to pre-interventions levels within 4-18 months (Dobkin and Nicosia 2009). In the context of Rx opioids, both substitution to other supply sources for the same Rx drugs as well as substitution to other illicit drugs are possible. Given that doctor shopping and physicians are an important supply source for patients who misuse opioids, constraining this access may lead them to seek out underground channels outside the healthcare system.

There is some emerging evidence that supply-side interventions that limit access to opioids may increase the use of some other illicit substances. Notably, the reformulation of

[15] In order to bypass the endogeneity between substance abuse and crime and between mental health and crime, these studies rely on natural experiment and exogenous shocks, for instance exploiting changes in illicit drug prices, emergence of crack cocaine, and mental health treatment.

OxyContin into an abuse-deterrent formulation, and its market entry in 2010, has been found to be associated with a sharp increase in mortality from heroin overdose (Alpert, Powell & Pacula 2018; Evans & Lieber 2019). Interactions with supply and distribution networks in illicit drug markets have been especially prone to violence, gang activity, and crimes involving guns.[16] Furthermore, the street price of Rx drugs tends to be considerably higher than the pharmacy price (Sajan et al. 1998; Surrat et al. 2012; Dasgupta et al. 2013), raising the total cost of access for a user substituting from the formal healthcare system to underground sources. Thus, if some users are now substituting to these underground supply sources as a result of the PDMPs, then this may lead to an increase in violent crime and possibly property crime.

Very little work has evaluated broader spillovers of opioid-related interventions. In the only other study on PDMPs and spillovers into crime-related outcomes that we are aware of, Mallatt (2019) finds a strong increase (about 112% on average) in crime incidents related to heroin possession, with stronger effects in counties which had higher rates of oxycodone prescribing at baseline.[17] Based on descriptive trends, some studies have linked the recent increase in homicide rates to the re-emergence of heroin and transition from Rx opioids to other illicit opioids (Rosenfeld 2016). Rosenfeld (2016) notes that the greater demand and entry of more users into the illicit drug market leads to greater opportunities and incentives for the sellers, and more disputes among sellers over territories and customer access and more disagreements between sellers and buyers can lead to greater violence. At the same time, studies directly linking

[16] Drug use has been found to be correlated with aggressive and violent behavior (Murray et al. 2008), and in terms of drug epidemics, the rise of heroin in the 1970's and the crack cocaine epidemic of the 1980's were both associated with substantial increases in violent crimes, including gun crimes and homicides (Szalavitz and Rigg 2017).

[17] Mallatt (2019) focuses solely on heroin and opioid crime, specifically related to possession, in order to gauge spillovers from restricted access to Rx opioids on substitution into illicit opioids. Kaestner and Ziedan (2019) consider broader socioeconomic outcomes including employment, earnings, public assistance, and marital status, and find little evidence that state interventions targeting Rx opioids are significantly associated with these outcomes.

interventions targeted at Rx opioid misuse and spillovers on other illegal drugs are limited and have not reached a consensus and find very weak adverse or even beneficial effects on other illicit drugs (Meinhofer 2018; Grecu et al. 2019).[18]

The upshot of this discussion is that, while spillover effects on crime are plausible, the net effects of disruption to Rx opioid access on criminal behaviors are a priori indeterminate. The overall effects depend on the extent of potential substitution into other illicit drugs vs. the overall reduction in the pool of addicts. The various reinforcing and/or counteracting channels also suggest that there may heterogeneous responses across crime types, and in particular point to potentially important (negative or positive) effects on violent crime, which generate much of the societal costs associated with crime (McCollister et al. 2010). We provide the first study on the broader spillover effects of PDMPs on total crime and across specific crime categories. As policies and interventions proliferate at the federal, state, and local levels targeted at curbing the opioid epidemic, it is important to account for spillovers on other outcomes and markets. Hence, our study contributes more broadly towards understanding how supply-side interventions which disrupt access to Rx opioids in the healthcare system impact crime. Finally, this study contributes to the larger literature on the effects of substance use on crime, providing evidence on the causal link between Rx opioid misuse and crime by exploiting the adoption of the mandatory PDMP provisions as a source of exogenous variation in access to and diversion of Rx drugs.

3. Data

3.1 Crime

[18] Degenhardt et al. (2005) exploit a supply shock in Australia in 2001, which sharply reduced heroin supply, and find a transient increase in cocaine use among injecting drug users, which was associated with an increase in violent crime. Doleac and Mukherjee (2018) study the effects of Naloxone (an opioid antagonist, effective at reversing overdose from Rx opioids) access laws and find an increase in opioid-related theft associated with greater access to Naloxone. They attribute this to an ex ante moral hazard effect and to change in the composition of the population towards surviving active drug users, who are more likely to commit such crimes.

We use measures of crime using data spanning 2003-2017 from the Federal Bureau of Investigation's (FBI) Uniform Crime Reports (UCR) monthly files[19], and use three separate datasets within the UCR, each providing complementary strengths.[20] All law enforcement agencies that operate under a U.S. jurisdiction, state, county, city, university/college, tribal and federal law enforcement agencies, submit crime data to the UCR, either through a state UCR program or directly to the FBI's UCR program. These files include the most commonly reported violent and property crimes (Part I crimes) including murder, manslaughter, rape, robbery, assault, burglary, larceny, and motor vehicle theft. Between 88 to 96 percent of the U.S. population is covered by agencies that report to the FBI's UCR Program (Maltz 1999).

For our primary analysis, we use the Offenses Known and Clearances by Arrests segments of the UCR. In addition to total crime, we estimate effects on Part I violent crime (homicide-murder and manslaughter, rape, robbery, assault and simple assault) and Part I property crime (burglary, larceny, and motor vehicle theft), as well as separately for each of the disaggregated crime types.

Known crimes are considered the most accurate crime outcome as they are not an endogenous function of police enforcement; however, a drawback is that data on known crimes do not include information about the offender (or the victim). Thus, we also supplement our main analyses with information from the UCR Arrest Data, which are valuable for two reasons. First, arrest data include information on drug-related crimes.[21] Second, arrest data include information on the demographics of the offender, which allows us to determine whether the

[19] Kaplan (2019) compiled the offenses, arrests and homicide UCR datasets in ICPSR. While the data on offenses known is available for 2017, the arrest data is only available until 2016.
[20] This is important and provides a validation check, given the inherent difficulties in measuring crime, a limitation not unique to our study.
[21] In particular, UCR Arrests report information for sale, manufacture or possession of: (1) opium/cocaine/derivatives, (2) marijuana, (3) synthetic narcotics, and (4) other dangerous non-narcotics.

propensity to commit crime changed in response to PDMP implementation differentially by age. Since young adults are more likely to engage in criminal activity in general and also the most likely to adjust their opioid use patterns in response to the implementation of PDMPs (Grecu et al. 2019), we expect the effect on crime among individuals of this age group to be disproportionately impacted by the policy. We further supplement our analyses with data from the UCR Supplementary Homicide Reports (SHR), with the added advantage that they contain information regarding the age of both the offender and the victim, albeit only for homicides.

Finally, it is important to note that the UCR data are reported at the agency level. Because of the heterogeneity in the reliability of reporting across agencies and the fact that a single non-reporting agency may account for a substantial fraction of crime for a given geographical area, we follow the crime literature and focus on agencies that reported crimes consistently in all 12 months of the year, every year (Maltz and Targonski, 2002).

3.2 Prescription Drug Monitoring Programs

While PDMP programs have been in existence for quite some time, in 2003 the Department of Justice began supporting initiatives to implement PDMPs, and the NAMSDL published the Model Prescription Monitoring Program Act and appropriated funds for its deployment (Dekker 2007). Thus, we chose to begin our analysis period in 2003, which provides a sample of PDMPs that are more homogeneous and potentially more effective across states.

To model the impact of PDMP legislation on crime we follow the literature and use dates on which a state's PDMP became operational derived from the Prescription Drug Abuse Policy System (PDAPS)[22] and dates of implementation of mandatory-access provisions. Mandatory-access provisions are stronger statutes that required all licensed prescribers and dispensers to

[22] http://pdaps.org/datasets/prescription-monitoring-program-laws-1408223416-1502818373

register on the PDMP and to query the PDMP prior to prescribing and dispensing controlled substances. We note that there is some heterogeneity across states in terms of mandatory access. For instance, Kentucky mandates access in the strictest sense in that it requires that both prescribers and dispensers must access the PDMP before writing and dispensing any script for controlled substances. In contrast, some states mandate access in limited circumstances or do not mandate access for all providers. For instance, Georgia only requires that physicians practicing at a pain clinic regularly check the PDMP on all new and existing patients and Florida only requires providers to check the database prior to prescribing but does not require dispensers to check the database prior to dispensing.[23]

Thus, there is some heterogeneity in the PDMP definitions derived from the PDAPS. In supplementary analyses, we also model the impact of PDMPs, based on an alternate dimension and dates that have been highlighted in a recent study (Horwitz et al. 2018). Horwitz et al. (2018) contend that a salient consideration when modeling the impact of PDMPs is to assess effectiveness relative to when a state's full modern, electronic PDMP system became operational and became directly accessible to all users (providers, law enforcement). They carefully assemble a legal database and report the dates based on these criteria, and further show these PDMPs to be negatively associated with measures of "doctor shopping".

3.3. Other Drug and Alcohol Policies

In order to account for other confounding shifts, we control for several additional policies and laws that were enacted over the sample period and which may also potentially have impacted drug use and crime. Specifically, we control for ID Laws, which require pharmacists to request and check identification prior to dispensing controlled substances, and physical exam

[23] According to PDAPS, eighteen states have mandated access defined as "Does the state require prescribers to check the PDMP before prescribing controlled substances?".

requirement (PER) laws, which require a physical examination or a bona fide physician-patient relationship prior to prescribing controlled substances. Dates of implementation of ID and PER laws are obtained from the National Conference of State Legislatures and the Centers for Disease Control and Prevention and are cross-validated with the review of individual state legislatures and the Federation of State Medical Boards.

We further control for Naloxone access laws, which expand access to Naloxone to people other than the person at risk of overdose in order to facilitate friends and family of the user to administer the opioid antagonist in case of an overdose (Rees et al. 2019). We also control for Good Samaritan Laws, which exempt those who seek medical assistance for someone experiencing overdose from arrest and prosecution for minor drug and alcohol law violations (Rees et al. 2019). Information on these laws is obtained from the Policy Surveillance Program, which is funded by the Robert Wood Johnson Foundation and the Network for Public Health Law.[24] Finally, we control for policies pertaining to marijuana legalization, marijuana decriminalization, medical marijuana, beer taxes, and whether the state has a 0.08 blood alcohol content (BAC) per se limit law.

3.4. Demographic and Police Composition Data

Police department employment data were obtained from the UCR Program Data: Police Employee (Law Enforcement Officers Killed and Assaulted Program - LEOKA) from 2003 to 2017. Specifically, we control for the natural logarithm of the number of officers in the police force per 100,000 residents. We also control for state-level demographic composition using data from the bridged-race population estimates, which are produced by the U.S. Census Bureau in collaboration with the National Center for health Statistics (NCHS).[25] In particular, we construct

[24] https://www.networkforphl.org/_asset/qz5pvn/network-naloxone-10-4.pdf
[25] https://wonder.cdc.gov/controller/datarequest/D9

the share of the population composed by minors, individuals ages 18-25, and males ages 18-25 years, as well as the overall share of males. Additionally, we control for income per capita and seasonally adjusted unemployment rates, which were obtained from the U.S. Bureau of Labor Statistics and the County Business Patterns (CBP), and account for shifts in the state's economy.[26] Finally, we control for the poverty rate, and the share of residents with a college degree, some college, high school, less than high school.[27]

4. Methods

Our empirical analysis is motivated by the mechanisms described above through which mandatory PDMPs, which have been shown to significantly reduce Rx opioid misuse, can have spillover effects on crime. To assess these relationships, we exploit variation in the timing of PDMP implementation across states, and estimate the following difference-in-differences (DD) specification:

$$Y_{jst} = \alpha_0 + \beta_0 PDMP_{st} + \beta_1 PDMP_{st} * MA_{st} + \delta X_{st} + \gamma_t + \gamma_j + \varepsilon_{jst} \qquad (1)$$

Equation (1) can be interpreted as a reduced-form crime supply function. The analysis is at the agency-year level j, and the outcome (denoted by Y_{jst}) represents the natural logarithm of the rate of offenses known to police per 100,000 residents in a given agency *j*, in state *s* and year t.[28] Models are estimated for all Part 1 crimes, and separately for violent and property crimes. The variable $PDMP_{st}$ is a dummy variable that indicates if a state has an operational PDMP in place, and MA_{st} is a dummy variable indicating that the state has enhanced its prescription drug

[26] Note that this dataset provides annual statistics for businesses with paid employees and excludes mostly establishments with government employees.
[27] These measures are obtained from the University of Kentucky Center for Poverty Research Welfare Data (http://www.ukcpr.org/data), and alternately computed from the Annual Social and Economic Supplement of the March Current Population Surveys.
[28] We add one to the counts before computing the rate in order to avoid dropping the agency-year observations with zero counts.

monitoring program and implemented stricter mandated-access provisions. The coefficient of interest is β_1, which represents the net reduced-form effect of mandated PDMP use, relative to states that have an operational but voluntary PDMPs.

All specifications control for an extended vector of socioeconomic and policy factors (X_{st}) including demographic information (share of population composed by minors, individuals age 18-25, males 18-25 years of age, males), drug and alcohol policies (ID laws, PER laws, Naloxone laws, Good Samaritan laws, marijuana decriminalization, marijuana legalization, medical marijuana laws, BAC laws, beer taxes), police composition (number of officers in the police force) and other socioeconomic variables (income per capita, unemployment rate, poverty rate and share of residents that have a college degree, some college, high school, and less than high school).

All specifications further include agency fixed effects (γ_j), and year fixed effects (γ_t). The agency fixed effects account for time-invariant differences across agencies (and hence time-invariant differences across states, since agencies are nested within states). Time fixed effects account for national trends in crime rates over the sample period. We also present estimates from models that include treatment-specific linear trends ($MA_s * t$), to account for the possibility that states which ever-adopted enhanced provisions to their PDMPs may be systematically different than the non-adopting states, and models that include state-specific linear trends ($\gamma_s * t$), to account for unmeasured systematic time-varying confounding factors across all states (e.g. policing behavior, funds allocated to policing, funds allocated to education, among others). These controls account to some degree for systematic differential trends across implementation vs. non-implementation states prior to the policy. Given that the analysis is performed at the agency-year level, including state-specific trends is salient as most potential confounders such as allocation of public funds or implementation of police training tactics would be implemented at the state and not at the agency level.[29] Standard errors are clustered at the state level, and all models are weighted by the population covered by the agency (Angrist and Pischke 2007).

We extend the baseline model in several ways. First, in addition to evaluating the effects on aggregated counts of all Part 1 crimes (per 100,000 residents), which implicitly assigns equal severity to each offense, we also evaluate effects on cost-weighted crime following Chalfin and McCrary (2018). The latter provides an estimate of the policy on the expected cost of crime based on a weighted aggregate of crime counts, with weights equal to the cost of each type of crime.[30] This approach explicitly places a larger weight on more costly crimes, and typically violent crimes are more costly than property crimes, given the high victim and societal costs of the former. Second, since aggregated crime may mask nuanced changes in relatively infrequent crimes, we also explicitly assess effects of PDMP policy separately on each offense type. Specifically, the following crimes are evaluated: homicide (which combines murder and manslaughter), rape, robbery, assault, burglary, larceny, and motor vehicle theft.

Third, drawing on the previous literature that has documented significant heterogeneity across age groups with respect to the non-medical use of opioids, we estimate the impact of PDMPs on crime conditioned on age group. While information on the offender's and victim's age is not contained in the UCR Offenses Known Segment, we can observe the offender's and

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[29] Previous crime literature exploits variation at the county or city level to evaluate the effect on crime or substance use at the agency level include a state by year fixed effect as the main specification in order to control for potential confounders such as the allocation of public funds on policing, education, changes in policing tactics and training, or socioeconomic conditions that usually vary at the state level (Bondurant, Lindo and Swensen, 2019; Swensen, 2015). Because PDMPs vary at the state-year level, we cannot include a state by year fixed effects, but a state-specific linear trend would take into account these confounders that vary linearly. Also, note that the treatment-specific linear trends are nested within the state-specific linear trends.

[30] Estimating the effect on cost-adjusted violent and property crimes, or the expected cost of crime, as presented in Chalfin and McCrary (2018), takes into account that a policy that prevents a small amount of more socially costly crimes such as homicide could be more cost-effective than a policy that prevents a large amount of less costly crimes such as burglary.

victim's age and gender with respect to homicide incidents using the UCR Supplement of Homicide Report (SHR). In particular, we examine the following dependent variables: the rate of homicides where the offender (victim) was between the ages of 18-39 and 40 and over.[31]

Fourth, we further exploit the SHR to evaluate whether the rate of homicides that involved a firearm or a knife changed in response to PDMP implementation. Illicit drug markets are more likely to involve interactions and networks prone to violence. In particular, studies of drug gangs show that a significant amount of gang activity involves homicide and assault (Levitt and Venkatesh 2000; Rainbow 2010; Klein, Maxson and Cunningham, 1991) and particularly gun-related homicide (Miron 1999; Levitt and Rubio 2005). If PDMPs impact interactions with illicit drug markets, violent crime, and homicides in particular, it is possible that the strongest impact among offenders may be among young adults - the group whose opioid misuse and adverse health events are most impacted by mandatory PDMPs (Grecu et al. 2019).

Fifth, we also use information on the offender's age from the arrest data, which have also been commonly used in the crime literature (Corman et al. 2014). Specifically, we re-estimate Equation (1) for total arrests for adults 18-30 and over 40. Another advantage of these data is that they allow separate analyses for drug-related arrests, which we capitalize on to assess effects on arrests related to specific categories of drugs.

A critical assumption necessary for the DD research design to credibly identify the causal effect is that trends in non-implementation states are a valid counterfactual for trends in implementation states in the absence of mandatory access provisions (Angrist and Pischke 2007;

[31] The age of the victim is missing only in 1.3 % of the incidents while the age of the offender is missing for 35% of the incidents and therefore the results pertaining the effects on demographics of the offender must be interpreted with caution.

Colman and Dave 2018). We conduct a fully-specified conditional event study based on the following specification.

$$Y_{jst} = \alpha + \sum_j \beta^k I[D_{st}^k = 1] + \delta X_{st} + \gamma_t + \gamma_j + \varepsilon_{jst} \qquad (2)$$

In this specification D_{st}^k is an indicator that has the value of one when state *s* has enacted a PDMP k years away from the contemporaneous period and we estimate this event study using both the voluntary PDMP implementation dates as well as the mandatory access dates from PDAPS. Note that when *k*<0 it indicates lead pre-policy effects, that the PDMP will be enacted *k* years in the future, and when *k*>0 it indicates post-policy effects, that the PDMP program was enacted *k* years in the past. We normalize β^{-1} to zero and therefore all parameters β^k for k between -4 and 4 should be interpreted as the policy effect on crime relative to the year prior to implementation. We also impose endpoint restrictions for periods at least five years away from the year of implementation, which prevents us from assigning unequal weight to states that enacted PDMP particularly early or particularly late given the unbalanced sample.

The event study framework serves two functions. First, it allows us to directly test for differential pre-policy trends by evaluating the magnitude and significance of the lead coefficients (*k*<0). Second, the event study allows us to decompose the dynamics of the main DD effect from Equation (1). That is, the main DD effect represents the average effect on crime over the post-policy window. For instance, Grecu et al. (2019) show that, while mandatory PDMPs are highly effective, the effects become stronger over time. This compounding is partly due to the diffusion of physician knowledge and training as they become more versed with using the PDMPs, partly because there may be lags in the disruption to supply due to stockpiling, or because it may take time for the total pool of addicts to decrease. Furthermore, even if access to Rx opioids is disrupted, alternate sources may substitute over time or there may be substitution into heroin and other illicit drugs (synthetic opioids) in the shorter or longer term. The event study allows us to capture any such dynamic effects that may either accumulate or dissipate over time.

Finally, to evaluate the validity of our empirical estimates we perform a placebo check similar to the randomization inference outlined in Abadie and Gardeazabal (2003). In this falsification exercise, agency-year indicators for whether mandated access is active are re-shuffled and randomly assigned. Equation (1) is then re-estimated with this placebo or "shuffled" pseudo-PDMP indicator, and this process is repeated 300 times, each time using a different set of placebo indicators. Once the estimation is complete, all 300 placebo coefficients are plotted and compared with the results of our primary DD analysis.

5. Results

5.1. Summary Statistics

Due to the fact that some agencies do not report offenses every year, decreases in crime could be driven by actual decreases in crime or could be driven by agencies not reporting crimes on that year. In order to avoid that problem, our main analysis is restricted to the 9,136 agencies that report crimes in all years between 2003 and 2017 and that report offenses all 12 months each year between 2003 and 2017.[32]

Panel A of Table 1 presents the summary statistics of offenses known to police for all agencies in the sample (columns 1-2), and agencies that reported all 12 months and reported data each year between columns 2003-2017 (columns 3-4). In terms of crime rates for the entire

[32] We also estimate the model restricting to agency-year cells that report offenses all 12 months regardless of whether they do so for all years between 2003 and 2017. We further analyze offenses known to police restricting the agencies to those that report crimes all years between 2003 and 2016 and that belong to cities with at least 10,000 residents and the results are similar. The last restriction excludes cities with population smaller than 10,000, MSAs and non-MSAs. These results will be provided upon request.

sample, overall there were approximately 2,240 crimes per 100,000 residents with 212 (9%) of these constituting violent crimes and the other 2,027 (90%) being property crimes. The violent crime with the highest crime rate is aggravated assault with 152 incidents per 100,000 residents while the least frequent violent crime is homicide with 2.4 incidents per 100,000 residents. Among property crimes, the most prevalent property crime is larceny with 1,487 incidents per 100,000 residents while the least prevalent property crime is motor vehicle theft with 129 incidents per 100,000 residents. While the means for the subsample we use in the main analysis are expectedly higher due to more complete information on all reporting agencies, the relative shares of violent and property crime in total crime, and the shares of the specific offenses in violent and property crime, remain largely unaffected.

Panel B presents summary statistics for the Supplementary Homicide Reports (SHR), where the first two columns correspond to the entire sample and the last two columns correspond to the subsample used in this study. Because the original SHR dataset reports homicides at the incident level, agencies only appear in the dataset as long as they reported a homicide and therefore the SHR is potentially restricted to agencies where homicide is more prevalent. A missing agency-year can occur either because the data are missing or because there were zero homicides during that period. In order to avoid this issue, we restrict the analysis to agencies that appear in the data every year, and hence report at least one homicide every year throughout the period studied. This is reflected in the fact that the number of homicides that occurred with a firearm are much larger in the subsample used.[33]

[33] We restrict the SHR analysis to agencies that correspond to cities with a population of at least 10,000 that reports data every year instead of restricting the analysis to agencies that report all 12 months because the latter would imply restricting the analysis to agencies that reported at least one homicide each month. The discrepancies between the murder rate and the murder rate conditional on any given age group occurs because not every incident reports demographics of the victim. As we mentioned earlier, demographics of the offender are largely missing.

Finally, Panel C presents summary statistics of the arrest dataset. Patterns of arrest rates (e.g. property crime arrests are more prevalent than violent crime arrests, murder is the least prevalent violent crime, among others) remain unchanged when we restrict the sample to agencies that report all 12 months and report crimes every year in the observed period. In addition, the patterns of arrest rates follow closely the patterns we observed among offenses known to police.

5.2 Effect of PDMPs on Part I Crimes

Table 2 presents the coefficients β_0 and β_1 from Equation (1) using agency-year level data, where the dependent variable is the natural log of the number of offenses per 100,000 residents. We also report estimates for the impact of mandatory access PDMPs, relative to no PDMP, using a model with mutually exclusive categories for voluntary and mandated PDMP. We present estimates for total Part I offenses, and then separately for violent and property offenses. Panel A presents the effects for aggregated crime counts, and Panel B presents effects on cost-weight crime counts, explicitly weighting each crime type by its total societal cost following Chalfin and McCrary (2018).

For each crime outcome, we estimate the baseline model, and then progressively add the treatment-specific trends and the state-specific trends in order to control for potential confounders and policies that likely vary at the state level and the less-than-perfect nature of the natural experiment. Our preferred estimates are the ones that include these trends, though it is reassuring that estimates are not largely sensitive to these controls or how we control for these trends (state-specific or treatment-specific). We present estimates from an event study framework later to more explicitly assess the parallel trends assumption and effect dynamics.

The estimates in Table 2 suggest three main findings. First, there is little indication that voluntary PDMPs have had any economically or statistically significant effect on crime. This is consistent with much of the prior work that concludes that merely having an operational PDMP without any mandate on providers to query the databases has not been effective in reducing Rx drug or opioid misuse (Haegerich et al. 2014; Buchmueller and Carey 2018; Grecu, Dave and Saffer 2019). Second, we do find evidence that mandatory-access PDMPs significantly decrease crime. Specifically, mandatory PDMPs are found to significantly reduce overall crime by about 5-6%, relative to voluntary PDMPs. Since virtually all states have an operational PDMP currently, these "add-on" effects are policy-relevant given that they inform what may happen if these states enhanced and mandated use of these systems. The total effect of moving from no PDMP of any kind to a fully mandated PDMP is significant and implies about a 7-8% reduction in total crime (based on models that control for trends).

Third, results largely hold when offenses are disaggregated into property and violent crime – voluntary PDMPs do not significantly reduce crime and mandatory access PDMPs do. However, some of these effects are imprecisely estimated. In general, these estimates imply about a 4-5% reduction in property and violent crime as a result of stricter PDMPs. Results in Panel B are largely similar and indicate a comparable reduction in total expected crime costs, driven by both a reduction in violent and property crimes. In Table 3 crimes are disaggregated into specific types of offenses (homicide, rape, robbery, assault, burglary, larceny, and motor vehicle (MV) theft). Similar to Table 2 – voluntary PDMPs are generally found to have no significant effect on any of the offense types. In contrast, mandatory-access PDMPs have a robust and significant negative effect on both assault and burglary. Also, while results are sensitive to model specification and disaggregated crime data are more subject to noise, we also find a negative effect of mandatory-access PDMPs on homicide, robbery, and motor vehicle theft. Generally, mandatory-access PDMPs are found to reduce offenses on the order of about 5-10%.

A limitation of offenses known segment of the UCR is that it does not contain information about the age of either the offender or the victim. There are several reasons to use the other UCR segments that contain demographics about the offender and victim. First, reflecting an age-crime gradient (Ulmer and Steffensmeier 2014), engagement in criminal activity tends to peak into late adolescence and early adulthood. Second, young adults ages 18-24, followed by adults ages 25-44, tend to have the highest prevalence of non-medical use of Rx drugs and dependence on pain relievers, though misuse has also been increasing among older adults.[34] Third, prior work has shown that young adults, and in particular young-adult males, have experienced the largest decrease in opioid misuse and related mortality as a result of mandatory access PDMPs (Grecu et al. 2019).[35]

To incorporate information about the offender and victim Appendix Tables A1 and A2 present estimates from FBI UCR arrest rates, which are commonly used in the crime literature (see for instance, Corman et al. 2014, 2017). It is validating that these estimates are largely consistent with those from the Offenses Known Segment. They consistently show that mandatory PDMPs are associated with a reduction in total arrests and are driven by both a reduction in violent and property crime arrests. The effect magnitudes are also similar to those reported in Table 2, implying a decline on the order of about 5-6%. Decomposing these effects

[34] Data from 2014 National Survey of Drug Use and Health indicate that the prevalence of Rx drug abuse and dependence (pain reliever abuse and dependence) is 3 times (2.8 times) higher and 2.6 times (2.5 times) higher among adults ages 18-25 and ages 26-44 relative to adults 45+, respectively.

[35] We also estimate the effect of PDMP with an alternative subsample of agencies that report crimes during all 12 months every year of the study and explore with defining the dependent variable as the log or as the log plus one in order to avoid agencies with zero counts and the results remain unchanged. See Table A2 and A3.

into specific crime types, we find a significant reduction in assault, burglary, and motor vehicle theft, particularly among young adults (ages 18-39). There is also a suggestive decline in robbery, assaults, burglary, and motor vehicle theft (5-13%).[36]

5.3 Homicide

Given that we find significant effects of PDMPs on homicide, we further evaluate whether this effect is also reflected in data from the UCR Homicide Supplements. Based on the Homicide Supplements we are further able to evaluate the extent to which the effect of PDMPs on homicides is driven by a particular demographic group among offenders (gender and age), to what extent it happens to a particular demographic group of victims, and whether the effects are driven by homicides involving a particular weapon or firearms. For consistency, we aggregate the data at the agency-year level.

Table 4 presents the results of the DD model estimated with the UCR Homicide Supplements where the dependent variable is the natural log of the number of homicides per 100,000 residents, conditioned on demographics. Results are broadly in line with the results in Table 3 in that voluntary PDMPs are not found to have a statistically significant impact on homicides, and mandatory-access PDMPs are found to have a significant impact.
Columns 2-3 of Table 4 report the effects of PDMPs on weapon used. The results indicate that mandated PDMPs decreased the rate of homicides that occurred with a firearm by approximately 7-14%. If stricter PDMP regulations affects the circumstances under which individuals access the illicit drug market, wherein interactions are particularly more likely to involve guns, one

[36] In addition, we computed a pairs cluster percentile-t bootstrap (Cameron and Miller, 2015; Hansen, 2018; Cameron, Gelbach and Miller, 2008), where we resample states and for every resample compute a bootstrapped t-statistic for the true null hypothesis that the bootstrap coefficient is equal to the full sample coefficient. The percentiles of the bootstrapped t-statistics can be used to adjust up or down the full sample standard error. This more refined approach to inference leaves our main results unchanged in terms of their qualitative conclusions. See Cameron and Miller (2015) for a description of paired-clustered percentile t-bootstrap.

would expect more pronounced effects on gun-related homicides. Previous literature has found that the drug market contributes to violent disputes, murders, and non-fatal shootings with handguns (Maher and Dixon 2001; Blumstein 1995; Maher and Dixon 1999; Ramussen et al. 1993; Miron 1999; Levitt and Rubio 2005; Sullivan and Elkus 2008).[37] The reduction in homicides, and in particular homicides involving handguns, suggest that overall, PDMPs may not have increased interactions with the illicit drug market. This is prima facie consistent with the prior literature that found that these interventions resulted in a net decrease in opioid misuse and related health consequences.

Columns 4-5 evaluate the impact of PDMPs on homicides of victims conditioned on age. Results indicate that mandatory access PDMPs reduced the number of homicides where the victim was between ages 18-39 by 7-13% and the number of homicides where the victim was over 40 by 8%.[38] Both of these effects are statistically significant at conventional levels. The last two columns present evidence that the number of homicides committed by individuals between the ages of 18-39 decreased by about 9%, with a similar magnitude of effect among older offenders.[39] As noted previously, the effects on the offender's demographics must be interpreted with caution because the demographics of the offender are largely missing.

Table 5 presents the effects of PDMP on the demographics of the victim (Panel A) and offender by gender (Panel B) and can be summarized as follows: There is a decrease in the rate of male homicide victims of 6-11% and this is driven mostly by a decrease in homicide rate of 18-39 year old men of approximately 6-12%. There is a decrease in the rate of female homicide

[37] On the other hand, prohibiting drugs or disrupting drug markets also lead to the inevitable consequences of gun violence and homicides (Werb et al, 2011).
[38] The effect on victimization of older adults is not statistically different from that for younger victims.
[39] Results a close to zero for models estimated with no time trends and the results for offenders over 40 are less precisely estimated.

victims of 14%, driven by larger effects among older females (40+). As indicated by the means reported in the table, homicide is a crime where the offender and victim are typically male. Hence, even if relative effects for female victims are similar, these estimates from the demographic composition of homicides suggest that the decline that we find in homicides is primarily driven by a decline among young adult male victims (ages 18-39).

Alternately we can also turn to arrests to identify whether the effects are different among younger or older adult offenders. Appendix Table A1 presents evidence that the decrease in overall and property crimes are somewhat higher among 18-39 year olds than among individuals over age 40. On the other hand, the effect of PDMP on violent crimes are generally similar in magnitude among younger or older adults. It should be noted that, though these relative effects are more or less similar, the effect sizes imply substantially larger reductions in the total number of crimes committed by young adult offenders (given that young adults commit more crimes than older adults).

5.4 Event Study and Timing of the Effects

We visually present the event study in Figures 1-4. Specifically, Figure 1 presents the coefficients β^j from Equation (2) corresponding to dates of mandated access implementation, for total Part 1 crimes, and Figures 2 and 3 present the corresponding estimates for violent and property crime rates respectively. Figure 4 separately presents the event study coefficients using the dates of voluntary PDMP implementation.[40]

Our event-study results underscore four points, all of which instill a degree of confidence to our estimates. First, there is consistent, dynamic evidence that voluntary PDMPs did not

[40] Given the inherent noisiness of the crime data, a limitation not unique to our study, disentangling the timing of the effects is an imprecise exercise. Furthermore, dynamics in the effect magnitudes (shorter vs. longer term effects, for instance) may also capture differential effects across early vs. later adopters (Rees et al. 2019), and estimates should be interpreted with care.

impact crime rates in any significant manner (Figure 4). Given that most of the literature has found little to no first-order effects of these discretionary programs on opioid misuse, this result adds confidence to the validity of our model. Second, we find that the lead pre-policy effects are close to zero (e.g. the coefficients β^j are statistically indistinguishable from zero for t<0), which indicate that the reduction in crime only materializes after the implementation of mandatory PDMP. This suggests that PDMPs were not endogenously implemented in response to changes in crime trends.

Third, figures 1-3 suggest that a reduction in crime materializes after the implementation of the mandatory access PDMPs. These results are also reflected in the expected cost of crime.[41] Fourth, there are important dynamics in the treatment effects. For violent crime, the post-policy effects persist up to our window of observation (4 years); there also appear to be lagged effects of the policy such that the effects on violent crime get stronger over time. Lagged effects are indicated in prior work, and plausible, given the time it takes for physicians to learn and become well-versed in accessing the databases. Also, this makes sense given the potential lags between restricted access to Rx opioids and substitution into alternate sources or diversion into treatment (Grecu et al. 2019).[42]

For property crime, the post-policy effects are negative for a while but then tend to rebound back to pre-policy levels by the last year of our observation window. This is consistent

[41] Figure A1 presents the coefficient corresponding to the event study using the dates of modern fully accessible PDMP systems from Horwitz et al (2018) and the results remained similar. Since the dates presented in Horwitz et al (2018) are not as recent as those of the PDAPS mandated access, we show a longer event study when using those dates, where we estimate dynamic effects within a five-year period and impose endpoint restrictions where $\beta^k = \bar{\beta}$ if $t \geq 6$ and $\beta^k = \underline{\beta}$ if $t \leq 6$. The endpoint restrictions prevent us from assigning unequal weight to cities that enacted their PDMP particularly earlier or later given that the sample is unbalanced in event time (Kline, 2014; McCrary, 2007).

[42] Prior work in the context of heroin (Moore and Schnepel 2018) also finds that a supply shock that increased the price of heroin by 400% resulted in a short term smaller increase in property crimes accompanied by a longer term decline; indicating that an average post-policy effect may mask important dynamics in the presence of drug transitions.

with Dobkin and Nicosia (2009) who also found that changes in prices and misuse indicators related to supply-side interventions, albeit for methamphetamines, were transient and returned to pre-intervention levels within two years. In terms of non-cost adjusted crime rates, the transient effects for property crime dominate those for violent crime and hence Figure 1 also suggests that total crime may revert back within four years. However, when one accounts for the relative severity of violent crime, cost-adjusted crime rates (Figure 1) – where violent crime carries a larger weight - continue to show a sustained decline. The discrepancies between crime rates and cost-adjusted crime rates arise because the more socially costly crimes are the least prevalent. While a very small change in crime would be unlikely to noticeably change crime rates, the cost-adjusted measure would capture it if these crimes are costly.

5.5 Robustness Checks and Falsification Diagnostics

Drug Arrests

One advantage of the arrest data is that they allow separate analyses for drug-related arrests, which we capitalize on to assess effects on arrests related to specific categories of drugs. Previous work has reported strong net decreases in opioid misuse among younger adults as a result of PDMPs (Grecu et al. 2019). Hence, if there is a decrease in Rx opioid misuse, and some of these individuals are diverted into treatment and do not substitute into other illicit drugs, then we would not expect strong effects on drug arrests. Drug-related arrest data are subject to measurement error and the effects of PDMP on drug-related arrest rates are largely imprecise.

Nevertheless, Appendix Table A3 presents some evidence of a decrease in arrests related to drugs offenses in general. This decrease is primarily driven by synthetic drugs (manufactured addicting narcotics such as Demerol and methadone) and by other non-narcotic drugs (e.g. barbiturates and Benzedrine). Previous literature has found a diversion effect from opioids to heroin, but our specification does not have sufficient power even though the effects are positive and suggestive of an increase of about 5% among younger adults. In addition, some recent work has found that opioids and marijuana may be substitutes, and that medical marijuana may be associated with a decrease in opioid use and misuse (Liang et al. 2018; Bachhuber et al. 2014). Consistent with this literature, we find a positive effect on marijuana-related arrests (on the order of 6%); however, this effect is statistically insignificant at the conventional level and not consistent across the trend controls.[43]

Falsification Diagnostics

As discussed in the previous section, we perform a placebo check similar to the randomization inference outlined in Abadie and Gardeazabal (2003) in order to evaluate where our results fare relative to a placebo analysis where agency-year indicators for whether mandated access is active are re-shuffled and randomly assigned. For this falsification exercise, we estimate equation (1) with an iteration-specific "shuffled" or placebo pseudo-PDMP indicator and repeat this process 300 times. Figures 5 presents the coefficients of these iterations for the 300 placebo parameters alongside the actual main policy effect and visual inspection suggest that the estimated effect of PDMPs is considerably different from the placebo estimates for the total crime rates as well as for the cost-adjusted crime rates. Figure A2 presents the coefficients of a similar exercise using the dates presented in Horwitz et al (2018) and the results remain similar.

Other Specification Checks

We implemented the following additional checks to verify that our main results are robust to alternate specifications and adjustments for sampling issues, and to assess and these

[43] We further examine the relationship between drug-related arrests and PDMP implementation using the dates from Horwitz et al (2018) and those results present evidence of a decrease in arrests related to "other drug" (e.g. Barbiturates and Benzedrine) that is statistically significant at the conventional level.

results are available upon request. First, we alternately specify the outcome as the crime rate or the natural log of the count of offenses (or arrests). Second, we estimate models using inverse hyperbolic sine transformation (that can account for zero cell counts without having to add one in the log models), fixed effects Poisson and negative binomial specifications. Third, we evaluate the sensitivity of our results to weighting. In our main analyses, we weight all models by the agency population, which produces a policy effect that represents an average over individuals (as opposed to an average over agencies, if the models are unweighted) and can also improve precision of the estimates since crime rates in a small agency may be more variable over time. Our coefficient estimates, patterns of results, and general conclusions are not materially affected by unweighting.

Fourth, we aggregated up all crime data to the state-year level, and re-estimated all specifications. Aggregation did not materially impact our results. Finally, in our main analyses we restricted the analyses to those agencies that consistently reported their crime statistics for every month of our sample period (that is, reported over all 180 months over our 2003-2017 sample period). As a robustness check we instead use agency-year cells that consistently reported over all 12 months in a given year, yielding an unbalanced panel of agencies (that still nevertheless reported consistently over all 12 months in the given calendar year for which we included their data). All of our estimates, in terms of signs, magnitudes, and statistical significance, remain robust in this expanded sample.

5.6 Alternate PDMP Measures

The bulk of the recent literature that has evaluated the effectiveness of PDMPs (for instance, Grecu et al. 2019; Buchmueller et al. 2018; Ali et al. 2017) stress the importance of differentiating mandatory access provisions to PDMPs. These studies find strong evidence that mandatory provisions have effectively reduced measures of opioid misuse. In recent work, Horwitz et al. (2018) stress another important dimension of such programs, notably when a state's full modern, electronic PDMP system became operational and became directly accessible to users (all key providers, law enforcement). They show that this aspect of PDMP deployment is significantly and negatively associated with doctor shopping and negatively associated with the dispensing of Rx opioids.

Given this evidence of a "first-stage", that such PDMPs appear to have reduced Rx opioid misuse, we also assess whether this dimension produces declines in crime consistent with mandatory access provisions. Appendix Table A4 and A5 utilize these alternate dates of modern, electronic, and fully accessible PDMP deployment from Horwitz et al. (2018) to assess effects on crime (based on both offenses known and the arrests). It is validating that these estimates largely confirm our previously discussed findings; they indicate a significant reduction in total crime as well as in violent and property crime, on the order of about 4%. Also, figure A1 graphically presents estimates from the event study analysis of PDMP deployment using the dates presented in Horwitz et al (2018). Reassuringly, the lead effects are insignificant and close to 0 in magnitude, suggestive of parallel pre-policy trends between the treated and control states. Furthermore, where there are reductions in crime, they materialize only after the deployment of the modern and fully accessible PDMP, with dynamics consistent with those discussed above with respect to mandatory PDMPs.

5.7 Effects in Context

Our estimates thus far suggest that mandatory access PDMPs have led to a significant reduction in overall crime, in both violent and property crime. The effect magnitudes indicate about a 5% reduction in the total number of offenses overall, and specifically a 7% reduction in the number arrests among young adults. These are reduced-form estimates that directly link the policy lever to a key societal outcome. We can combine the reduced-form effect on crime with the reduced-form effect on Rx drug misuse from the literature to impute an "implied instrumental variables" (IV) estimate of the structural effect of shifts in Rx drug misuse on crime.[44] Specifically, Grecu, Dave and Saffer (2018), based on similar DD and event-study specifications, find robust evidence that mandatory PDMPs reduced Rx opioid misuse among young adults ages 18-24 by between 26-32% (26% for opioid-related mortality, and 32% for treatment admissions). Combining these sets of estimates, the implied IV-based elasticity of total crime with respect to Rx opioid misuse is about 0.2 for young adults.[45] This effect in line with the literature relating other substances (heavy alcohol use, crack cocaine) to crime (Grogger and Willis 2000; Carpenter 2007; Fryer et al. 2013).

We can further use these sets of estimates to project the numbers of arrests that could be prevented at the margin from reducing Rx drug misuse. In 2017, about 2.5 million adults (ages 18-25) misused opioid pain relievers (based on the NSDUH), and law enforcement made about 2.21 million arrests among this age group (based on the UCR Arrest files). The reduced-form estimates indicate that mandatory PDMP provisions may have decreased the number of young adult Rx opioid misusers by about 750,000 and decreased total arrests among young adults by about 154,700. This indicates that for every 5 or so fewer Rx drug misusers, about one arrest appears to have been averted. Thus, the marginal effect of Rx opioid misuse on arrests is also about 0.2 (154,700 / 750,000). This compares to an average probability of an arrest relative to

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[44] Note that the causal effect of Rx drug abuse on crime (∂Crime / ∂Rx Abuse) can be decomposed as the ratio of two reduced-form effects: (∂Crime / ∂Rx Abuse) = (∂Crime / ∂PDMP) / (∂Rx Abuse / ∂PDMP)

[45] The reduced-form effect of the policy on crime is about 7% and the reduced-form of the policy on Rx opioid abuse is about 30% (26-32%), among young adults. Thus, the implied IV elasticity, akin to a Wald estimate, is: (-0.07 / -0.30) or 0.2.

having ever misused opioids, of about 0.31.[46] Hence, the marginal probability implied by our estimates is reasonable and "in the ball park"; that it is somewhat smaller than the average probability may imply a concave crime production function with respect to Rx opioid misuse.

While these imputed estimates help to frame the potential importance of PDMPs in affecting crime, help derive a structural causal effect of Rx drug misuse on crime, and also help assess the plausibility of the effect magnitudes, they are meant to be suggestive and should be interpreted with caution. The implied structural causal effect of Rx misuse on crime assumes that shifts in Rx opioid misuse are the only proximate channel through which mandatory access PDMPs affect crime, which appears plausible. Furthermore, small changes in the underlying reduced-form effects (numerator and denominator of the Wald estimate) can lead to large changes in the implied structural effect. Finally, the structural effect represents a local average treatment effect, capturing how Rx drug abuse impacts crime for the marginal misuser who is deterred from misusing Rx drugs due to the access restrictions (though they may substitute into other drugs, or transition into treatment and complete abstinence). Nevertheless, this exercise provides some validation that the effect sizes are of a plausible order of magnitude, being consistent with prior "first-order" effects of the policy on Rx opioid misuse and also consistent with descriptive data on the percent of opioid misusers who are arrested.

6. Conclusion

The misuse of opioids in the United States has quadrupled in the last 15 years and has reached epidemic proportions. In an attempt to mitigate opioid misuse almost every state has implemented a PDMP, and while the early literature on the effects of PDMPs did not find these programs to be effective, numerous recent studies have found a significant effect of mandatory-

[46] Data from the 2014 NSDUH indicate that among young adults ages 18-24, who had ever misused opioid pain relievers, 31.1% had reported being arrested.

access PDMPs on both the misuse of opioids and opioid related deaths (Grecu, Dave, and Saffer 2018; Buchmueller and Carey 2018; Alpert, Powell, and Pacula 2017). However, there are costs associated with PDMPs, particularly mandatory-access PDMPs, and there is still some debate regarding the appropriateness of PDMP legislation.

Furthermore, while the recent opioid epidemic has its roots within the formal healthcare system and originated with the rapid growth in the prescribing of opioid analgesics, it is unclear how restricting Rx opioids per se within the healthcare system would impact societal outcomes and population well-being. On the one hand, such restrictions may reduce overall misuse and adverse health consequences, though there may also be unintended costs due to the possibility that individuals may substitute to other illicit drugs or more dangerous supply channels to continue their habit. This study contributes to this debate and presents some of the first empirical analyses on the broader spillover impact of PDMP mandates on non-health related domains. Our study also more generally informs the question of how policies that specifically restrict the prescribing of opioids (and other controlled drugs) impact an important societal outcome, overall crime.

We find consistent evidence that stricter and well-deployed PDMPs, but not voluntary PDMPs, have led to a reduction in criminal activity. Our main estimates suggest that the stricter PDMP regulations reduced overall crime by about 5%, which is driven by reductions in violent crimes (4%), specifically homicides, as well as property crime (5%), specifically burglary and motor vehicle theft.[47] Though PDMPs were not implemented as a tool to fight crime, its implementation has affected crime to an extent comparable to more controversial and costly

[47] The decline in property crime is consistent with a large literature that links substance use to crime and finds evidence of an economic effect whereby addicts may resort to property crime as a way to fund drug habits (Carpenter 2007; Silverman and Spruill 1977; Manzoni et al 2006).

policies, such as increasing the size of the police force by approximately 10% (Evans and Owens 2007; Chalfin and McCrary 2007)[48].

The reduction in violent crime, and in particular homicides, may reflect the pharmacologic and systemic effects linking substance misuse to crime. Prior work has found that mandatory PDMPs have led to robust reductions in opioid misuse and overdose-related mortality. Even if some of these individuals are substituting into heroin or alternate underground supply sources for Rx drugs, the reduction in crime we find implies that on the net the marginal Rx drug misuser, who is impacted by the PDMP restrictions, has less exposure to the illicit drug market (which is strongly associated with violence, homicides, and gun-related deaths; Werb et al. 2011), has less exposure to the pharmacologic effects of the drugs (which may further help to reduce violence and aggression), and has less of an incentive to resort to crime to fund their drug addiction.[49]

The Centers for Disease Control and Prevention (CDC), Government Accountability Office (GAO), and the President's Opioid Commission (U.S. GAO 2009; Christie et al. 2017) have all stressed that in order for PDMPs to be effective, providers must access the data. They underscore the importance of moving towards universal registration and utilization, and recommend that all states institute mandatory access provisions. PDMP mandates are proliferating, though these mandates continue to face some opposition by physician and dentist groups on the grounds that they are intrusive, burdensome and difficult to implement in practice,

[48] To put this in cotext, given the cost-weighted crime elasticity of -0.21 to -0.47 of police and crime (Chalfin and McCrary, 2017), the 4%-6% decrease in the expected cost of total crime driven by the implementation of mandated access PDMP has an effect comparable to a 10% increase in the police force. Given the high cost of expanding policing services as the annual salary of a police officer in 2018 is $65,400 as estimated by the Bureau of Labor statistics (last accessed October 1st, 2019), expanding PDMP to mandated access PDMP may be a cost-effective tool to fight crime.

[49] While individuals who are already addicted to Rx opioids may enter the underground market to substitute towards illicit drugs, there will be newer cohorts that will not become addicted to Rx opioids as a result of the restrictions and hence that substitution would be less likely to occur over time.

take up time that could be otherwise spent treating patients, and can result in substantial punitive consequences for prescribers (Haffajee et al. 2015). At the end of our sample period, in 2017, 18 states, representing 33% of the population had required that providers must use the PDMP prior to prescribing a controlled drug; the rest continued to leave PDMP registration and use to the discretion of the providers or mandated use in limited circumstances. Our estimates for violent Part I offenses suggest that expanding strict PDMP mandates from the 33% coverage rate to universal coverage across the U.S. could reduce violent crime by about 3.4% or by about 42,408 offenses.[50] This would result in economic cost savings of up to $9.8 billion annually.[51] Overall, these findings specifically provide additional evidence that prescription drug monitoring programs are an effective social policy tool to mitigate the negative consequences of opioid misuse, and more broadly indicate that opioid policies can have important spillover effects into other non-health related domains such as crime that should be considered in any cost-benefit calculus.

[50] Table 2 and Appendix Table A1 reported that mandatory PDMP provisions reduce violent crime by between 4% and 6%, or on average 5%. Expanding coverage by 67% (from 33% to universal coverage) would therefore result in approximately (0.67*5) 3.4% reduction in violent crime. In 2017, the FBI reported 1,247,321 violent Part I crimes (see https://ucr.fbi.gov/crime-in-the-u.s/2017/crime-in-the-u.s.-2017/topic-pages/tables/table-1). Thus, a 3.4% reduction translates into 42,408 fewer offenses. Since property crime might be rebounding by the end of our observation window, we do not include these in our calculations.

[51] McCollister et al. (2010) present crime-specific estimates, combining the tangible and intangible costs, for Part I and some Part 2 crimes. Aggregating their violent crime estimates, based on the specific shares of each offense in total violent crimes for 2008, and converting to 2017 dollars yields the total cost of a violent offense as $230,205.

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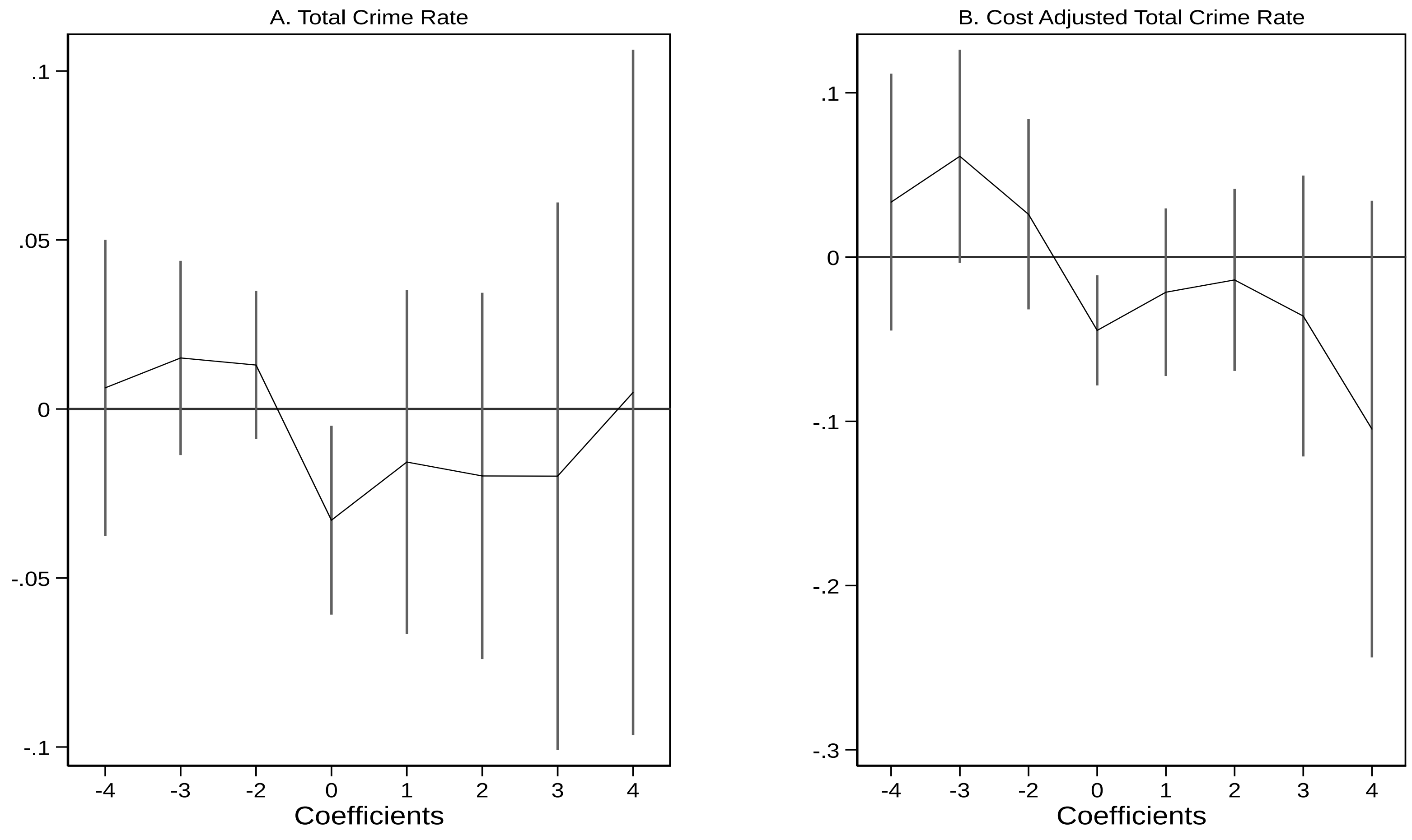
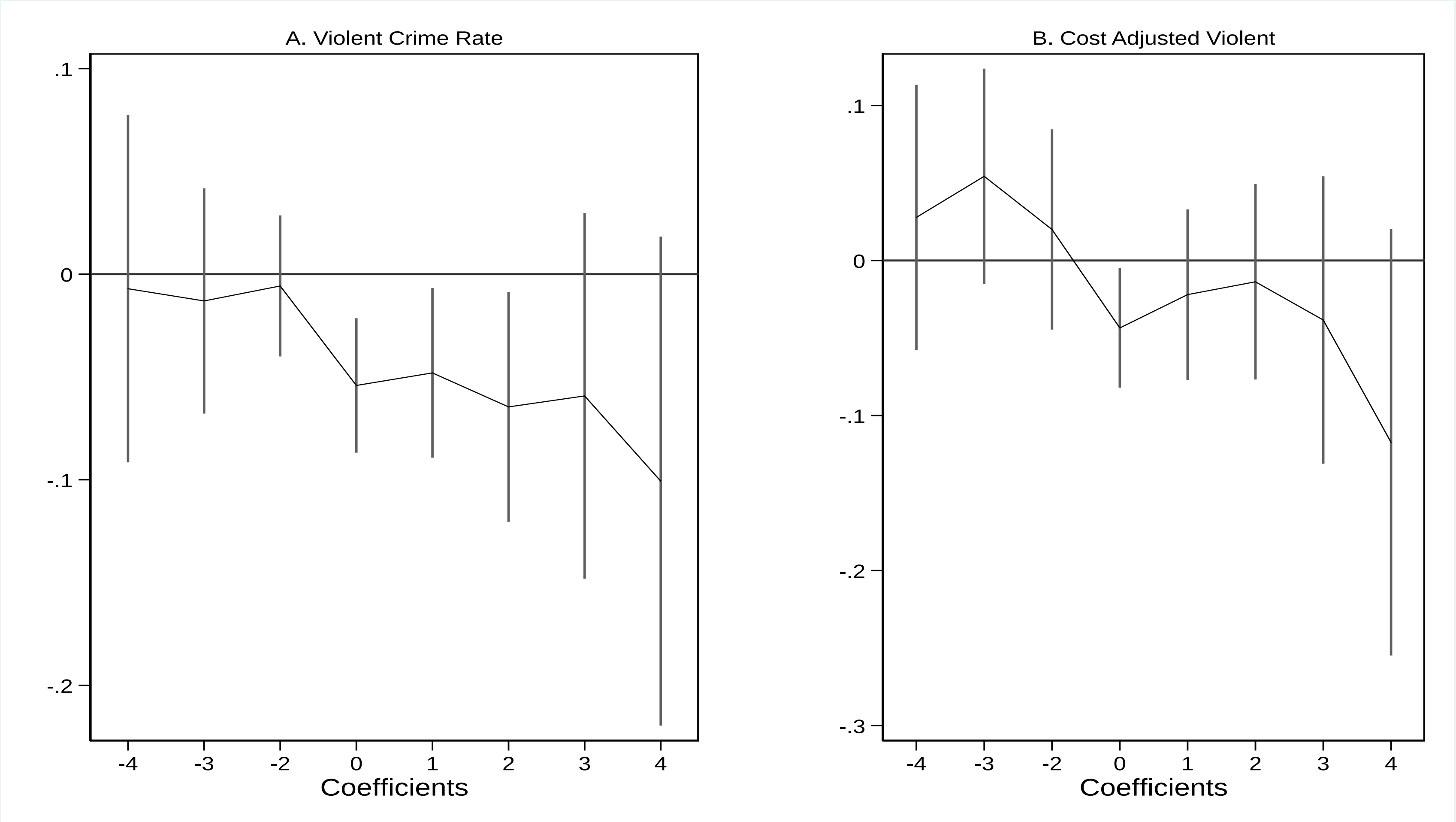
Figure 1: Dynamic Effects of MA PDMP on Total Crime



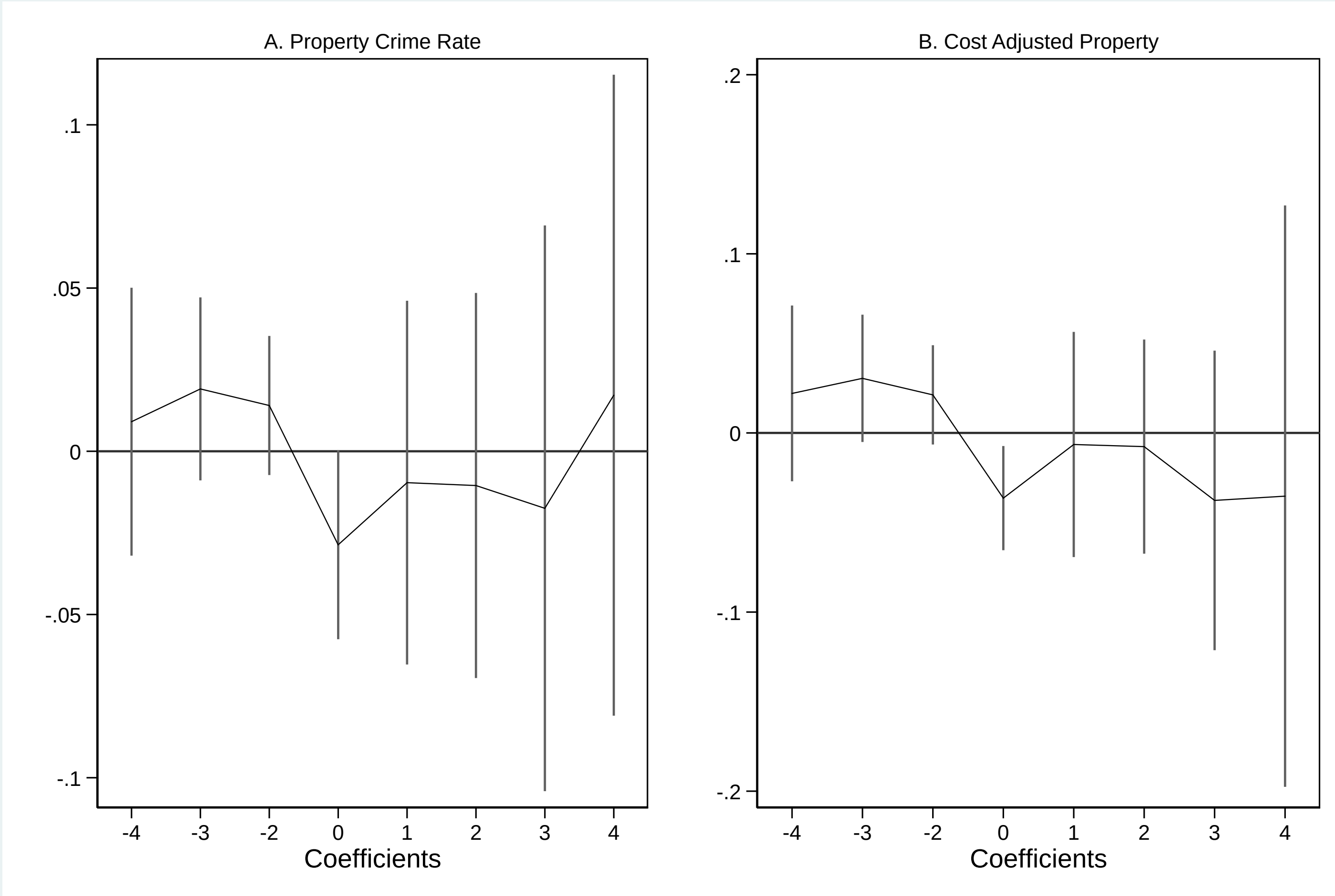
Notes: This event study uses the PDAPS dates of mandatory access implementation. The outcome is total crime rates (crimes per 100,000 residents) and cost-adjusted total crime rates. The coefficient corresponding to the year prior to the implementation (t=-1) of mandated access PDMP is normalized to zero.

Figure 2: Dynamic Effects of MA PDMP on Violent Crime



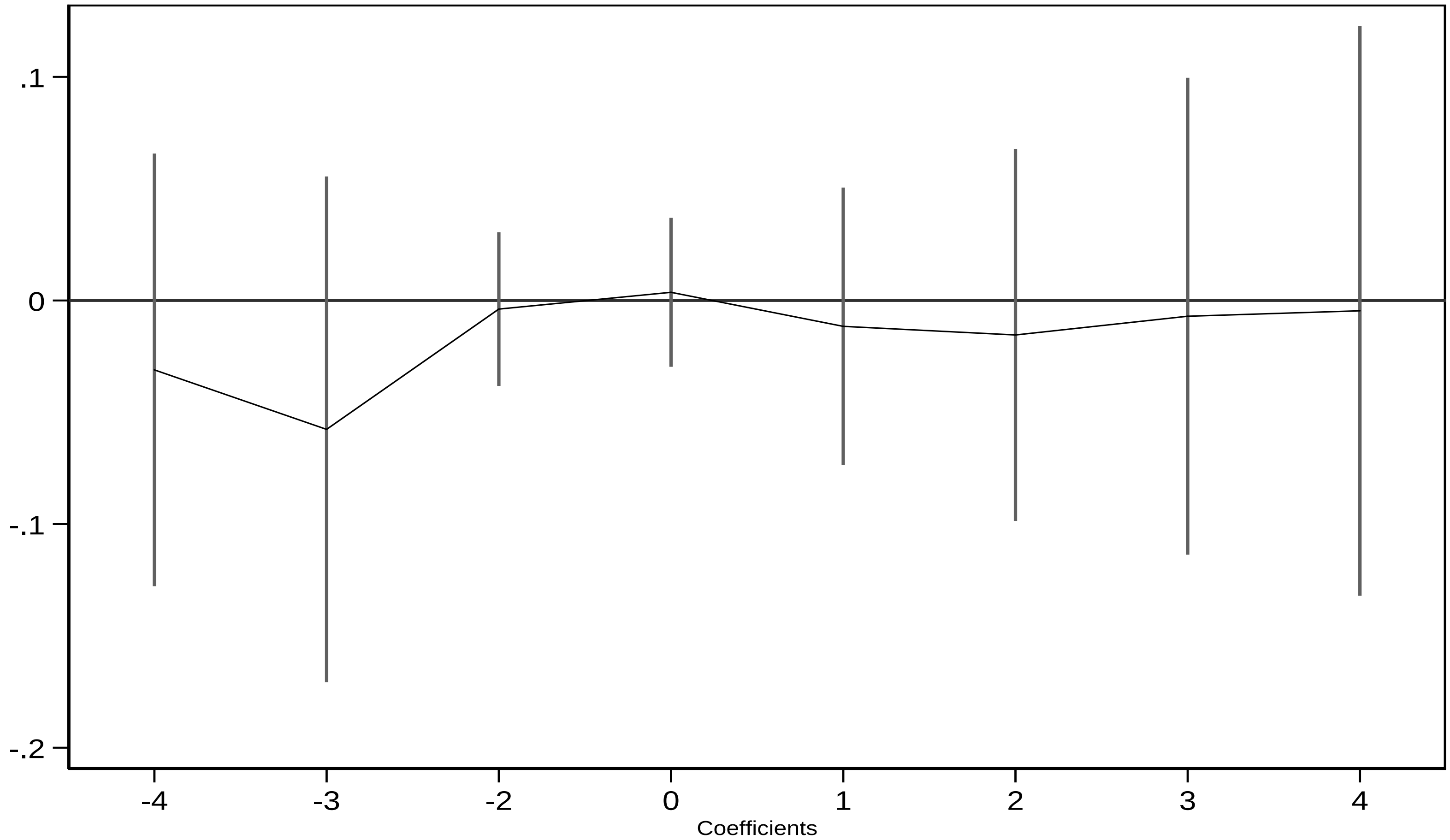
Notes: This event study uses the PDAPS dates of mandatory access implementation. The outcome is violent crime rates (crimes per 100,000 residents) and cost-adjusted violent crime rates. The coefficient corresponding to the year prior to the implementation (t=-1) of mandated access PDMP is normalized to zero.

Figure 3: Dynamic Effects of MA PDMP on Property Crime



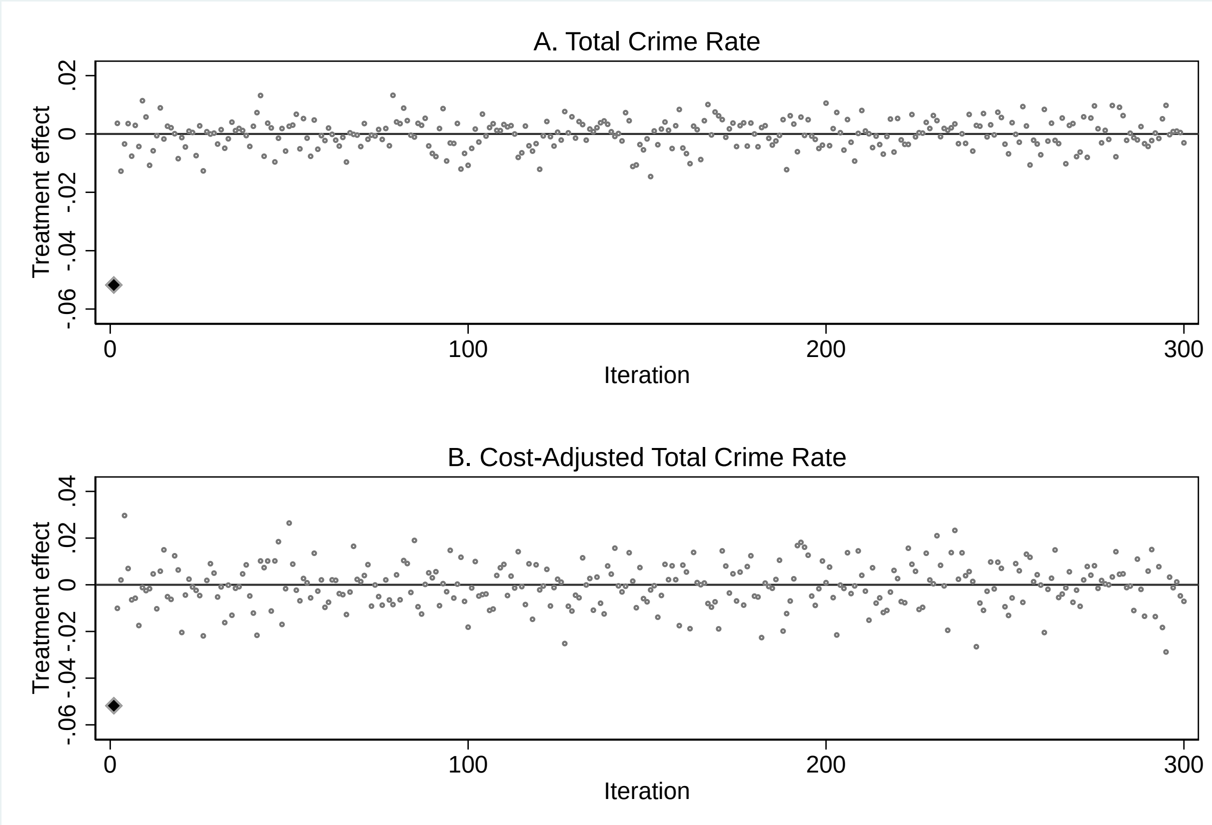
Notes: This event study uses the PDAPS dates of mandatory access implementation. The outcome is violent crime rates (crimes per 100,000 residents) and cost-adjusted violent crime rates. The coefficient corresponding to the year prior to the implementation (t=-1) of mandated access PDMP is normalized to zero.

Figure 4: Dynamic Effects of Voluntary PDMP on Total Crime



Notes: This event study uses the PDAPS dates of voluntary implementation. The outcome is total crime rates (crimes per 100,000 residents). The coefficient corresponding to the year prior to the implementation (t=-1) of voluntary PDMP is normalized to zero.

Figure 5: Randomization Inference, Mandated Access



Notes: This randomization inference exercise estimates the DD specification 300 times after "re-shuffling" the indicator for whether a state has a mandatory access PDMP and estimates the effect of a mandated access PDMP relative to a voluntary PDMP.

Table 1: Summary Statistics, Crime Rate per 100,000 Residents

	Full Sample		Subsample Reports 12 Months	
	Mean	SD	Mean	SD
Panel A: Offenses Known (per 100,000 population covered)				
Total	2,240.07	(27,420.41)	3,253.86	(39,638.11)
Violent	212.77	(635.58)	298.90	(751.33)
Property	2,027.33	(27,149.56)	2,954.97	(39,269.62)
Homicide	2.39	(14.90)	3.25	(14.67)
Rape	19.75	(46.67)	27.59	(43.16)
Robbery	38.02	(287.74)	58.13	(407.75)
Assault	152.82	(417.94)	210.19	(402.53)
Burglary	410.50	(779.26)	562.46	(976.06)
Larceny	1,487.74	(26,643.28)	2,193.23	(38,571.12)
MV Theft	129.09	(1,355.15)	199.28	(1,939.42)
Agencies	22,779		9,136	
Observations	243,986		115,892	
Panel B: Homicide Circumstances (per 100,000 population covered)				
	Full Sample		**City Pop>10,000**	
	Mean	**SD**	**Mean**	**SD**
Murders	11.82	(27.02)	10.56	(9.79)
Weapon Firearm	7.18	(24.28)	7.83	(8.53)
Weapon Knife	1.74	(7.27)	1.10	(1.31)
Victim 18-39	6.18	(20.95)	6.95	(7.15)
Victim Over 40	4.32	(13.15)	2.61	(2.66)
Offender 18-39	5.88	(14.12)	4.65	(4.12)
Offender Over 40	3.05	(18.24)	1.14	(1.32)
Victim Male	8.41	(24.26)	8.83	(8.81)
Victim Female	3.36	(12.42)	1.72	(1.81)
Victim Male 18-39	4.76	(19.31)	6.09	(6.61)
Victim Male Over 40	2.84	(11.16)	1.98	(2.26)
Victim Female 18-39	1.40	(8.13)	0.85	(1.22)
Victim Female Over 40	1.47	(7.23)	0.62	(0.96)
Agencies	8,988		316	
Observations	39,069		4,740	

Table 1 (Continued) : Summary Statistics, Crime Rate per 100,000 Residents

	Full Sample		Subsample Reports 12 Months	
	Mean	**SD**	**Mean**	**SD**
Panel C: Arrests (per 100,000 population covered)				
Total	866.27	(16,742.59)	807.01	(3,038.45)
Violent	147.61	(3,333.44)	171.00	(543.45)
Property	718.66	(13,448.34)	636.01	(2,600.73)
Murder	2.49	(24.15)	2.65	(15.15)
Rape	7.10	(22.09)	7.70	(16.77)
Robbery	20.07	(117.09)	26.79	(155.91)
Assault	117.95	(3,316.69)	133.86	(396.72)
Burglary	93.31	(573.89)	109.80	(714.87)
Larceny	594.45	(6,943.70)	493.76	(1,764.37)
MV Theft	30.91	(6,600.40)	32.45	(339.83)
Total 18-39	416.53	(1,640.12)	498.71	(2,063.25)
Violent 18-39	94.82	(358.51)	110.85	(393.01)
Property 18-39	321.71	(1,361.07)	387.86	(1,737.45)
Total 40 Plus	162.36	(3,332.54)	156.01	(700.40)
Violent 40 Plus	65.00	(3,299.19)	38.84	(137.83)
Property 40 Plus	97.35	(423.49)	117.18	(600.08)
N Agencies	22,640		3,987	

Notes: The first two columns present summary statistics for the entire sample. The last two columns present summary statistics for the subsample used in this analysis. The analysis using offenses known to police and arrest file are restricted to agencies that reported crimes all 12 months while the Supplementary Homicide Report analysis uses agencies that correspond to a city of at least 10,000 residents and that report at least one homicide in each year of study. Offenses known data is available until 2017 and arrest data is available until 2016.

Table 2: The Effect of PDMP on Total, Violent and Property Crimes

	FBI UCR Offenses Known								
	Total			Violent			Property		
Panel A: Ln Crime Rates									
PDMP	-0.029**	-0.023	-0.022	-0.040	-0.042	-0.000	-0.025	-0.018	-0.026
	(0.014)	(0.015)	(0.020)	(0.031)	(0.031)	(0.019)	(0.015)	(0.015)	(0.021)
MA	-0.022	-0.052*	-0.057*	-0.058**	-0.044	-0.040*	-0.016	-0.049	-0.053*
	(0.025)	(0.029)	(0.029)	(0.028)	(0.029)	(0.023)	(0.026)	(0.030)	(0.029)
Observations	115,892	115,892	115,892	115,891	115,891	115,891	115,895	115,895	115,895
Total MA Effect	-0.052*	-0.075**	-0.078**	-0.097***	-0.086**	-0.041	-0.041	-0.066*	-0.079**
	(0.028)	(0.031)	(0.034)	(0.034)	(0.034)	(0.027)	(0.031)	(0.034)	(0.036)
Panel B: Ln Cost-Adjusted Crime Rates									
PDMP	-0.024	-0.026	0.023	-0.019	-0.022	0.026	-0.030	-0.031	-0.020
	(0.022)	(0.024)	(0.019)	(0.025)	(0.027)	(0.021)	(0.023)	(0.023)	(0.022)
MA	-0.064**	-0.052*	-0.039	-0.061**	-0.045	-0.030	-0.038	-0.035	-0.045
	(0.028)	(0.029)	(0.027)	(0.030)	(0.032)	(0.029)	(0.026)	(0.028)	(0.030)
Observations	115,882	115,882	115,882	115,871	115,871	115,871	115,895	115,895	115,895
Total MA Effect	-0.087**	-0.078**	-0.016	-0.080**	-0.068*	-0.004	-0.069*	-0.066*	-0.065*
	(0.034)	(0.031)	(0.028)	(0.037)	(0.032)	(0.028)	(0.034)	(0.036)	(0.036)
Agency FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
State Trend	N	N	Y	N	N	Y	N	N	Y
Treatment Trend	N	Y	N	N	Y	N	N	Y	N
Weight Agency Pop	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cluster State	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note: Models weighted by population agency. Standard erros are clustered by state and reported in parentheses. All models controls for demographic factors (% minors, % age 18-25, %males age 18-25, %males), drug and alcohol policies (ID laws, PER laws, Naloxone laws, Good Samaritan laws, marijuana decriminalization, marijuana legalization, medical marijuana laws, BAC laws, beer taxes), police composition (ln officers per 100,000 residents) and other socioeconomic variables (income per capita, unemployment rate, poverty rate and share of residents that have a college degree, some college, high school, and less than high school). **** p-value≤0.001, *** p-value≤0.01, * *p-value≤0.05, *p-value<0.10

Table 3: The Effect of PDMP on Crime Categories, Ln Crime Rate

	FBI UCR Offenses Known		
Panel A: Homicide			
PDMP	-0.005	-0.004	0.024
	(0.017)	(0.019)	(0.017)
MA	-0.048*	-0.052**	-0.034
	(0.027)	(0.024)	(0.021)
Observations	115,891	115,891	115,891
Total MA Effect	-0.053	-0.056*	-0.010
	(0.034)	(0.029)	(0.023)
Panel B: Rape			
PDMP	-0.152	-0.170	0.001
	(0.107)	(0.125)	(0.046)
MA	-0.309	-0.224	-0.098
	(0.252)	(0.175)	(0.071)
Observations	115,833	115,833	115,833
Total MA Effect	-0.461	-0.394	-0.096
	(0.348)	(0.283)	(0.062)
Panel C: Robbery			
PDMP	-0.016	-0.023	0.010
	(0.029)	(0.029)	(0.016)
MA	-0.057*	-0.025	-0.026
	(0.032)	(0.033)	(0.027)
Observations	115,889	115,889	115,889
Total MA Effect	-0.073**	-0.048	-0.015
	(0.035)	(0.033)	(0.027)
Panel D: Assault			
PDMP	-0.035	-0.033	-0.012
	(0.036)	(0.036)	(0.023)
MA	-0.047	-0.061*	-0.054*
	(0.036)	(0.036)	(0.030)
Observations	115,886	115,886	115,886
Total MA Effect	-0.083*	-0.093*	-0.066*
	(0.046)	(0.047)	(0.036)
Agency FE	Y	Y	Y
Year FE	Y	Y	Y
State Trend	N	N	Y
Treatment Trend	N	Y	N
Weight Agency Pop	Y	Y	Y
Cluster State	Y	Y	Y

(Continued) Table 3: The Effect of PDMP on Crime Categories , Ln Crime Rate

	FBI UCR Offenses Known		
Panel E: Burglary			
PDMP	-0.035	-0.029	-0.013
	(0.023)	(0.023)	(0.023)
MA	-0.052	-0.081**	-0.091**
	(0.036)	(0.038)	(0.039)
Observations	115,895	115,895	115,895
Total MA Effect	-0.087**	-0.110***	-0.105**
	(0.039)	(0.041)	(0.045)
Panel F: Larceny			
PDMP	-0.041	-0.036	-0.096
	(0.035)	(0.035)	(0.070)
MA	-0.017	-0.040	-0.016
	(0.039)	(0.051)	(0.044)
Observations	115,895	115,895	115,895
Total MA Effect	-0.057	-0.076	-0.112
	(0.067)	(0.073)	(0.088)
Panel G: MV Theft			
PDMP	-0.060	-0.076**	-0.040
	(0.040)	(0.038)	(0.029)
MA	-0.103***	-0.024	-0.037
	(0.037)	(0.030)	(0.031)
Observations	115,894	115,894	115,894
Total MA Effect	-0.163***	-0.100**	-0.078
	(0.054)	(0.049)	(0.047)
Agency FE	Y	Y	Y
Year FE	Y	Y	Y
State Trend	N	N	Y
Treatment Trend	N	Y	N
Weight Agency Pop	Y	Y	Y
Cluster State	Y	Y	Y

Notes: Models weighted by population agency. Standard errors are clustered by state, and reported in parentheses. All models control for demographic factors (% minors, % age 18-25, %males age 18-25, %males), drug and alcohol policies (ID laws, PER laws, Naloxone laws, Good Samaritan laws, marijuana decriminalization, marijuana legalization, medical marijuana laws, BAC laws, beer taxes), police composition (ln officers per 100,000 residents) and other socioeconomic variables (income per capita, unemployment rate, poverty rate and share of residents that have a college degree, some college, high school, and less than high school). **** p-value≤0.001, *** p-value≤0.01, * *p-value≤0.05, *p-value<0.10

Table 4: The Effect of PDMP on Homicide Circumstances

	FBI UCR Supplementary Homicide Reports						
	Murders	Weapon Firearms	Weapon Knife	Victim 18-39	Victim Over 40	Offender 18-39	Offender Over 40
Panel A: No Trend							
PDMP	-0.025	-0.012	0.041	-0.019	-0.028	-0.026	-0.068
	(0.035)	(0.047)	(0.045)	(0.047)	(0.039)	(0.049)	(0.041)
MA	-0.116**	-0.126**	-0.037	-0.129**	-0.085**	-0.002	-0.029
	(0.047)	(0.058)	(0.030)	(0.055)	(0.033)	(0.051)	(0.056)
Total MA Effect	-0.141**	-0.138	0.004	-0.148*	-0.113*	-0.028	-0.097
	(0.067)	(0.086)	(0.050)	(0.083)	(0.056)	(0.081)	(0.080)
Panel C: Treatment Trend							
PDMP	-0.024	-0.009	0.038	-0.019	-0.028	-0.007	-0.056
	(0.037)	(0.049)	(0.047)	(0.047)	(0.043)	(0.049)	(0.042)
MA	-0.122***	-0.138**	-0.023	-0.127**	-0.084**	-0.086*	-0.081
	(0.042)	(0.051)	(0.045)	(0.052)	(0.040)	(0.047)	(0.059)
Total MA Effect	-0.145**	-0.147*	0.015	-0.146*	-0.112**	-0.093	-0.137*
	(0.061)	(0.080)	(0.051)	(0.082)	(0.051)	(0.073)	(0.074)
Agency FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y
Weight Agency Pop	Y	Y	Y	Y	Y	Y	Y
Cluster State	Y	Y	Y	Y	Y	Y	Y

(Continued) Table 4: The Effect of PDMP on Homicide Circumstances

	FBI UCR Supplementary Homicide Reports						
	Murders	Weapon Firearms	Weapon Knife	Victim 18-39	Victim Over 40	Offender 18-39	Offender Over 40
Panel B: State Trend							
PDMP	0.018	0.034	0.066	0.020	-0.008	0.017	-0.041
	(0.033)	(0.048)	(0.059)	(0.039)	(0.046)	(0.055)	(0.060)
MA	-0.075**	-0.074	-0.028	-0.069*	-0.083*	-0.088**	-0.133**
	(0.034)	(0.045)	(0.048)	(0.039)	(0.045)	(0.039)	(0.053)
Total MA Effect	-0.058	-0.040	0.038	-0.049	-0.091	-0.071	-0.174**
	(0.050)	(0.068)	(0.057)	(0.060)	(0.066)	(0.070)	(0.078)
Observations	4,740	4,740	4,740	4,740	4,740	4,740	4,740
Agency FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y
Weight Agency Pop	Y	Y	Y	Y	Y	Y	Y
Cluster State	Y	Y	Y	Y	Y	Y	Y

Notes: Models weighted by population agency. Standard errors are clustered by state, and reported in parentheses. All models control for demographic factors (% minors, % age 18-25, %males age 18-25, %males), drug and alcohol policies (ID laws, PER laws, Naloxone laws, Good Samaritan laws, marijuana decriminalization, marijuana legalization, medical marijuana laws, BAC laws, beer taxes), police composition (ln officers per 100,000 residents) and other socioeconomic variables (income per capita, unemployment rate, poverty rate and share of residents that have a college degree, some college, high school, and less than high school). **** p-value≤0.001, *** p-value≤0.01, * *p-value≤0.05, *p-value<0.10

Table 5 : The Effect of PDMP on Demographic Composition of Homicide Victim and Offenders

	FBI UCR Supplementary Homicide Reports								
Panel A: Male Victim									
	Male Victim			**Male Victim 18-39**			**Male Victim Over 40**		
PDMP	-0.022	-0.020	0.048	-0.019	-0.019	0.039	-0.022	-0.023	0.044
	(0.041)	(0.042)	(0.040)	(0.049)	(0.049)	(0.044)	(0.037)	(0.040)	(0.042)
MA	-0.102**	-0.111**	-0.063*	-0.120**	-0.121**	-0.062	-0.057	-0.053	-0.047
	(0.048)	(0.041)	(0.034)	(0.054)	(0.051)	(0.043)	(0.036)	(0.050)	(0.056)
Total MA Effect	-0.124*	-0.131*	-0.015	-0.140	-0.140*	-0.023	-0.079	-0.076	-0.004
	(0.071)	(0.066)	(0.052)	(0.084)	(0.082)	(0.062)	(0.056)	(0.057)	(0.070)
Panel B: Female Victim									
	Female Victim			**Female Victim 18-39**			**Female Victim Over 40**		
PDMP	-0.007	-0.004	-0.046	-0.016	-0.023	-0.030	-0.002	0.006	-0.089
	(0.035)	(0.039)	(0.047)	(0.047)	(0.046)	(0.058)	(0.051)	(0.056)	(0.061)
MA	-0.144**	-0.160**	-0.141**	-0.130+	-0.100	-0.075	-0.097	-0.133**	-0.167***
	(0.056)	(0.066)	(0.061)	(0.065)	(0.075)	(0.064)	(0.063)	(0.062)	(0.061)
Total MA Effect	-0.151**	-0.163**	-0.187**	-0.145	-0.122	-0.105	-0.099	-0.127	-0.256***
	(0.073)	(0.073)	(0.086)	(0.086)	(0.094)	(0.105)	(0.098)	(0.087)	(0.085)
Agency FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
State Trend	N	N	Y	N	N	Y	N	N	Y
Treatment Trend	N	Y	N	N	Y	N	N	Y	N
Weight Agency Pop	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cluster State	Y	Y	Y	Y	Y	Y	Y	Y	Y

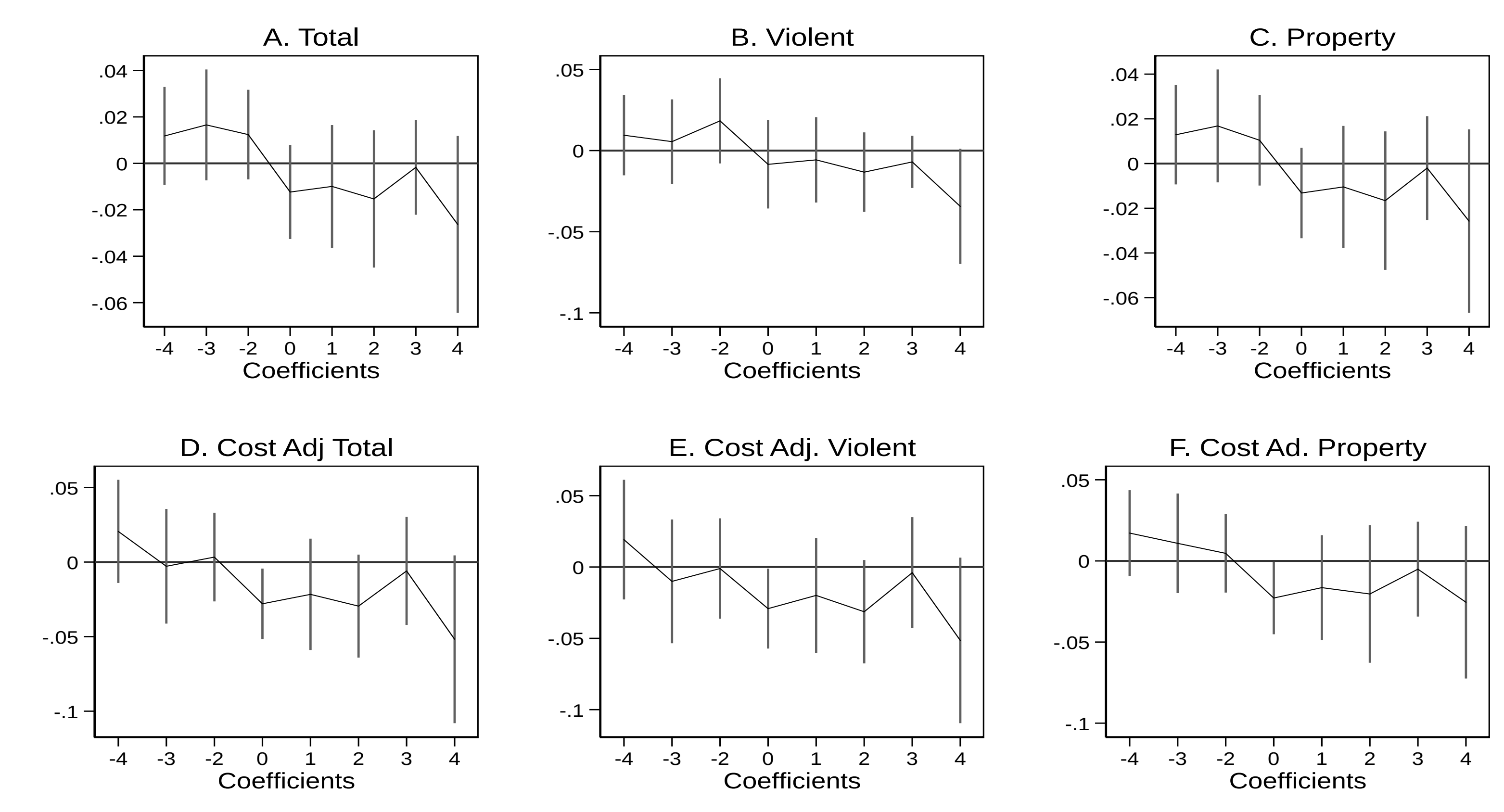
(Continued) Table 5 : The Effect of PDMP on Demographic Composition of Homicide Victim and Offenders

	FBI UCR Supplementary Homicide Reports								
Panel C: Male Offender									
	Male Offender			**Male Offender 18-39**			**Male Over 40**		
PDMP	-0.045	-0.034	-0.014	-0.025	-0.007	0.015	-0.064	-0.053	-0.043
	(0.046)	(0.048)	(0.042)	(0.051)	(0.051)	(0.053)	(0.039)	(0.039)	(0.060)
MA	-0.070	-0.121***	-0.118***	-0.019	-0.100**	-0.095**	-0.026	-0.078	-0.135**
	(0.046)	(0.042)	(0.036)	(0.049)	(0.046)	(0.039)	(0.058)	(0.065)	(0.058)
Total MA Effect	-0.115*	-0.155**	-0.133**	-0.044	-0.107	-0.079	-0.090	-0.130	-0.179**
	(0.066)	(0.059)	(0.060)	(0.080)	(0.072)	(0.068)	(0.081)	(0.079)	(0.087)
Panel D: Female Offender									
	Female Offender			**Female Offender18-39**			**Female Offender Over 40**		
PDMP	-0.018	-0.014	0.009	-0.023	-0.009	0.022	-0.066	-0.057	-0.059
	(0.080)	(0.081)	(0.090)	(0.085)	(0.088)	(0.110)	(0.054)	(0.056)	(0.072)
MA	0.059	0.041	0.001	0.123*	0.059	0.003	-0.018	-0.056	-0.052
	(0.057)	(0.074)	(0.072)	(0.070)	(0.098)	(0.091)	(0.047)	(0.071)	(0.074)
Total MA Effect	0.041	0.027	0.011	0.099	0.050	0.025	-0.084	-0.113	-0.111
	(0.115)	(0.119)	(0.120)	(0.133)	(0.139)	(0.134)	(0.068)	(0.077)	(0.098)
Observations	4,740	4,740	4,740	4,740	4,740	4,740	4,740	4,740	4,740
Agency FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
State Trend	N	N	Y	N	N	Y	N	N	Y
Treatment Trend	N	Y	N	N	Y	N	N	Y	N
Weight Agency Pop	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cluster State	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: Models weighted by population agency. Standard errors are clustered by state, and reported in parentheses. All models control for demographic factors (% minors, % age 18-25, %males age 18-25, %males), drug and alcohol policies (ID laws, PER laws, Naloxone laws, Good Samaritan laws, marijuana decriminalization, marijuana legalization, medical marijuana laws, BAC laws, beer taxes), police composition (ln officers per 100,000 residents) and other socioeconomic variables (income per capita, unemployment rate, poverty rate and share of residents that have a college degree, some college, high school, and less than high school). **** p-value≤0.001, *** p-value≤0.01, * *p-value≤0.05, *p-value<0.10

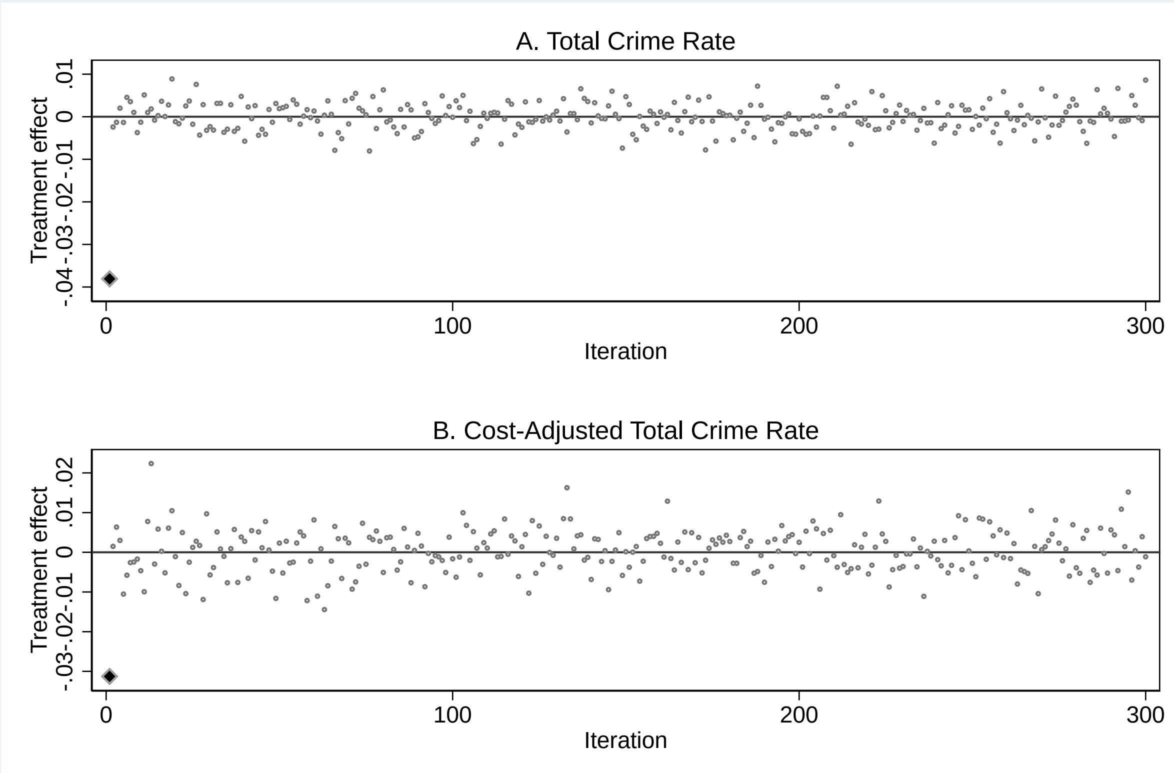
Figure A1: Dynamic Effects of Modern Fully Accessible PDMP

Using Horwitz et al (2018)



Notes: This event study uses the dates of implementation from Horwitz et al (2018). The outcomes are total, violent and property crime rates (crimes per 100,000 residents) and cost-adjusted total, violent, and property crime rates. The coefficient corresponding to the year prior to the implementation (t=-1) of PDMP as defined in Horwitz et al (2018) is normalized to zero.

Figure A2: Randomization Inference, Modern Fully Accessible PDMP Dates
Using Horwitz et al (2018) dates



Notes: This randomization inference exercise estimates the DD specification 300 times after "re-shuffling" the indicator for whether a state has a PDMP and estimates the total effect of PDMP implementation as defined in Horwitz et al (2018)

Table A1: The Effect of PDMP on Total, Violent and Property Ln Arrest Rates

	Total			Violent			Property		
Panel A: All Ages									
PDMP	-0.065**	-0.043	-0.055**	-0.065	-0.052	-0.030	-0.061*	-0.037	-0.066**
	(0.028)	(0.030)	(0.024)	(0.039)	(0.042)	(0.026)	(0.032)	(0.031)	(0.028)
MA	0.023	-0.084***	-0.058***	-0.046	-0.113****	-0.060***	0.054	-0.066*	-0.052**
	(0.035)	(0.030)	(0.019)	(0.040)	(0.024)	(0.018)	(0.038)	(0.035)	(0.023)
Total MA Effect	-0.042	-0.128***	-0.113****	-0.111**	-0.165****	-0.090****	-0.007	-0.103***	-0.118****
	(0.049)	(0.041)	(0.029)	(0.060)	(0.047)	(0.026)	(0.050)	(0.045)	(0.033)
Panel B: Ages 18-39									
PDMP	-0.046	-0.026	-0.048*	-0.053	-0.040	-0.026	-0.046	-0.023	-0.060+
	(0.029)	(0.031)	(0.026)	(0.038)	(0.041)	(0.027)	(0.031)	(0.031)	(0.033)
MA	-0.001	-0.105***	-0.070***	-0.053	-0.115****	-0.061***	0.021	-0.093*	-0.069*
	(0.038)	(0.034)	(0.025)	(0.039)	(0.024)	(0.018)	(0.041)	(0.040)	(0.029)
Total MA Effect	-0.048	-0.130***	-0.118***	-0.106*	-0.155***	-0.087***	-0.025	-0.116***	-0.129****
	(0.053)	(0.044)	(0.033)	(0.059)	(0.046)	(0.027)	(0.054)	(0.049)	(0.040)
Panel C: Age 40 and Over									
PDMP	-0.041	-0.026	-0.042	-0.068*	-0.053	-0.028	-0.033	-0.019	-0.050+
	(0.029)	(0.032)	(0.025)	(0.040)	(0.043)	(0.027)	(0.032)	(0.034)	(0.026)
MA	0.011	-0.066**	-0.055**	-0.034	-0.111****	-0.074***	0.033	-0.035	-0.040+
	(0.036)	(0.029)	(0.021)	(0.041)	(0.028)	(0.023)	(0.042)	(0.034)	(0.024)
Total MA Effect	-0.030	-0.091**	-0.097***	-0.103	-0.164***	-0.102***	0.000	-0.055	-0.090***
	(0.053)	(0.041)	(0.029)	(0.065)	(0.055)	(0.032)	(0.055)	(0.045)	(0.031)
Observations	51,513	51,513	51,513	51,513	51,513	51,513	51,513	51,513	51,513
Agency FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
State Trend	N	N	Y	N	N	Y	N	N	Y
Treatment Trend	N	Y	N	N	Y	N	N	Y	N
Weight Agency Pop	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cluster State	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: Models weighted by population agency. Standard errors are clustered by state, and reported in parentheses. All models control for demographic factors (% minors, % age 18-25, %males age 18-25, %males), drug and alcohol policies (ID laws, PER laws, Naloxone laws, Good Samaritan laws, marijuana decriminalization, marijuana legalization, medical marijuana laws, BAC laws, beer taxes), police composition (ln officers per 100,000 residents) and other socioeconomic variables (income per capita, unemployment rate, poverty rate and share of residents that have a college degree, some college, high school, and less than high school). **** p-value≤0.001, *** p-value≤0.01, * *p-value≤0.05, *p-value<0.10

Table A2: The Effect of PDMP on Ln Arrest Rates, Crime Categories

	FBI UCR Arrest Rate						
	Murder	Rape	Robbery	Assault	Burglary	Larceny	MV Theft
Panel A: All Ages, No Trend							
PDMP	0.024	-0.088**	-0.006	-0.092*	-0.064*	-0.076*	0.031
	(0.023)	(0.040)	(0.025)	(0.047)	(0.035)	(0.038)	(0.057)
MA	-0.035	0.005	-0.057+	-0.028	-0.032	0.089*	-0.059
	(0.043)	(0.055)	(0.032)	(0.042)	(0.044)	(0.039)	(0.066)
Total MA Effect	-0.001	-0.083	-0.055	-0.119*	-0.095	0.027	-0.019
	(0.043)	(0.070)	(0.044)	(0.067)	(0.065)	(0.056)	(0.080)
Panel B: All Ages, Treated State Trend							
PDMP	0.027	-0.072*	-0.000	-0.076	-0.049	-0.054	0.054
	(0.023)	(0.042)	(0.025)	(0.051)	(0.033)	(0.037)	(0.057)
MA	-0.053	-0.078	-0.084***	-0.113****	-0.109*	-0.028	-0.176**
	(0.042)	(0.054)	(0.030)	(0.029)	(0.055)	(0.037)	(0.072)
Total MA Effect	-0.018	-0.148**	-0.077*	-0.186***	-0.157**	-0.071	-0.121
	(0.039)	(0.065)	(0.040)	(0.057)	(0.075)	(0.044)	(0.087)
Panel C: All Ages, State Trend							
PDMP	-0.006	-0.085*	0.013	-0.066	-0.043	-0.083***	-0.048
	(0.046)	(0.045)	(0.023)	(0.049)	(0.031)	(0.030)	(0.045)
MA	-0.032	-0.053	-0.029	-0.057**	-0.093**	-0.000	-0.128**
	(0.045)	(0.060)	(0.032)	(0.025)	(0.044)	(0.026)	(0.053)
Total MA Effect	-0.025	-0.136**	-0.012	-0.123***	-0.140**	-0.088**	-0.172**
	(0.056)	(0.065)	(0.042)	(0.042)	(0.060)	(0.034)	(0.065)
Agency FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y
Weight Agency Pop	Y	Y	Y	Y	Y	Y	Y
Cluster State	Y	Y	Y	Y	Y	Y	Y

(Continued) Table A2: The Effect of PDMP on Ln Arrest Rates, Crime Categories

	FBI UCR Arrest Rate						
	Murder	**Rape**	**Robbery**	**Assault**	**Burglary**	**Larceny**	**MV Theft**
Panel D: Age 18-39, No trend							
PDMP	0.019	-0.096**	-0.000	-0.082*	-0.041	-0.067*	0.067
	(0.024)	(0.039)	(0.024)	(0.047)	(0.036)	(0.037)	(0.056)
MA	-0.034	0.026	-0.064**	-0.033	-0.038	0.048	-0.106
	(0.045)	(0.048)	(0.030)	(0.043)	(0.050)	(0.041)	(0.080)
Total MA Effect	-0.004	-0.066	-0.058	-0.115*	-0.076	-0.004	-0.029
	(0.044)	(0.064)	(0.043)	(0.067)	(0.072)	(0.057)	(0.081)
Panel E: 18-39, Treated State Trend							
PDMP	0.025	-0.081*	0.004	-0.066	-0.026	-0.046	0.090
	(0.024)	(0.041)	(0.025)	(0.052)	(0.034)	(0.038)	(0.056)
MA	-0.062	-0.048	-0.086***	-0.115****	-0.112*	-0.059	-0.226**
	(0.042)	(0.041)	(0.028)	(0.030)	(0.061)	(0.039)	(0.086)
Total MA Effect	-0.030	-0.125**	-0.075*	-0.178***	-0.135	-0.095**	-0.131
	(0.040)	(0.056)	(0.039)	(0.056)	(0.081)	(0.045)	(0.086)
Panel F:18-39, State Trend							
PDMP	0.014	-0.095**	0.023	-0.059	-0.038	-0.075**	-0.005
	(0.054)	(0.047)	(0.022)	(0.049)	(0.035)	(0.033)	(0.058)
MA	-0.048	-0.025	-0.042	-0.053*	-0.095*	-0.019	-0.169**
	(0.043)	(0.044)	(0.030)	(0.027)	(0.051)	(0.031)	(0.065)
Total MA Effect	-0.023	-0.122**	-0.014	-0.112**	-0.135*	-0.100**	-0.166**
	(0.061)	(0.056)	(0.039)	(0.043)	(0.069)	(0.037)	(0.076)
Agency FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y
Weight Agency Pop	Y	Y	Y	Y	Y	Y	Y
Cluster State	Y	Y	Y	Y	Y	Y	Y

(Continued) Table A2: The Effect of PDMP on Ln Arrest Rates, Crime Categories

	FBI UCR Arrest Rate						
	Murder	**Rape**	**Robbery**	**Assault**	**Burglary**	**Larceny**	**MV Theft**
Panel G: Age Over 40, No Trend							
PDMP	0.021	-0.043	0.019	-0.085*	-0.013	-0.044	0.045
	(0.016)	(0.030)	(0.027)	(0.046)	(0.030)	(0.038)	(0.047)
MA	0.005	0.001	-0.055	-0.020	-0.010	0.069	-0.152*
	(0.024)	(0.048)	(0.034)	(0.043)	(0.045)	(0.046)	(0.079)
Total MA Effect	0.028	-0.049	-0.030	-0.100	-0.029	0.036	-0.091
	(0.029)	(0.061)	(0.054)	(0.068)	(0.064)	(0.061)	(0.076)
Panel H: Age Over 40 Treated State Trend							
PDMP	0.021	-0.025	0.025	-0.068	-0.011	-0.030	0.061
	(0.017)	(0.030)	(0.027)	(0.049)	(0.030)	(0.039)	(0.048)
MA	0.001	-0.090*	-0.086**	-0.109***	-0.022	-0.004	-0.233**
	(0.031)	(0.048)	(0.036)	(0.032)	(0.049)	(0.041)	(0.093)
Total MA Effect	0.027	-0.117*	-0.052	-0.172***	-0.037	-0.024	-0.159*
	(0.030)	(0.059)	(0.051)	(0.062)	(0.066)	(0.049)	(0.085)
Panel I: Age Over 40, State Trend							
PDMP	-0.027	-0.008	0.054	-0.070	-0.013	-0.064**	0.009
	(0.029)	(0.031)	(0.033)	(0.045)	(0.025)	(0.028)	(0.052)
MA	0.021	-0.081*	-0.074**	-0.064**	-0.033	0.003	-0.192***
	(0.033)	(0.044)	(0.036)	(0.026)	(0.041)	(0.031)	(0.069)
Total MA Effect	0.000	-0.085	-0.022	-0.133***	-0.052	-0.066*	-0.170**
	(0.031)	(0.054)	(0.056)	(0.046)	(0.053)	(0.036)	(0.065)
Agency FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y
Weight Agency Pop	Y	Y	Y	Y	Y	Y	Y
Cluster State	Y	Y	Y	Y	Y	Y	Y

Notes: Models weighted by agency's population. Standard errors are clustered by state, and reported in parentheses. All models control for demographic factors (% minors, % age 18-25, %males age 18-25, %males), drug and alcohol policies (ID laws, PER laws, Naloxone laws, Good Samaritan laws, marijuana decriminalization, marijuana legalization, medical marijuana laws, BAC laws, beer taxes), police composition (ln officers per 100,000 residents) and other socioeconomic variables (income per capita, unemployment rate, poverty rate and share of residents that have a college degree, some college, high school, and less than high school). **** p-value≤0.001, *** p-value≤0.01, * *p-value≤0.05, *p-value<0.10

Table A3: The Effect of PDMP on Drug Arrest Rates

	FBI UCR Arrest Rate								
	All Ages			Age 18-39			Age Over 40		
Panel A: Total									
PDMP	-0.123	-0.104	-0.045	-0.111	-0.088	-0.032	-0.167**	-0.158**	-0.071
	(0.073)	(0.078)	(0.064)	(0.076)	(0.080)	(0.064)	(0.063)	(0.067)	(0.062)
MA	-0.010	-0.107	-0.088	0.001	-0.115	-0.095	-0.034	-0.084	-0.065
	(0.076)	(0.111)	(0.083)	(0.077)	(0.114)	(0.085)	(0.066)	(0.090)	(0.073)
Total MA Effect	-0.102	-0.187	-0.142	-0.078	-0.178	-0.134	-0.183+	-0.226**	-0.143
	(0.112)	(0.128)	(0.107)	(0.113)	(0.132)	(0.110)	(0.098)	(0.105)	(0.098)
Panel B: Marijuana									
PDMP	-0.019	0.009	-0.040	-0.003	0.028	-0.016	-0.091	-0.065	-0.048
	(0.105)	(0.112)	(0.084)	(0.108)	(0.116)	(0.088)	(0.083)	(0.091)	(0.077)
MA	0.075	-0.068	0.036	0.109	-0.049	0.059	0.100	-0.033	0.057
	(0.111)	(0.144)	(0.120)	(0.113)	(0.147)	(0.125)	(0.090)	(0.125)	(0.108)
Total MA Effect	0.114	-0.014	-0.004	0.169	0.029	0.045	0.052	-0.062	0.014
	(0.172)	(0.183)	(0.164)	(0.178)	(0.187)	(0.172)	(0.136)	(0.150)	(0.148)
Panel C: Other Drug									
PDMP	-0.155*	-0.122	-0.145	-0.130	-0.095	-0.094	-0.197***	-0.175***	-0.172**
	(0.088)	(0.087)	(0.088)	(0.093)	(0.093)	(0.089)	(0.063)	(0.061)	(0.074)
MA	0.044	-0.124	-0.123	0.044	-0.139	-0.143	0.045	-0.065	-0.044
	(0.085)	(0.123)	(0.102)	(0.085)	(0.122)	(0.099)	(0.085)	(0.119)	(0.094)
Total MA Effect	-0.078	-0.208	-0.260*	-0.051	-0.192	-0.227	-0.130	-0.213*	-0.212
	(0.113)	(0.138)	(0.142)	(0.115)	(0.139)	(0.142)	(0.097)	(0.122)	(0.127)
Agency FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
State Trend	N	N	Y	N	N	Y	N	N	Y
Treatment Trend	N	Y	N	N	Y	N	N	Y	N
Weight Agency Pop	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cluster State	Y	Y	Y	Y	Y	Y	Y	Y	Y

(Continued) Table A3: The Effect of PDMP on Drug Arrest Rates

	FBI UCR Arrest Rate								
	All Ages			Age 18-39			Age Over 40		
Panel D: Heroin and Coke									
PDMP	-0.034	-0.052	-0.037	-0.036	-0.052	-0.019	-0.065	-0.080	-0.042
	(0.103)	(0.100)	(0.065)	(0.096)	(0.094)	(0.074)	(0.079)	(0.076)	(0.077)
MA	-0.135	-0.044	0.028	-0.081	0.005	0.052	-0.062	0.015	0.040
	(0.114)	(0.147)	(0.210)	(0.122)	(0.178)	(0.217)	(0.104)	(0.154)	(0.188)
Total MA Effect	-0.158	-0.075	-0.014	-0.106	-0.027	0.034	-0.130	-0.056	-0.001
	(0.166)	(0.193)	(0.226)	(0.176)	(0.217)	(0.251)	(0.145)	(0.185)	(0.221)
Panel D: Synthetic Drugs									
PDMP	0.041	0.058	0.058	0.012	0.023	0.068	-0.039	-0.027	0.060
	(0.116)	(0.114)	(0.098)	(0.115)	(0.114)	(0.093)	(0.079)	(0.081)	(0.077)
MA	-0.167	-0.254+	-0.142	-0.140	-0.197	-0.116	-0.130	-0.192+	-0.126
	(0.125)	(0.137)	(0.149)	(0.123)	(0.137)	(0.143)	(0.104)	(0.108)	(0.106)
Total MA Effect	-0.104	-0.172	-0.074	-0.115	-0.149	-0.034	-0.164	-0.202	-0.046
	(0.153)	(0.171)	(0.156)	(0.154)	(0.172)	(0.155)	(0.121)	(0.124)	(0.114)
Observations	51,353	51,353	51,353	51,353	51,353	51,353	51,354	51,354	51,354
Agency FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
State Trend	N	N	Y	N	N	Y	N	N	Y
Treatment Trend	N	Y	N	N	Y	N	N	Y	N
Weight Agency Pop	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cluster State	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note: Models weighted by agency's population. Standard errors are clustered by state, and reported in parentheses. All models control for demographic factors (% minors, % age 18-25, %males age 18-25, %males), drug and alcohol policies (ID laws, PER laws, Naloxone laws, Good Samaritan laws, marijuana decriminalization, marijuana legalization, medical marijuana laws, BAC laws, beer taxes), police composition (ln officers per 100,000 residents) and other socioeconomic variables (income per capita, unemployment rate, poverty rate and share of residents that have a college degree, some college, high school, and less than high school). **** p-value≤0.001, *** p-value≤0.01, * *p-value≤0.05, *p-value<0.10

Table A4: The Effect of PDMP on Total, Violent and Property Crime (2003-2017)

	Modern, Fully Accessible PDMP Systems (Horwitz et al, 2018)								
	Crime Rates (2003-2017)			Cost-Adjusted Crime Rates (2003-2017)			Ln Arrest Rate (2003-2016)		
	Total	Violent	Property	Total	Violent	Property	Total	Violent	Property
Panel A: PDPAS, no trend									
PDMP Horwitz	-0.038***	-0.031**	-0.039**	-0.032**	-0.029	-0.037**	-0.034*	-0.031	-0.033
	(0.014)	(0.012)	(0.015)	(0.015)	(0.017)	(0.017)	(0.018)	(0.021)	(0.020)
Observations	115,892	115,891	115,895	115,882	115,871	115,895	51,513	51,513	51,513
Mean Pre-MA	3778	485.4	3294	633.3	586.9	46.51	753.7	206.5	547.1
Panel C: Treated State-Trend									
PDMP Horwitz	-0.038***	-0.030**	-0.039***	-0.031**	-0.028	-0.036**	-0.041***	-0.035*	-0.041**
	(0.013)	(0.012)	(0.015)	(0.015)	(0.017)	(0.017)	(0.015)	(0.020)	(0.016)
Observations	115,892	115,891	115,895	115,882	115,871	115,895	51,513	51,513	51,513
Mean Pre-MA	3778	485.4	3294	633.3	586.9	46.51	753.7	206.5	547.1
Panel B: PDPAS , trend									
PDMP Horwitz	-0.036***	-0.022**	-0.038***	-0.020	-0.016	-0.032**	-0.041***	-0.038***	-0.042***
	(0.012)	(0.008)	(0.013)	(0.012)	(0.014)	(0.014)	(0.013)	(0.013)	(0.015)
Observations	115,892	115,891	115,895	115,882	115,871	115,895	51,513	51,513	51,513
Mean Pre-MA	3778	485.4	3294	633.3	586.9	46.51	753.7	206.5	547.1
Agency FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
State Trend	N	Y	N	N	Y	N	N	Y	N
Treatment Trend	N	N	Y	N	N	Y	N	N	Y
Weight Agency Pop	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cluster State	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: Models weighted by agency's population. Standard errors are clustered by state, and reported in parentheses. All models control for demographic factors (% minors, % age 18-25, %males age 18-25, %males), drug and alcohol policies (ID laws, PER laws, Naloxone laws, Good Samaritan laws, marijuana decriminalization, marijuana legalization, medical marijuana laws, BAC laws, beer taxes), police composition (ln officers per 100,000 residents) and other socioeconomic variables (income per capita, unemployment rate, poverty rate and share of residents that have a college degree, some college, high school, and less than high school). **** p-value≤0.001, *** p-value≤0.01, * *p-value≤0.05, *p-value<0.10

Table A5: The Effect of PDMP on Crime Categories, FBI UCR Offenses Known and Arrests

	Modern, Fully Accessible PDMP Systems (Horwitz et al, 2018)						
	Homicide	Rape	Robbery	Assault	Burglary	Larceny	MV Theft
Panel A: Offenses Known, No Trend (2003-2017)							
PDMP Horwitz	-0.034**	-0.012	-0.028*	-0.039***	-0.033	-0.060**	-0.044*
	(0.013)	(0.046)	(0.017)	(0.014)	(0.023)	(0.027)	(0.025)
Observations	115,891	115,833	115,889	115,886	115,895	115,895	115,894
Mean Pre-MA	5.882	29.09	154.8	296	706.5	2222	365.4
Panel C: Offenses Known, Treatment Trend (2003-2017)							
PDMP Horwitz	-0.033**	-0.008	-0.027	-0.038***	-0.033	-0.061**	-0.0428*
	(0.013)	(0.045)	(0.016)	(0.014)	(0.023)	(0.026)	(0.024)
Observations	115,891	115,833	115,889	115,886	115,895	115,895	115,894
Mean Pre-MA	5.882	29.09	154.8	296	706.5	2222	365.4
Panel B: Offenses Known, State-Trend (2003-2017)							
PDMP Horwitz	-0.025**	-0.016	-0.019*	-0.035***	-0.024	-0.066**	-0.030*
	(0.011)	(0.044)	(0.011)	(0.011)	(0.023)	(0.027)	(0.016)
Observations	115,891	115,833	115,889	115,886	115,895	115,895	115,894
Mean Pre-MA	5.882	29.09	154.8	296	706.5	2222	365.4
Agency FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y
Weight Agency Pop	Y	Y	Y	Y	Y	Y	Y
Cluster State	Y	Y	Y	Y	Y	Y	Y

(Continued) Table A5: The Effect of PDMP on Crime Categories, FBI UCR Offenses Known and Arrests

	Modern, Fully Accessible PDMP Systems (Horwitz et al, 2018)						
	Homicide	**Rape**	**Robbery**	**Assault**	**Burglary**	**Larceny**	**MV Theft**
Panel D: Arrests, No Trend (2003-2016)							
PDMP Horwitz	0.005	-0.028	0.013	-0.053**	0.011	-0.037*	-0.057
	(0.018)	(0.035)	(0.021)	(0.025)	(0.028)	(0.022)	(0.042)
Observations	51,513	51,513	51,513	51,513	51,513	51,513	51,513
Mean Pre-MA	4.099	8.171	42.17	152.1	98.18	410.8	38.11
Panel F: Arrests, Treatment Trend (2003-2016)							
PDMP Horwitz	0.005	-0.034	0.013	-0.059*	0.007	-0.046***	-0.063
	(0.018)	(0.035)	(0.020)	(0.025)	(0.026)	(0.017)	(0.042)
Observations	51,513	51,513	51,513	51,513	51,513	51,513	51,513
Mean Pre-MA	4.099	8.171	42.17	152.1	98.18	410.8	38.11
Panel E: Arrests, State-Trend (2003-2016)							
PDMP Horwitz	-0.006	-0.065**	0.011	-0.063****	-0.005	-0.044**	-0.124****
	(0.020)	(0.025)	(0.025)	(0.016)	(0.029)	(0.017)	(0.028)
Observations	51,513	51,513	51,513	51,513	51,513	51,513	51,513
Mean Pre-MA	4.099	8.171	42.17	152.1	98.18	410.8	38.11
Agency FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y
Weight Agency Pop	Y	Y	Y	Y	Y	Y	Y
Cluster State	Y	Y	Y	Y	Y	Y	Y

Notes: Models weighted by agency's population. Standard errors are clustered by state, and reported in parentheses. All models control for demographic factors (% minors, % age 18-25, %males age 18-25, %males), drug and alcohol policies (ID laws, PER laws, Naloxone laws, Good Samaritan laws, marijuana decriminalization, marijuana legalization, medical marijuana laws, BAC laws, beer taxes), police composition (ln officers per 100,000 residents) and other socioeconomic variables (income per capita, unemployment rate, poverty rate and share of residents that have a college degree, some college, high school, and less than high school). **** p-value≤0.001, *** p-value≤0.01, * *p-value≤0.05, *p-value<0.1

EXHIBIT 198

U.S. Department of Justice
Office of Justice Programs
Bureau of Justice Statistics

Revised July 10, 2024

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Bulletin

Heroin, Fentanyl, and Other Opioid Offenses in Federal Courts, 2021

Mark Motivans, PhD, *BJS Statistician*

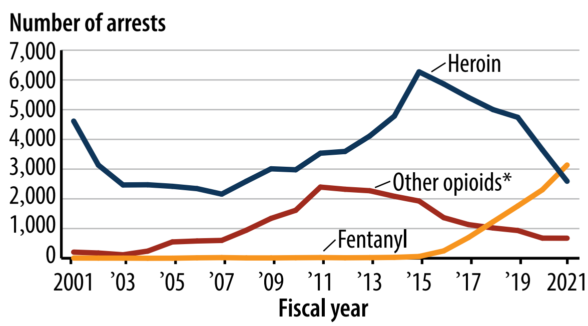
During fiscal year (FY) 2021, the Drug Enforcement Administration (DEA) made 3,138 arrests for fentanyl, 2,591 arrests for heroin, and 676 arrests for other opioid offenses **(figure 1)**.[1] In FY 2021, for the first time, the number of arrests by the DEA for fentanyl (3,138) surpassed the number of arrests for heroin (2,591). From FY 2020 to FY 2021, there was a 36% increase in arrests made by the DEA for fentanyl and a 29% decrease in arrests for heroin **(table 1)**.

This report uses data from the Bureau of Justice Statistics' (BJS) Federal Justice Statistics Program (FJSP) to describe persons arrested, convicted, and sentenced for federal drug offenses involving heroin, fentanyl, and other opioids.[2]

[1]Annual federal justice data are reported for the fiscal year, which is from October 1 to September 30.

[2]The FJSP includes data received from the Drug Enforcement Administration, the U.S. Sentencing Commission, and other agencies. (See *Methodology.*)

FIGURE 1
Federal and state arrests by the Drug Enforcement Administration involving heroin, fentanyl, and other opioids, FY 2001–2021



Note: See appendix table 1 for counts.
*Includes oxycodone, hydrocodone, hydromorphone (Palladone), oxymorphone, opioid treatment pharmaceuticals, opium, and morphine.
Source: Bureau of Justice Statistics, based on data from the Drug Enforcement Administration, Defendant Statistical System, fiscal years 2001–2021.

HIGHLIGHTS

- From FY 2020 to FY 2021, the number of drug arrests the Drug Enforcement Administration (DEA) made for fentanyl increased by 36% from 2,305 to 3,138.
- In FY 2021, for the first time, the number of drug arrests the DEA made for fentanyl (3,138) surpassed the number of arrests for heroin (2,591).
- Of the 28,224 total drug arrests by the DEA in FY 2021, 3,138 (11%) were for fentanyl, 2,591 (9%) were for heroin, and 676 (2%) were for other opioids.
- DEA arrests for heroin, fentanyl, and other opioids increased from 4,830 in FY 2001 to a peak of 8,258 in 2015 and declined to 6,405 in FY 2021.
- In FY 2021,
  - 97% of persons sentenced for a drug offense involving opioids were sentenced for drug trafficking.
  - most persons sentenced for drug offenses involving heroin (89%) or fentanyl (87%) had a prior criminal history at sentencing.
  - persons sentenced for drug offenses involving heroin or fentanyl received a median prison term of 46 months, persons sentenced for oxycodone received a median prison term of 26 months, and persons sentenced for hydrocodone received a median prison term of 24 months.

Drug arrests by the DEA increased 6% from FY 2020 to FY 2021

The DEA reported a 6% (1,528) increase in total drug arrests from FY 2020 (26,696) to FY 2021 (28,224) (table 1). From FY 2020 to FY 2021, the DEA reported the greatest increase in arrests for fentanyl (up 833 arrests) followed by arrests for methamphetamine (629), other drug or non-drug offenses (611), powder cocaine (575), and marijuana (39). Arrests declined from FY 2020 to FY 2021 for heroin (-1,058), crack cocaine (-99), and other opioids (-2).

The DEA reported 28,224 total drug arrests in FY 2021, a decrease of 2% on average annually since FY 2001. The DEA made less than 100 arrests for fentanyl in any year between 2001 and 2015. Starting in 2016, the number of arrests rose substantially, reaching 3,138 in 2021. Methamphetamine comprised 19% of drug arrests in FY 2001 and 33% of drug arrests in FY 2021, an average annual increase of 1% during this period. Arrests for drugs that decreased on average annually from FY 2001 to FY 2021 included arrests for crack cocaine (-9%), marijuana (-5%), powder cocaine (-3%), heroin (-3%), and other drug or non-drug offenses (-1%).

The remainder of this report focuses on heroin, fentanyl, and other opioids including how they are classified under the Controlled Substances Act, the number of deaths due to overdose, and the number of persons arrested and sentenced for federal offenses involving these substances.

The Drug Enforcement Administration

The Drug Enforcement Administration (DEA) is the primary federal law enforcement agency responsible for enforcing controlled substances laws, including diversion control efforts for prescription opioids, and for shaping federal drug enforcement policy. One example is Operation Synthetic Opioid Surge (S.O.S.), a U.S. Department of Justice enforcement initiative focusing on reducing the supply of synthetic opioids in areas selected based on having high overdose death rates (see *Targeted opioid enforcement efforts*). Federal prosecutors work with the DEA to prosecute drug traffickers involved with fentanyl and other synthetic opioids.

In addition to being responsible for making drug arrests at the federal level, the DEA works with state and local law enforcement agencies to make arrests. Tables in this report use DEA data that combine arrests referred to state and local prosecutor offices and arrests referred to U.S. attorney's offices. To protect the identity of agents and operations, the DEA does not provide BJS with geographic information, such as the federal judicial district where the arrest occurred. The DEA data does not provide the type of drug arrest (e.g., whether drug trafficking or drug possession). Data that are made publicly available from the DEA are posted on the Data and Statistics page of their website (https://www.dea.gov/resources/data-and-statistics).

Revised July 10, 2024

TABLE 1

Federal and state arrests by the Drug Enforcement Administration by drug type, FY 2001–2021

		Opioids								
Fiscal year	Total arrests	Total	Heroin	Fentanyl	Other opioids[a]	Cocaine powder	Crack cocaine	Marijuana	Methamphetamine	Other/non-drug[b]
2001	41,999	4,830	4,615	8	207	10,077	7,236	7,375	8,147	4,334
2002	34,245	3,319	3,136	6	177	8,970	5,252	5,870	6,879	3,955
2003	29,238	2,590	2,467	5	118	7,143	4,205	6,015	6,268	3,017
2004	29,807	2,715	2,473	1	241	7,804	4,183	6,302	6,276	2,527
2005	30,998	2,974	2,421	3	550	8,699	4,344	6,113	6,646	2,222
2006	30,268	2,942	2,344	16	582	8,500	4,632	6,002	5,925	2,267
2007	30,296	2,783	2,159	23	601	8,533	4,371	6,884	5,641	2,084
2008	28,834	3,549	2,592	12	945	8,807	3,387	6,289	4,792	2,010
2009	31,061	4,364	3,010	12	1,342	8,854	2,955	7,532	4,948	2,408
2010	31,517	4,611	2,977	19	1,615	8,231	2,640	8,215	5,527	2,293
2011	32,379	5,954	3,535	24	2,395	7,664	2,726	7,723	5,547	2,765
2012	31,628	5,933	3,594	17	2,322	7,386	2,653	6,787	6,000	2,869
2013	30,532	6,408	4,113	22	2,273	6,346	2,113	5,862	6,858	2,945
2014	29,548	6,900	4,784	31	2,085	5,582	1,782	5,082	7,005	3,197
2015	31,538	8,258	6,272	60	1,926	6,017	1,567	4,741	8,023	2,932
2016	29,486	7,479	5,864	248	1,367	5,484	1,455	4,213	8,068	2,787
2017	27,223	7,242	5,412	697	1,133	5,495	1,152	3,541	7,280	2,513
2018	27,348	7,248	5,001	1,227	1,020	5,198	1,103	3,266	8,088	2,445
2019	27,543	7,435	4,742	1,759	934	4,899	970	2,597	9,076	2,566
2020	26,696	6,632	3,649	2,305	678	4,474	1,217	2,576	8,783	3,014
2021	28,224	6,405	2,591	3,138	676	5,049	1,118	2,615	9,412	3,625
Average annual percent change, FY 2001–2021[c]	-2.0%	1.4%	-2.8%	34.8%	6.1%	-3.4%	-8.9%	-5.1%	0.7%	-0.9%
Percent change, FY 2020–2021	5.7%	-3.4%	-29.0%	36.1%	-0.3%	12.9%	-8.1%	1.5%	7.2%	20.3%

Note: The unit of count is an arrest made by the Drug Enforcement Administration (DEA) where each arrest for an individual is counted. Includes state and federal arrests made by the DEA.

[a]Includes oxycodone, hydrocodone, hydromorphone (Palladone), oxymorphone, opioid treatment pharmaceuticals, opium, and morphine.

[b]Includes non-opioid pharmaceutical controlled substances, other depressants, sedatives, ephedrine, pseudoephedrine, hallucinogens, synthetic cannabinoids, other steroids, equipment to manufacture controlled substances, and drug-use paraphernalia.

[c]Calculated using fiscal year counts in 2001 and in 2021. See *Methodology*.

Source: Bureau of Justice Statistics, based on data from the Drug Enforcement Administration, Defendant Statistical System, fiscal years 2001–2021.

Classification of opioids using the Controlled Substances Act's drug schedule

Opioids are controlled substances with classifications ranging from Schedule I to Schedule V, depending on medical usefulness, abuse potential, safety, and drug dependence profile.[3]

Schedule I drugs have a high potential for abuse and potential to create severe psychological and/or physical dependence. There is no current accepted medical use. Heroin is the only Schedule I drug included in this report. It has no medical use in the United States and is illegal to distribute, purchase, or use outside of medical research.

- **Heroin** is a natural opioid synthesized from morphine that can be a white or brown powder or a black sticky substance.

Schedule II drugs have a high potential for abuse, but also have current accepted medical use with severe restrictions.

- **Fentanyl** is a very powerful synthetic opioid approved by the Food and Drug Administration for limited medical use for chronic pain relief and as an anesthetic.[4]
- **Oxycodone** is a semisynthetic opioid derived from the poppy plant and prescribed for pain. The extended-release tablet formulation is marketed under the brand name OxyContin.
- **Oxymorphone** is a semisynthetic opioid used to treat pain.
- **Hydrocodone** is a semisynthetic opioid used to treat pain or relieve coughs.[5]
- **Hydromorphone** is a semisynthetic opioid with an accepted medical use as a pain reliever. It has an analgesic potency of two to eight times greater than that of morphine and has a rapid onset of action. The extended-release tablet formulation is marketed under the brand name Palladone and in oral liquid and tablet form under the brand name Dilaudid.
- **Methadone** is a synthetic opioid used for pain reduction and in medication-assisted treatment of opioid use disorder. While it may legally be used under a doctor's supervision, its non-medical use is illegal.
- **Morphine** is a natural opioid derived from opium and used for the treatment of pain.
- **Opium** is a natural opioid extracted from the poppy plant.

Schedule III drugs have an accepted medical use and the potential for abuse is less than the drugs in Schedules I and II. Examples include products containing not more than 90 milligrams of codeine per dosage unit (e.g., acetaminophen with codeine and Suboxone).

Schedule IV drugs have a lower potential for abuse relative to the drugs in Schedule III and have an accepted medical use. Examples include Darvocet and tramadol.

Schedule V drugs have a current accepted medical use and have a low potential for abuse relative to the drugs in Schedule IV. Examples include cough syrup with less than 200 milligrams of codeine per 100 milliliters or 100 grams and other analgesics.

[3]The schedules went into effect on October 27, 1970 (Title 21 U.S.C. § 812) and are updated and republished on an annual basis per the Controlled Substances Act (CSA).

[4]According to the Drug Enforcement Administration, fentanyl was first developed in 1959 and introduced in the 1960s as an intravenous anesthetic. It is legally manufactured and distributed in the United States. Only a small amount of fentanyl is needed to cause a severe reaction or death. Legal fentanyl products are diverted via theft, fraudulent prescriptions, and illegal distribution by patients, physicians, and pharmacists. The People's Republic of China is the primary source of precursor chemicals used to produce U.S.-bound illicit fentanyl. (Congressional Research Services (2022). *China Primer: Illicit Fentanyl and China's Role.* https://crsreports.congress.gov/product/pdf/IF/IF10890).

[5]The DEA, in an effort to cut down on abuse, reclassified hydrocodone in October 2014 from a Schedule III to a Schedule II drug. The result of the change is that licensed medical practitioners or prescribers can no longer write or call in refills for hydrocodone prescriptions. Additional hydrocodone requires a new prescription from a licensed medical practioner.

DEA arrests for fentanyl increased from 8 arrests in FY 2001 to 3,138 arrests in FY 2021

Schedule II and III drugs (including fentanyl, oxycodone, hydrocodone, and other opioids) are available as legal pharmaceuticals as well as trafficked in counterfeit form. Among opioid arrests involving pharmaceuticals, the growth was greatest for fentanyl, which increased from 8 arrests in FY 2001 to 3,138 arrests in FY 2021 **(figure 2)**. Arrests for oxycodone peaked at 1,900 in FY 2011 and decreased to 512 arrests in FY 2021. Hydrocodone arrests peaked at 449 in FY 2014 and decreased to 72 in FY 2021.

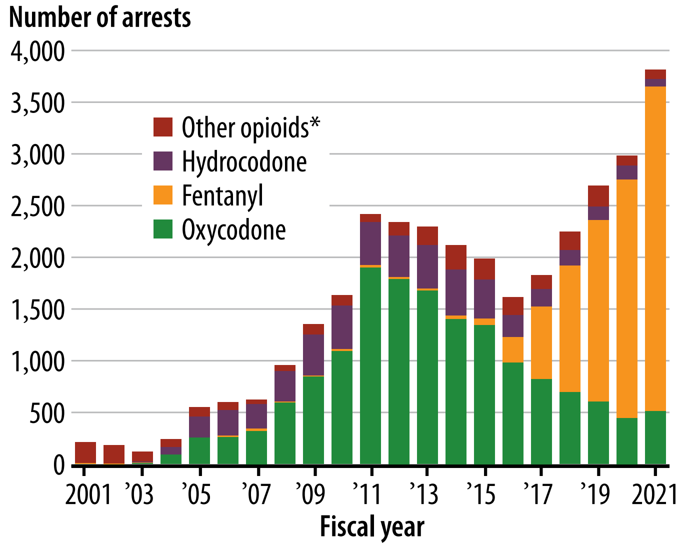
Most (52%) persons arrested by the DEA for opioids were ages 21 to 34

Of the 6,405 total persons arrested by the DEA for opioids as the primary drug in FY 2021, 52% were ages 21 to 34, while 11% were age 50 or older and 5% were age 20 or younger **(table 2)**.

Males made up 80% and females 20% of persons arrested for heroin, fentanyl, oxycodone, and other opioids. Among persons arrested by the DEA for fentanyl, 81% were male and 19% were female. The largest number of arrests of males (2,470) and of females (576) were for fentanyl. Among males and females arrested by the DEA for opioids in FY 2021, total arrests by opioid type from greatest to least were fentanyl, heroin, oxycodone, then other opioids.

FIGURE 2

Federal and state arrests by the Drug Enforcement Administration involving fentanyl and other pharmaceutical opioids, FY 2001–2021



Note: The unit of count is an arrest made by the Drug Enforcement Administration (DEA) where each arrest for an individual is counted. Includes state and federal arrests made by the DEA. See appendix table 2 for counts.

*Includes opium, morphine, opioid treatment pharmaceuticals, hydromorphone (Palladone), and oxymorphone.

Source: Bureau of Justice Statistics, based on data from the Drug Enforcement Administration, Defendant Statistical System, fiscal years 2001–2021.

TABLE 2

Persons arrested by the Drug Enforcement Administration for heroin, fentanyl, oxycodone, and other opioids, by age and sex, FY 2021

	Total arrested		Heroin		Fentanyl		Oxycodone		Other opioids*	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total persons	6,405	100%	2,591	100%	3,138	100%	512	100%	164	100%
Sex										
Male	4,926	79.6%	1,985	80.0%	2,470	81.1%	358	71.7%	113	69.8%
Female	1,263	20.4	497	20.0	576	18.9	141	28.3	49	30.2
Age										
20 or younger	295	4.6%	88	3.4%	171	5.5%	32	6.3%	4	2.4%
21–34	3,297	51.7	1,267	49.1	1,739	55.7	233	45.7	58	35.4
35–49	2,111	33.1	943	36.6	968	31.0	147	28.8	53	32.3
50–64	600	9.4	257	10.0	230	7.4	73	14.3	40	24.4
65 or older	74	1.2	24	0.9	16	0.5	25	4.9	9	5.5

Note: Data were missing age for 28 records and sex for 216 records. Includes Drug Enforcement Administration arrests that are referred for state or federal prosecution.

*Includes opium, morphine, opioid treatment pharmaceuticals, hydrocodone, hydromorphone (Palladone), and oxymorphone.

Source: Bureau of Justice Statistics, based on data from the Drug Enforcement Administration, Defendant Statistical System, fiscal year 2021.

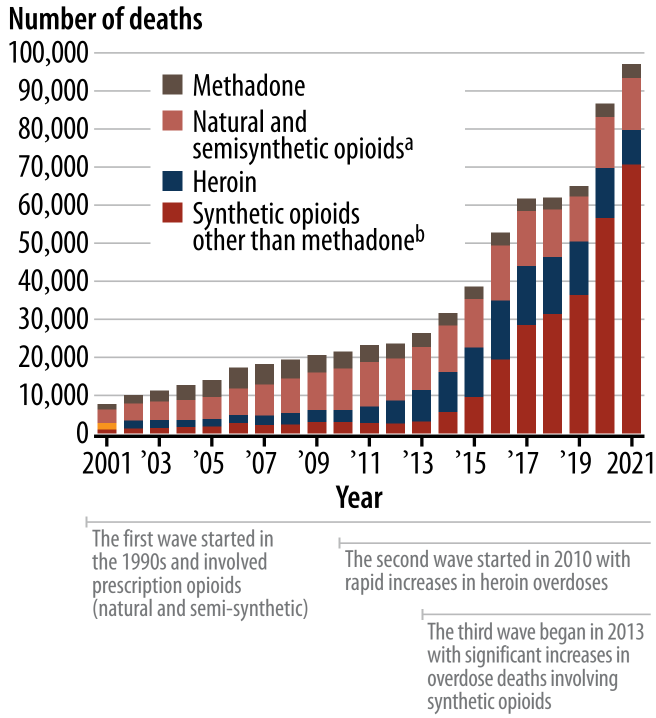
Overdose deaths due to opioids

The majority of overdose deaths, which continue to increase in the United States, involved opioids. In 2021, 106,699 persons died of a drug overdose.[6] Opioids were involved in 80,411 of these overdose deaths in 2021 (75% of all drug overdose deaths) **(figure 3)**. More than 628,000 people died from a drug overdose involving any opioid, including prescription and illicit opioids, from 2001 to 2021. In 2021, synthetic opioids were involved in more overdose deaths (70,601) than any other type of opioid. Synthetic opioids accounted for 88% of all overdose deaths involving opioids in 2021. About 11% of all overdose deaths involving opioids in 2021 involved heroin. The number of overdose deaths involving heroin increased fivefold from 2001 to 2021.

According to the Centers for Disease Control and Prevention, the rise in opioid overdose deaths from 2001 to 2021 occurred in three waves:

1. In the 1990s, prescribing of opioids increased. Overdose deaths involving prescription opioids (natural and semisynthetic opioids and methadone) started increasing in the late 1990s.
2. In 2010, overdose deaths involving heroin began to rapidly increase.
3. In 2013, overdose deaths involving synthetic opioids significantly increased, particularly those involving illicitly manufactured fentanyl.[7]

FIGURE 3
Number of drug overdose deaths involving opioids, by type of opioid, 2001–2021



Note: Deaths involving more than one type of opioid were counted in both categories. See appendix table 3 for counts.
[a]Natural and semisynthetic opioids include morphine, oxycodone, and hydrocodone.
[b]Synthetic opioids include fentanyl, fentanyl analogs, and tramadol.
Source: Centers for Disease Control and Prevention. Data Brief 457. Drug Overdose Deaths in the United States, 2001–2021, National Center for Health Statistics, National Vital Statistics System, Mortality.

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[6]Centers for Disease Control and Prevention. *Drug Overdose Deaths in the United States, 1999–2021*. https://nida.nih.gov/research-topics/trends-statistics/overdose-death-rates.

[7]https://www.cdc.gov/opioids/data/analysis-resources.html.

Targeted opioid enforcement efforts

The U.S. Department of Justice (DOJ) has advanced three law enforcement strategies to address drug diversion and trafficking of opioids. In addition, the High Intensity Drug Trafficking Areas (HIDTA) program provides assistance to federal, state, local, and tribal law enforcement agencies to address drug trafficking in the United States.

Operation Synthetic Opioid Surge (S.O.S.)[8]

- Operation S.O.S. is a U.S. DOJ enforcement initiative in 10 federal judicial districts to reduce the supply of synthetic opioids in high impact areas. Started in July 2018, it focuses on identifying wholesale distribution networks and international and domestic suppliers.
- Prosecutors work with the Drug Enforcement Administration (DEA) and Organized Crime Drug Enforcement Task Forces. Efforts focus on selecting one county to prosecute every readily provable drug distribution case involving synthetic opioids (fentanyl, fentanyl analogs, and other synthetic opioids) regardless of drug quantity.
- The 10 districts were selected in 2018 based on having high overdose death rates **(map 1)**.

Appalachian Regional Prescription Opioid (ARPO) Strike Force[9]

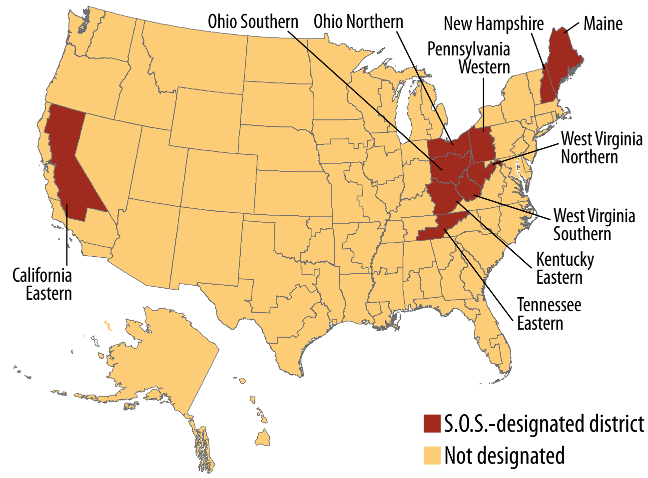
- The ARPO Strike Force investigates health care fraud in the Appalachian region and surrounding areas with a focus on medical professionals involved in the unlawful distribution of opioids and other prescription narcotics.
- Formed by DOJ in October 2018, the ARPO Strike Force brings together the Health Care Fraud Unit in the Criminal Division's Fraud Section, the U.S. attorney's offices for 10 federal districts in 6 states, as well as law enforcement partners at the FBI, the Department of Health and Human Service's Office of the Inspector General (HHS-OIG), the DEA, and other federal and state agencies **(map 2)**.

New England Prescription Opioid (NEPO) Strike Force[10]

- The NEPO Strike Force is a DOJ law enforcement effort that was formed in June 2022 and seeks to address unlawful prescription and diversion of opioids by physicians, pharmacists, and other medical professionals in the New England region.

MAP 1

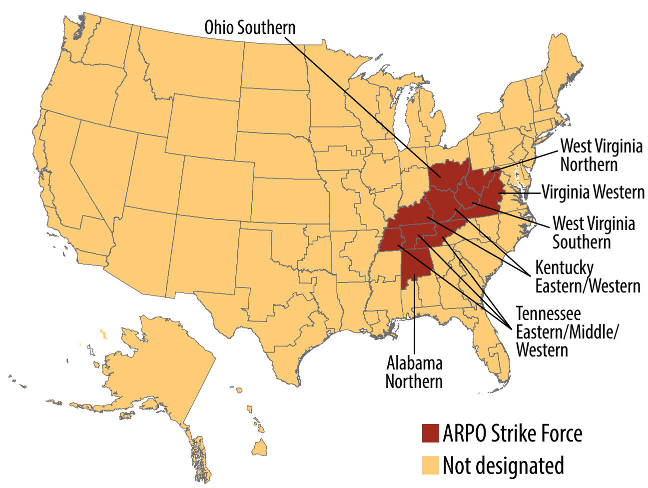
Federal judicial districts designated by Operation Synthetic Opioid Surge (S.O.S.), 2018



Source: www.justice.gov/opa/pr/attorney-general-jeff-sessions-announces-formation-operation-synthetic-opioid-surge-sos.

MAP 2

Federal judicial districts designated by Appalachian Regional Prescription Opioid (ARPO) Strike Force, 2018



Source: www.justice.gov/criminal-fraud/arpo-strike-force.

- Since 2018, some of the greatest spikes in the drug overdose death rate have occurred in New England.
- NEPO Strike Force brings together the Health Care Fraud Unit in the Criminal Division's Fraud Section, the U.S. attorney's offices for three federal districts (Vermont, Maine, and New Hampshire), and law enforcement partners at HHS-OIG, DEA, and the FBI.

[8]https://www.justice.gov/opa/pr/attorney-general-jeff-sessions-announces-formation-operation-synthetic-opioid-surge-sos.

[9]https://www.justice.gov/criminal-fraud/arpo-strike-force.

[10]https://www.justice.gov/opa/pr/justice-department-s-criminal-division-creates-new-england-prescription-opioid-strike-force.

continued on page 8

Targeted opioid enforcement efforts (continued)

High Intensity Drug Trafficking Areas (HIDTA)[11]

- The HIDTA program coordinates and assists federal, state, local, and tribal law enforcement agencies to address regional drug threats with the purpose of reducing drug trafficking and drug production in the United States.
- There are 33 regional HIDTAs in all 50 states, Puerto Rico, the U.S. Virgin Islands, and the District of Columbia. Congress established the HIDTA program to operate under the direction of the Office of National Drug Control Policy (ONDCP) by the Anti-Drug Abuse Act of 1988 (P.L.100–690) and the ONDCP Reauthorization Act of 1998.

[11]https://www.hidtaprogram.org/summary.php.

Persons sentenced for opioid offenses

This section uses data from the U.S. Sentencing Commission (USSC) to describe sentences imposed on opioid offenders in federal courts.[12] In 1984, Congress passed the Sentencing Reform Act, which established the USSC. The Sentencing Reform Act directed the USSC to develop sentencing guidelines for federal crimes and to ensure uniformity and proportionality in sentencing.

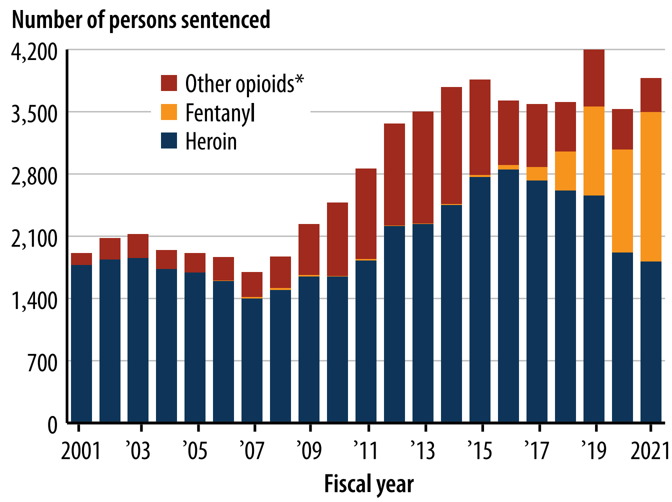
In FY 2021, 3,860 persons were sentenced for a drug offense involving heroin, fentanyl, or other opioids.[13] The total number of persons sentenced for opioids increased from 1,889 in FY 2001 to a peak of 3,842 in FY 2015. The total number of persons sentenced decreased in FY 2016 (3,608) before increasing through FY 2021 (3,860) (figure 4).

[12]The federal sentencing guidelines apply to most felony and class A misdemeanor cases in the federal courts. The sentencing guidelines do not apply to Class B or C misdemeanors or infractions that are subject to prison sentences of 6 months or less (see USSC 1B1.9).

[13]The primary guideline at sentencing is used for reporting persons sentenced for drug offenses.

FIGURE 4

Number of persons sentenced for a drug offense involving heroin, fentanyl, or other opioids as primary drug, FY 2001–2021



Note: Includes cases where persons were sentenced under U.S. Sentencing Guidelines Chapter Two, Part D (Drug Guidelines). The primary drug is the drug that results in the greatest penalty (when multiple drugs are involved). See appendix table 4 for counts.

*Includes oxycodone (OxyContin), oxymorphone, morphine, hydromorphone (Dilaudid), opium, codeine, and hydrocodone.

Source: Bureau of Justice Statistics, based on data from the U.S. Sentencing Commission, Monitoring File, fiscal years 2001–2021.

The number of persons sentenced for a drug offense involving fentanyl increased by 45% from FY 2020 to FY 2021

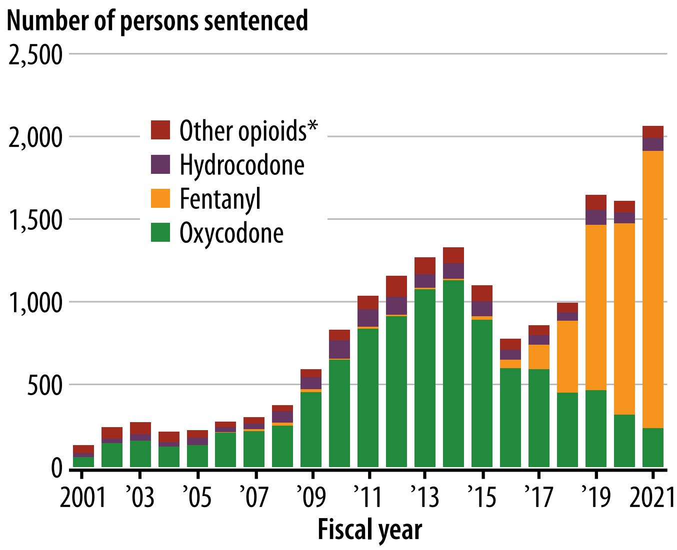
In FY 2021, 1,679 persons were sentenced for drug offenses involving fentanyl—a 45% increase from the number of persons sentenced for fentanyl in FY 2020 (1,156) (figure 5). Among persons sentenced for a drug offense involving fentanyl and other pharmaceutical opioids in FY 2021, fentanyl (1,679) was the most common opioid type followed by oxycodone (233), hydrocodone (79), and other opioids (71).

The growth in persons sentenced for fentanyl and other pharmaceutical opioids from FY 2008 to FY 2014 was mostly the result of an increase in persons sentenced for oxycodone (882). The growth in persons sentenced for fentanyl and other pharmaceutical opioids from FY 2016 to FY 2021 was mostly due to an increase in the number of persons sentenced for drug offenses involving fentanyl (1,627 arrests).

Sentences imposed for drug offenses involving heroin, fentanyl, and other opioids comprised a larger share of drug sentences imposed in northeastern states in FY 2021 than in other regions (map 3). The states with the greatest share of drug offenses involving heroin, fentanyl, and other opioids per 100 drug sentences imposed in FY 2021 included: New Hampshire (69), Massachusetts (69), Delaware (63), Connecticut (58), and New Jersey (56).

FIGURE 5

Number of persons sentenced for a drug offense involving fentanyl and other pharmaceutical opioids, by drug type, FY 2001–2021



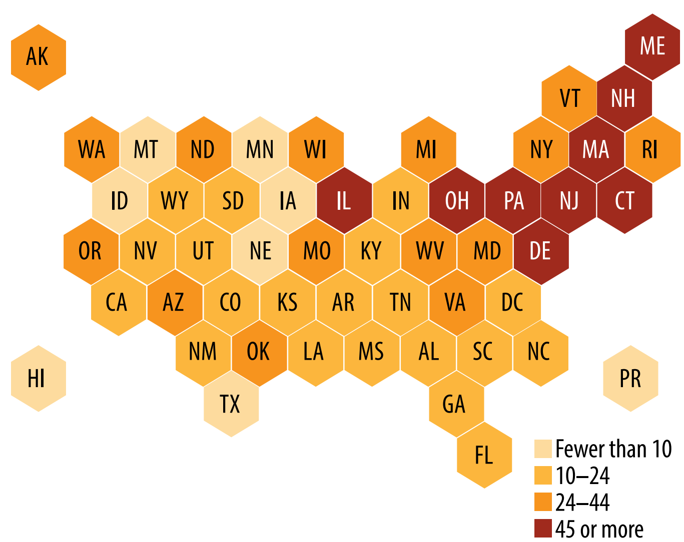
Note: Includes cases where persons were sentenced under U.S. Sentencing Guidelines Chapter Two, Part D (Drug Guidelines). The primary drug is the drug that results in the greatest penalty (when multiple drugs are involved). See appendix table 5 for counts.

*Includes hydromorphone (Dilaudid), opium, morphine, methadone, oxymorphone, and codeine.

Source: Bureau of Justice Statistics, based on data from the U.S. Sentencing Commission, Monitoring File, fiscal years 2001–2021.

MAP 3

Rates of sentences imposed for heroin, fentanyl, and other opioids per 100 drug sentences by state, FY 2021



Note: Includes heroin, fentanyl, fentanyl analogs, opium, methadone, morphine, oxymorphone, hydrocodone, hydromorphone (Dilaudid), codeine, and oxycodone (OxyContin). See appendix table 6 for rates.

Source: Bureau of Justice Statistics, based on data from the U.S. Sentencing Commission, Monitoring File, fiscal year 2021.

Most persons sentenced for drug offenses involving opioids were male (82%)

Males accounted for 82% of persons sentenced for a drug offense involving opioids in FY 2021 and females accounted for 18% **(table 3)**. Males made up 83% and females 17% of persons sentenced for opioid offenses involving fentanyl and heroin. Females accounted for a larger share of those sentenced for hydrocodone (29%) and other opioids (44%) than for other drug types.

Forty-four percent of persons sentenced for fentanyl were ages 25 to 34 and the median age was younger for persons sentenced for fentanyl (32 years) than for heroin (35 years), oxycodone (41 years), other opioids (42 years), and hydrocodone (49 years).

The majority (77%) of persons sentenced in FY 2021 for drug offenses involving fentanyl, heroin, or other opioids as the primary drug were Hispanic (39%) or black (38%) with white (21%); American Indian (1%); and Asian, Native Hawaiian, or Other Pacific Islander (1%) comprising the remainder.[14] Most (86%) persons sentenced for drug offenses involving fentanyl, heroin, or other opioids were U.S. citizens.[15] Non-U.S. citizens comprised 14% of persons sentenced for a drug offense involving opioids with 7% being citizens of Mexico, followed by countries in the Caribbean (4%). Seventy-four percent of persons sentenced with fentanyl, heroin, or other opioids as the primary drug had a high school diploma (38%) or less than high school education (36%). Twenty-six percent of persons sentenced had some college (21%) or were college graduates (5%).

Persons sentenced for fentanyl and persons sentenced for heroin in FY 2021 share similar demographic profiles. Seventy-two percent of persons sentenced for fentanyl were between the ages of 25 and 44 (compared with 69% of persons sentenced for heroin). Four percent of persons sentenced for fentanyl were age 55 or older, while 3% were under the age of 21 (similar to the profile for heroin). In FY 2021, 41% of persons convicted of a drug offense with fentanyl as the primary drug were Hispanic; followed by black (38%); white (19%); Asian, Native Hawaiian, or Other Pacific Islander (1%); and American Indian (1%). This is similar to the racial demographics for persons sentenced for drug offenses involving heroin.

[14]Race and Hispanic origin were categorized based on the Office of Management and Budget's standards for federal statistical and administrative reporting. (Office of Management and Budget (1997). *Revisions to the standards for the classification of federal data on race and ethnicity. Federal Register* 62 (210), 58782–58790) All of the race categories are "single race," meaning that only one race was self-reported in the presentence report.

[15]Citizenship is recorded in the presentence report and is used by the U.S. Sentencing Commission for reporting purposes.

TABLE 3

Demographic characteristics of persons sentenced for a drug offense involving heroin, fentanyl, and other opioids, by opioid type, FY 2021

	All persons		Opioid type				
Demographic characteristics	Number	Percent	Heroin	Fentanyl[a]	Oxycodone	Hydrocodone	Other opioids[b]
Total persons	3,860	100%	1,798	1,679	233	79	71
Sex							
Male	3,152	81.7%	83.2%	82.7%	74.3%	70.9%	56.3%
Female	708	18.3	16.8	17.3	25.8	29.1	43.7
Race/Hispanic origin[c]							
White	799	21.4%	18.8%	19.4%	40.0%	31.2%	49.3%
Black/African American	1,425	37.7	37.0	38.3	37.0	57.1	21.4
Hispanic	1,482	39.2	43.2	40.7	14.4	7.8	20.3
American Indian/ Alaska Native	46	1.2	0.8	0.7	7.0	<0.05	7.3
Asian/Native Hawaiian/ Other Pacific Islander	28	0.7	0.3	0.9	1.7	3.9	1.5
Age							
18–20	80	2.1%	1.8%	2.8%	<0.05%	1.3%	<0.05%
21–24	338	8.8	7.6	11.1	4.3	1.3	5.6
25–34	1,562	40.5	39.8	44.3	29.2	15.2	32.4
35–44	1,090	28.2	29.6	27.4	29.2	16.5	22.5
45–54	487	12.6	14.0	10.1	13.3	24.1	21.1
55–64	223	5.8	5.7	3.6	13.3	25.3	11.3
65 or older	80	2.1	1.4	0.7	10.7	16.5	7.0
Median	34 years		35 years	32 years	41 years	49 years	42 years
Education level							
Less than high school	1,369	35.6%	37.3%	38.1%	16.3%	16.5%	19.7%
High school graduate	1,472	38.3	39.5	38.8	30.9	29.1	29.6
Some college	807	21.0	20.5	20.4	27.0	21.5	26.8
College graduate	196	5.1	2.7	2.6	25.8	32.9	23.9
Citizenship							
U.S. citizen	3,335	86.4%	84.3%	86.5%	96.1%	97.5%	94.4%
Non-U.S. citizen	525	13.6	15.7	13.5	3.9	2.5	5.6
Country/region of citizenship							
North America	3,814	98.9%	98.5%	99.3%	98.7%	97.5%	98.6%
United States	3,335	86.4	84.3	86.5	96.6	97.5	94.4
Mexico	276	7.2	10.1	5.3	0.9	<0.05	4.2
Caribbean islands[d]	164	4.3	2.5	6.9	1.3	<0.05	<0.05
Central America[d]	39	1.0	1.6	0.7	<0.05	<0.05	<0.05
South America[d]	22	0.6	1.0	0.2	<0.05	<0.05	<0.05
Other countries[d]	22	0.6	0.5	0.4	1.3	2.5	1.4

Note: Includes cases where persons were sentenced under U.S. Sentencing Guidelines Chapter Two, Part D (Drug Guidelines). The primary drug is the drug that results in the greatest penalty (when multiple drugs are involved). Data were missing for the following: race/Hispanic origin (80), education level (16), and citizenship (2).

[a]Includes fentanyl and fentanyl analogs.

[b]Includes hydromorphone (Dilaudid), opium, methadone, morphine, oxymorphone, and codeine.

[c]Excludes persons of Hispanic origin, unless specified.

[d]Countries aggregated by region. Other regions include Asia (12), Europe (4), and Africa (6).

Source: Bureau of Justice Statistics, based on data from the U.S. Sentencing Commission, Monitoring File, fiscal year 2021.

Persons were sentenced for fentanyl at greater rates in northeastern states in FY 2021

Sentences imposed for fentanyl comprised a larger share of drug sentences imposed in northeastern states in FY 2021. The states with the highest rate of fentanyl sentences per 100 drug sentences imposed included New Hampshire (67 per 100), Massachusetts (58 per 100), Maine (38 per 100), and Rhode Island (36 per 100) (map 4).

Most (79%) persons sentenced for a drug offense involving opioids were represented by panel-appointed counsel or a public defender

Panel-appointed attorneys represented more than half (54%) of persons sentenced for opioids, while public defenders represented 25% of persons and private counsel represented 21% of persons (table 4).[16] In FY 2021, panel-appointed attorneys were most likely to represent persons sentenced for a drug offense involving heroin (58%) or fentanyl (51%). In FY 2021, persons sentenced for a drug offense involving opioids were convicted following either a guilty plea (98%) or by bench or jury trial (2%).

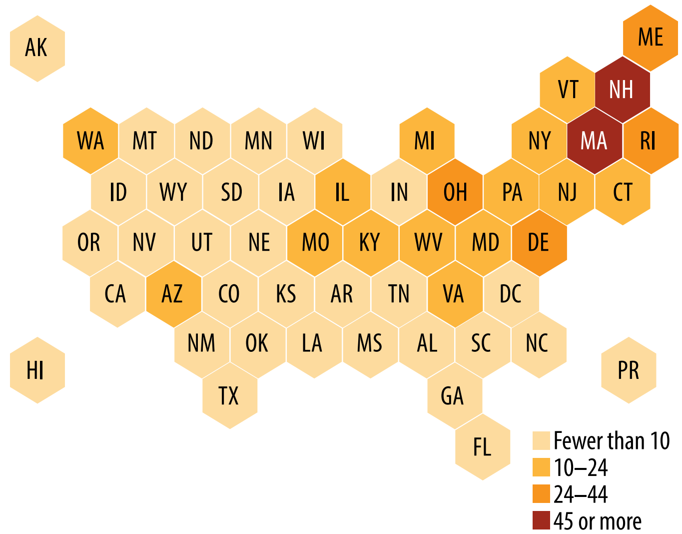
A person may receive a longer sentence for organizing, managing, or leading the illicit activity involving heroin or other opioids.[17] Of persons sentenced, 6% received a longer sentence for playing a leadership role in the offense. The percentage of persons who received a longer sentence for playing a leadership role in the offense was similar for heroin (5%) and fentanyl (5%) in FY 2021. Twenty-two percent of persons sentenced for hydrocodone received a longer sentence for playing a leadership role in the offense.

[16]The Administrative Office of the U.S. Courts provides for two types of counsel for federal indigent persons: federal public defenders and panels of private attorneys (referred to as panel-appointed attorneys) who accept appointments to represent eligible persons for reimbursement from the government. Private counsel are hired directly by the defendant.

[17]For more on aggravating and mitigating role adjustments, see https://www.ussc.gov/sites/default/files/pdf/training/primers/2023_Primer_Role.pdf.

MAP 4

Rates of sentences imposed for fentanyl per 100 drug sentences, by state, FY 2021



Note: Includes fentanyl and fentanyl analogs. See appendix table 7 for rates.
Source: Bureau of Justice Statistics, based on data from the U.S. Sentencing Commission, Monitoring File, fiscal year 2021.

About 1 in 5 persons sentenced for a drug offense involving opioids received a sentence increase for use or possession of a weapon

Sentences may be increased if the person is charged with drug trafficking offenses involving both weapons and drugs. During FY 2021, 19% of persons sentenced for drug offenses involving heroin, fentanyl, or other opioids received an increased sentence for the use or possession of a weapon during the offense. Increased sentences for weapon involvement were twice as prevalent in offenses involving fentanyl (21%) than in offenses involving hydrocodone (9%).

TABLE 4
Sentencing characteristics of persons sentenced for an opioid offense, by opioid type, FY 2021

	Total		Opioid type				
Defendant characteristics	Number	Percent	Heroin	Fentanyl[a]	Oxycodone	Hydrocodone	Other opioids[b]
Total persons	3,860	100%	1,798	1,679	233	79	71
Type of counsel							
Panel-appointed attorney[c]	1,876	53.5%	57.9%	50.7%	41.9%	54.9%	38.7%
Private counsel	747	21.3	18.3	21.4	37.4	38.0	30.7
Public defender	883	25.2	23.7	27.8	20.7	7.0	30.7
Disposition							
Guilty plea	3,736	98.4%	98.7%	98.7%	97.4%	89.9%	95.8%
Trial	61	1.6	1.3	1.3	2.6	10.1	4.2
Aggravating role in offense							
No role adjustment	3,583	94.4%	94.6%	94.9%	92.6%	78.5%	97.2%
Leadership/supervisory role in offense	214	5.6	5.4	5.1	7.4	21.5	2.8
Weapon involvement							
No weapon involved	3,077	81.0%	81.0%	79.5%	86.1%	91.1%	90.1%
Weapon involved	720	19.0	19.0	20.5	13.9	8.9	9.9
Criminal history							
No criminal history, first offense	508	13.4%	11.5%	12.6%	22.1%	26.6%	36.6%
Prior criminal history	3,289	86.6	88.5	87.4	77.9	73.4	63.4
Acceptance of responsibility reduction							
Did not accept responsibility	117	3.1%	2.4%	2.5%	5.6%	19.0%	8.5%
Accepted responsibility	3,680	96.9	97.6	97.5	94.4	81.0	91.5
Career offender status							
No career offender status	3,571	94.1%	94.1%	92.9%	98.3%	98.7%	100%
Career offender status	226	5.9	5.9	7.1	1.7	1.3	0.0

Note: Includes cases where persons were sentenced under U.S. Sentencing Guidelines Chapter Two, Part D (Drug Guidelines). The primary drug is the drug that results in the greatest penalty (when multiple drugs are involved). Complete guideline application information was missing for 63 records.

[a]Includes fentanyl and fentanyl analogs.

[b]Includes hydromorphone (Dilaudid), opium, methadone, morphine, oxymorphone, and codeine.

[c]Criminal Justice Act-appointed attorney.

Source: Bureau of Justice Statistics, based on data from the U.S. Sentencing Commission, Monitoring File, fiscal year 2021.

2 in 3 persons sentenced for a drug offense involving opioids received a sentence below the guideline range

Of persons sentenced for drug offenses involving opioids in FY 2021, the majority (71%) were sentenced outside applicable guideline ranges (table 5). Sixty-seven percent of persons sentenced received a downward departure or more lenient sentence than the guideline range. This includes departures under downward range variances (25%), substantial assistance (19%), government-sponsored variances (11%), Early Disposition Program (8%), and other downward departures (4%).[18] Downward sentencing departures were more frequently due to prosecutors' motions (38%) than any other reason (29%).[19]

An early disposition program departure occurs when the government seeks a sentence below the guideline range because the person participated in the government's early disposition program through which cases are resolved in an expedited manner. Eight percent of persons sentenced for a drug offense involving opioids received an early disposition program departure.

9 in 10 persons sentenced for a drug offense involving opioids in FY 2021 received a prison sentence

In FY 2021, about 9 in 10 (89%) persons sentenced for a drug offense involving opioids were sentenced to imprisonment only. Persons sentenced for a drug offense involving heroin received a median prison term of 46 months in FY 2021, as did persons sentenced for a drug offense involving fentanyl.

Of 3,860 persons sentenced for a drug offense involving opioids during FY 2021, 2,042 (53%) received a mandatory minimum term of imprisonment. Persons sentenced for opioid offenses were subject to the following mandatory minimum prison terms: 27% received a mandatory-minimum term of 5 years; 24% received a mandatory minimum term of 10 years; and 2% received a mandatory-minimum term of 20 years. Fifty-eight percent of persons sentenced for a drug offense involving heroin received a mandatory minimum sentence, compared to 1% of persons sentenced with other opioids as the primary drug type. In FY 2021, 33% of persons sentenced for drug offenses involving heroin, fentanyl, or other opioids received a "safety valve" departure.[20]

Most persons (97%) convicted for a drug offense involving opioids were sentenced for drug trafficking

In 2021, drug trafficking was the most common conviction offense among persons sentenced in federal district court for heroin, fentanyl, and other opioids (table 6). About 1% were sentenced for acquiring drugs by fraud, most commonly for oxycodone; 1% were sentenced for possession; and less than 1% for other drug offenses.

[18]Departures are sentences outside of the guideline range authorized by specific policy statements in the Guidelines Manual. Variances are sentences outside of the guideline range that are not imposed within the guidelines framework because of the guidelines' advisory nature following *United States v. Booker* (543 U.S. 220, 259 (2005)). Sentencing courts typically calculate any departures prior to considering whether to vary. See https://www.ussc.gov/sites/default/files/pdf/training/primers/2023_Primer_Departure_Variance.pdf.

[19]Government sponsored departures include §5K1.1 Substantial Assistance, §5K3.1 Early Disposition Program, and government-sponsored variances. All other downward departures include other downward departures and downward range variances.

[20]The "safety valve" provision is codified at 18 U.S.C. § 3553(f) and incorporated into the guidelines by §5C1.2(a). Eligibility for relief from a mandatory sentence for a drug offense is determined by the following factors: no more than one criminal history point under guidelines (Criminal History Category I); offense was non-violent, no dangerous weapon possessed; offense did not result in death or serious bodily injury; defendant was not an organizer, leader, manager, or supervisor; and the defendant provided full disclosure to the government about crime of conviction.

TABLE 5

Sentencing outcomes of persons sentenced for an opioid offense, by opioid type, FY 2021

	Total		Opioid type				
Sentencing outcomes	**Number**	**Percent**	**Heroin**	**Fentanyl[a]**	**Oxycodone**	**Hydrocodone**	**Other opioids[b]**
Total persons	3,860	100%	1,798	1,679	233	79	71
Sentences relative to the guideline range							
Within guideline range	1,132	29.3%	30.9%	27.7%	24.6%	27.9%	46.5%
Upward departure	30	0.8	0.9	0.7	<0.05	<0.05	2.8
§5K1.1 Substantial Assistance	727	18.8	20.0	16.8	26.2	21.5	9.9
§5K3.1 Early Disposition Program	293	7.6	6.1	10.5	0.9	1.3	5.6
Other downward departure	175	4.5	4.7	4.4	4.7	5.1	2.8
Variances[c]							
Above range variance	95	2.5%	1.6%	3.4%	3.0%	<0.05%	4.2%
Government sponsored	440	11.4	10.5	13.5	8.6	1.3	5.6
Downward range variance	966	25.0	25.3	23.0	32.2	43.0	22.5
Mandatory minimum sentence							
No drug mandatory minimum	1,818	47.1%	42.0%	41.3%	95.3%	97.5%	98.6%
5-year mandatory minimum	1,043	27.0	29.9	29.7	3.4	<0.05	<0.05
10-year mandatory minimum	924	23.9	26.3	26.7	0.9	<0.05	<0.05
20-year mandatory minimum	75	1.9	1.8	2.3	0.4	2.5	1.4
Safety valve							
No safety valve	2,545	66.9%	67.1%	65.4%	69.7%	81.3%	71.0%
Received safety valve	1,262	33.1	32.9	34.6	30.3	18.7	29.0
Sentence imposed							
Prison only	3,441	89.2%	90.3%	91.1%	77.7%	81.0%	59.2%
Prison/community split	177	4.6	5.1	4.2	3.9	3.8	4.2
Probation and confinement	60	1.6	1.2	1.1	3.9	7.6	7.0
Probation only	182	4.7	3.4	3.6	14.6	7.6	29.6
Median prison sentence received[d]	42 mos.		46 mos.	46 mos.	26 mos.	24 mos.	7 mos.

Note: Includes cases where persons were sentenced under U.S. Sentencing Guidelines Chapter Two, Part D (Drug Guidelines). The primary drug is the drug that results in the greatest penalty (when multiple drugs are involved). Complete guideline application information was missing for 63 records.

[a]Includes fentanyl and fentanyl analogs.

[b]Includes hydromorphone (Dilaudid), opium, methadone, morphine, oxymorphone, and codeine.

[c]Includes cases where the sentence imposed was above or below the applicable guideline range and for which the court cited a reason on Part VI of the Statement of Reasons form (Court Determination for a Variance). Variances are initiated as motions by the government or by the defendant.

[d]Sentences of probation only are included as 0 months of imprisonment.

Source: Bureau of Justice Statistics, based on data from the U.S. Sentencing Commission, Monitoring File, fiscal year 2021.

TABLE 6
Persons sentenced in federal district court for heroin, fentanyl, and other opioids, by primary guideline, FY 2021

Primary drug guideline[a]	Total		Opioid type				
	Number	Percent	Heroin	Fentanyl[b]	Oxycodone	Hydrocodone	Other opioids[c]
Total persons	3,860	100%	1,798	1,679	233	79	71
Drug trafficking[d]	3,760	97.4%	98.5%	98.2%	89.7%	93.7%	81.7%
Trafficking in protected locations[e]	18	0.5	0.6	0.4	<0.05	<0.05	<0.05
Drug possession[f]	35	0.9	0.8	0.8	2.2	<0.05	4.2
Acquiring drugs by fraud[g]	37	1.0	<0.05	0.5	7.3	5.1	11.3
Other[h]	10	0.3	0.1	0.2	0.9	1.3	2.8

[a]Includes cases where persons were sentenced under U.S. Sentencing Guidelines Chapter Two, Part D (Drug Guidelines). The primary drug is the drug that results in the greatest penalty (when multiple drugs are involved).

[b]Includes fentanyl and fentanyl analogs.

[c]Includes hydromorphone (Dilaudid), opium, methadone, morphine, oxymorphone, and codeine.

[d]Restricted to cases where §2D1.1 is the primary guideline.

[e]Restricted to cases where §2D1.2 is the primary guideline.

[f]Restricted to cases where §2D2.1 is the primary guideline.

[g]Restricted to cases where §2D2.2 is the primary guideline.

[h]Restricted to cases where §2D1.5, §2D1.8, §2D1.12, §2D1.13, or §2D3.1 is the primary guideline.

Source: Bureau of Justice Statistics, based on data from the U.S. Sentencing Commission, Monitoring File, fiscal year 2021.

Methodology

This report uses data from the Bureau of Justice Statistics' (BJS) Federal Justice Statistics Program (FJSP). The FJSP receives administrative data files from six federal criminal justice agencies: the U.S. Marshals Service, Drug Enforcement Administration (DEA), Executive Office for U.S. Attorneys, Administrative Office of the U.S. Courts, U.S. Sentencing Commission, and Federal Bureau of Prisons. Data represent the federal criminal case-processing stages from arrest to imprisonment and release. BJS standardizes these data to maximize comparability across and within agencies over time. This includes—

- applying, where possible, the person-case as the primary unit of count
- delineating the fiscal year (October 1 through September 30) as the period for reported events
- applying a uniform offense classification across agencies[21]
- classifying dispositions and sentences imposed.

This report uses data from the FJSP and other published sources to describe persons arrested and sentenced for federal drug offenses involving heroin, fentanyl, and other opioids. The FJSP provides a system perspective of the annual activity, workloads, and outcomes associated with offenders handled in federal criminal courts. Data are standardized by applying unified offense and case disposition categories across agencies and a common unit of analysis and reporting period. The classification of opioids was standardized across the data sets provided by the DEA and the U.S. Sentencing Commission. The data in this report are based on the fiscal year (FY). Data quality checks are performed on the data files in preparation for data analysis. This includes documenting new codes appearing in the data and confirming records with missing or invalid information.

FJSP data sources

Drug Enforcement Administration: The Defendant Statistical System contains data on persons arrested within the United States by DEA agents. The data include information on the characteristics of persons arrested and the type of drug for which they were arrested. Persons are counted more than once in a fiscal year if they were arrested multiple times by the DEA during the period. DEA data include all arrests made by DEA agents and do not describe whether a DEA arrest is a state or federal case. To protect the identity of agents and operations, the DEA does not provide BJS with geographic information, such as the federal judicial district where the arrest occurred. Data that are made publicly available from the DEA are posted on the Data and Statistics page of their website (https://www.dea.gov/resources/data-and-statistics).

U.S. Sentencing Commission: Data received from the U.S. Sentencing Commission were used to analyze persons sentenced under federal guidelines for offenses involving opioids. The U.S. Sentencing Commission Monitoring File does not include data on Class B and Class C misdemeanors or infractions, offenses with a maximum prison sentence of 6 months or less, juvenile offenders, or death penalty cases. The data includes persons convicted and sentenced under the U.S. Sentencing Guidelines. The data do not include persons whose case ended in a dismissal or acquittal and does not include probation violations/supervised release revocations.

The average annual percent change used in this report measures the average rate of growth (or decline) in the number per year between FY 2001 and FY 2021. The following formula is used:

$$\left[\left(\frac{n^{\text{th}}\text{ year}}{\text{first year}}\right)^{\frac{1}{n}} - 1\right] \times 100$$

The total average annual percent change in federal and state arrests by the Drug Enforcement Administration involving heroin, fentanyl, and other opioids, FY 2001–FY 2021 is computed as follows:

$$\left[\left(\frac{6{,}405}{4{,}830}\right)^{\frac{1}{2021\text{-}2001}} - 1\right] \times 100 = [(1.32609^{0.05}) - 1] \times 100 = (1.014212 - 1) \times 100 \approx 1.4\%$$

Other resources

FJSP data are available in the Federal Criminal Case Processing Statistics Tool, an interactive BJS web tool that permits users to query the federal data and download the results as a spreadsheet.[22] It provides statistics by the stage of the federal criminal case process, including law enforcement, prosecution and courts, and incarceration. Users can generate queries on persons sentenced for drug offenses involving opioids for up to three variables using data for the years 1998 to 2021.

[21]Offense categories for federal arrestees are based on the FBI's National Crime Information Center offense classifications, which are aggregated into the offense categories shown in the report.

[22]BJS's Federal Criminal Case Processing Statistics (FCCPS) data tool is available at https://fccps.bjs.ojp.gov.

APPENDIX TABLE 1

Counts for figure 1. Federal and state arrests by the Drug Enforcement Administration involving heroin, fentanyl, and other opioids, FY 2001–2021

Fiscal year	Total	Heroin	Fentanyl	Other opioids[a]
2001	4,830	4,615	8	207
2002	3,319	3,136	6	177
2003	2,590	2,467	5	118
2004	2,715	2,473	1	241
2005	2,974	2,421	3	550
2006	2,942	2,344	16	582
2007	2,783	2,159	23	601
2008	3,549	2,592	12	945
2009	4,364	3,010	12	1,342
2010	4,611	2,977	19	1,615
2011	5,954	3,535	24	2,395
2012	5,933	3,594	17	2,322
2013	6,408	4,113	22	2,273
2014	6,900	4,784	31	2,085
2015	8,258	6,272	60	1,926
2016	7,479	5,864	248	1,367
2017	7,242	5,412	697	1,133
2018	7,248	5,001	1,227	1,020
2019	7,435	4,742	1,759	934
2020	6,632	3,649	2,305	678
2021	6,405	2,591	3,138	676
Average annual percent change, FY 2001–2021[b]	1.4%	-2.8%	34.8%	6.1%
Percent change, FY 2020–2021	-3.4%	-29.0%	36.1%	-0.3%

[a]Includes oxycodone, hydrocodone, hydromorphone (Palladone), oxymorphone, opioid treatment pharmaceuticals, opium, and morphine.
[b]Calculated using fiscal year counts in 2001 and in 2021. See *Methodology*.
Source: Bureau of Justice Statistics, based on data from the Drug Enforcement Administration, Defendant Statistical System, fiscal years 2001–2021.

APPENDIX TABLE 2

Counts for figure 2. Federal and state arrests by the Drug Enforcement Administration involving fentanyl and other pharmaceutical opioids, FY 2001–2021

Fiscal year	Total	Fentanyl	Oxycodone	Hydrocodone	Other opioids[a]
2001	215	8	0	0	207
2002	183	6	0	0	177
2003	123	5	9	13	96
2004	242	1	90	75	76
2005	553	3	256	203	91
2006	598	16	261	243	78
2007	624	23	320	237	44
2008	957	12	594	292	59
2009	1,354	12	846	395	101
2010	1,634	19	1,092	424	99
2011	2,419	24	1,900	417	78
2012	2,339	17	1,790	402	130
2013	2,295	22	1,677	420	176
2014	2,116	31	1,403	449	233
2015	1,986	60	1,346	379	201
2016	1,615	248	982	212	173
2017	1,830	697	823	170	140
2018	2,247	1,227	694	146	180
2019	2,693	1,759	603	127	204
2020	2,983	2,305	445	139	94
2021	3,814	3,138	512	72	92
Average annual percent change, FY 2001–2021[b]	15.5%	34.8%	^	^	-4.0%
Percent change, FY 2020–2021	27.9%	36.1%	15.1%	-48.2%	-2.1%

Note: The unit of count is an arrest made by the Drug Enforcement Administration (DEA) where each arrest for an individual is counted. Includes state and federal arrests made by the DEA.

^Estimate is based on 10 or fewer cases.

[a]Includes opium, morphine, opioid treatment pharmaceuticals, hydromorphone (Palladone), and oxymorphone.

[b]Calculated using fiscal year counts in 2001 and in 2021. See *Methodology*.

Source: Bureau of Justice Statistics, based on data from the Drug Enforcement Administration, Defendant Statistical System, fiscal years 2001–2021.

APPENDIX TABLE 3

Counts for figure 3. Number of drug overdose deaths involving opioids, by type of opioid, 2001–2021

Year	Any opioid	Heroin	Natural and semisynthetic opioids[a]	Methadone	Synthetic opioids other than methadone[b]
2001	9,496	1,779	3,479	1,456	957
2002	11,920	2,089	4,416	2,358	1,295
2003	12,940	2,080	4,867	2,972	1,400
2004	13,756	1,878	5,231	3,845	1,664
2005	14,918	2,009	5,774	4,460	1,742
2006	17,545	2,088	7,017	5,406	2,707
2007	18,516	2,399	8,158	5,518	2,213
2008	19,582	3,041	9,119	4,924	2,306
2009	20,422	3,278	9,735	4,696	2,946
2010	21,089	3,036	10,943	4,577	3,007
2011	22,784	4,397	11,693	4,418	2,666
2012	23,166	5,925	11,140	3,932	2,628
2013	25,052	8,257	11,346	3,591	3,105
2014	28,647	10,574	12,159	3,400	5,544
2015	33,091	12,989	12,727	3,301	9,580
2016	42,249	15,469	14,487	3,373	19,413
2017	47,600	15,482	14,495	3,194	28,466
2018	46,802	14,996	12,552	3,023	31,335
2019	49,860	14,019	11,886	2,740	36,359
2020	68,630	13,165	13,471	3,543	56,516
2021	80,411	9,173	13,618	3,678	70,601
Total, 2001–2021	628,476	148,123	208,313	78,405	286,450
Percent change, FY 2020–2021	17.2%	-30.3%	1.1%	3.8%	24.9%

Note: Deaths involving more than one type of opioid were counted in both categories.

[a]Natural and semisynthetic opioids include morphine, oxycodone, and hydrocodone.

[b]Synthetic opioids include fentanyl, fentanyl analogs, and tramadol.

Source: Centers for Disease Control and Prevention. Data Brief 457. Drug Overdose Deaths in the United States, 2001–2021, National Center for Health Statistics, National Vital Statistics System, Mortality.

APPENDIX TABLE 4
Counts for figure 4. Number of persons sentenced for a drug offense involving heroin, fentanyl, or other opioids as primary drug, FY 2001–2021

Fiscal year	Total	Heroin	Fentanyl	Other opioids[a]
2001	1,889	1,758	0	131
2002	2,059	1,818	1	240
2003	2,105	1,833	0	272
2004	1,926	1,712	0	214
2005	1,893	1,670	3	220
2006	1,849	1,576	6	267
2007	1,682	1,382	14	286
2008	1,851	1,476	20	355
2009	2,218	1,626	18	574
2010	2,457	1,627	8	822
2011	2,843	1,809	12	1,022
2012	3,349	2,193	10	1,146
2013	3,485	2,216	10	1,259
2014	3,760	2,432	9	1,319
2015	3,842	2,744	23	1,075
2016	3,608	2,831	52	725
2017	3,566	2,709	150	707
2018	3,591	2,597	433	561
2019	4,183	2,537	1,001	645
2020	3,510	1,900	1,156	454
2021	3,860	1,798	1,679	383
Average annual percent change, FY 2001–2021[b]	3.6%	0.1%	^	5.5%
Percent change, FY 2020–2021	10.0%	-5.4%	45.2%	-15.6%

Note: Includes cases where persons were sentenced under U.S. Sentencing Guidelines Chapter Two, Part D (Drug Guidelines). The primary drug is the drug that results in the greatest penalty (when multiple drugs are involved).

^Estimate is based on 10 or fewer cases.

[a]Includes oxycodone (OxyContin), oxymorphone, morphine, hydromorphone (Dilaudid), opium, codeine, and hydrocodone.

[b]Calculated using fiscal year counts in 2001 and in 2021. See *Methodology*.

Source: Bureau of Justice Statistics, based on data from the U.S. Sentencing Commission, Monitoring File, fiscal years 2001–2021.

APPENDIX TABLE 5

Counts for figure 5. Number of persons sentenced for a drug offense involving fentanyl and other pharmaceutical opioids, by drug type, FY 2001–2021

Fiscal year	Total	Fentanyl	Oxycodone	Hydrocodone	Other opioids[a]
2001	131	0	58	27	46
2002	241	1	143	27	70
2003	272	0	158	41	73
2004	214	0	122	29	63
2005	223	3	131	43	46
2006	273	6	206	30	31
2007	300	14	216	33	37
2008	375	20	248	71	36
2009	592	18	453	70	51
2010	830	8	648	110	64
2011	1,034	12	837	103	82
2012	1,156	10	910	109	127
2013	1,269	10	1,074	81	104
2014	1,328	9	1,130	93	96
2015	1,098	23	890	90	95
2016	777	52	596	63	66
2017	857	150	591	55	61
2018	994	433	450	52	59
2019	1,646	1,001	464	90	91
2020	1,610	1,156	317	67	70
2021	2,062	1,679	233	79	71
Average annual percent change, FY 2001–2021[b]	14.8%	^	7.2%	5.5%	2.2%
Percent change, FY 2020–2021	28.1%	45.2%	-26.5%	17.9%	1.4%

Note: Includes cases where persons were sentenced under U.S. Sentencing Guidelines Chapter Two, Part D (Drug Guidelines). The primary drug is the drug that results in the greatest penalty (when multiple drugs are involved).

^Estimate is based on 10 or fewer cases.

[a]Includes hydromorphone (Dilaudid), opium, morphine, methadone, oxymorphone, and codeine.

[b]Calculated using fiscal year counts in 2001 and in 2021. See *Methodology*.

Source: Bureau of Justice Statistics, based on data from the U.S. Sentencing Commission, Monitoring File, fiscal years 2001–2021.

APPENDIX TABLE 6

Counts for map 3. Rates of sentences imposed for heroin, fentanyl, and other opioids per 100 drug sentences by state, FY 2021

State	Total number of drug sentences	Sentences imposed for heroin, fentanyl, and other opioids	Rate per 100 drug sentences
Total	17,690	3,860	22
Alabama	271	50	18
Alaska	51	13	25
Arizona	580	150	26
Arkansas	242	37	15
California	2279	323	14
Colorado	123	26	21
Connecticut	137	80	58
Delaware	24	15	63
District of Columbia	39	7	18
Florida	799	138	17
Georgia	396	53	13
Hawaii	79	4	5
Idaho	100	8	8
Illinois	337	136	40
Indiana	251	52	21
Iowa	357	26	7
Kansas	147	24	16
Kentucky	294	50	17
Louisiana	165	36	22
Maine	108	53	49
Maryland	197	70	36
Massachusetts	178	123	69
Michigan	246	66	27
Minnesota	96	8	8
Mississippi	103	11	11
Missouri	555	158	28
Montana	143	10	7
Nebraska	145	8	6
Nevada	79	13	16
New Hampshire	121	84	69
New Jersey	238	134	56
New Mexico	265	36	14
New York	665	249	37
North Carolina	613	105	17
North Dakota	128	49	38
Ohio	548	254	46
Oklahoma	239	68	28
Oregon	162	49	30
Pennsylvania	428	207	48
Puerto Rico	445	27	6
Rhode Island	28	12	43
South Carolina	262	64	24
South Dakota	147	21	14
Tennessee	564	117	21
Texas	2918	273	9
Utah	244	34	14
Vermont	84	27	32
Virginia	355	101	28
Washington	184	63	34
West Virginia	272	83	31
Wisconsin	165	48	29
Wyoming	48	7	15

Note: Includes heroin, fentanyl, fentanyl analogs, opium, methadone, morphine, oxymorphone, hydrocodone, hydromorphone (Dilaudid), codeine, and oxycodone (OxyContin).

Source: Bureau of Justice Statistics, based on data from the U.S. Sentencing Commission, Monitoring File, fiscal year 2021.

APPENDIX TABLE 7

Counts for map 4. Rates of sentences imposed for fentanyl per 100 drug sentences by state, FY 2021

State	Total number of drug sentences	Sentences imposed for fentanyl	Rate per 100 drug sentences
Total	17,690	1,679	9
Alabama	271	8	3
Alaska	51	1	2
Arizona	580	95	16
Arkansas	242	15	6
California	2,279	175	8
Colorado	123	11	9
Connecticut	137	31	23
Delaware	24	7	29
District of Columbia	39	2	5
Florida	799	74	9
Georgia	396	7	2
Hawaii	79	1	1
Idaho	100	3	3
Illinois	337	40	12
Indiana	251	22	9
Iowa	357	6	2
Kansas	147	8	5
Kentucky	294	30	10
Louisiana	165	4	2
Maine	108	41	38
Maryland	197	41	21
Massachusetts	178	103	58
Michigan	246	31	13
Minnesota	96	6	6
Mississippi	103	2	2
Missouri	555	108	19
Montana	143	2	1
Nebraska	145	4	3
Nevada	79	1	1
New Hampshire	121	81	67
New Jersey	238	42	18
New Mexico	265	14	5
New York	665	105	16
North Carolina	613	43	7
North Dakota	128	6	5
Ohio	548	159	29
Oklahoma	239	4	2
Oregon	162	6	4
Pennsylvania	428	90	21
Puerto Rico	445	5	1
Rhode Island	28	10	36
South Carolina	262	11	4
South Dakota	147	4	3
Tennessee	564	36	6
Texas	2,918	58	2
Utah	244	11	5
Vermont	84	10	12
Virginia	355	35	10
Washington	184	23	13
West Virginia	272	32	12
Wisconsin	165	14	8
Wyoming	48	1	2

Note: Includes fentanyl and fentanyl analogs.
Source: Bureau of Justice Statistics, based on data from the U.S. Sentencing Commission, Monitoring File, fiscal year 2021.

The Bureau of Justice Statistics of the U.S. Department of Justice is the principal federal agency responsible for measuring crime, criminal victimization, criminal offenders, victims of crime, correlates of crime, and the operation of criminal and civil justice systems at the federal, state, tribal, and local levels. BJS collects, analyzes, and disseminates reliable statistics on crime and justice systems in the United States, supports improvements to state and local criminal justice information systems, and participates with national and international organizations to develop and recommend national standards for justice statistics. Kevin M. Scott, PhD, is the acting director.

This report was written by Mark Motivans. George E. Browne verified the report.

Stephanie Eckroth edited the report. Jeffrey Link produced the report.

February 2024, NCJ 307497

NCJ 307497

EXHIBIT 199

QuickFacts

Fentanyl Trafficking

Population Snapshot

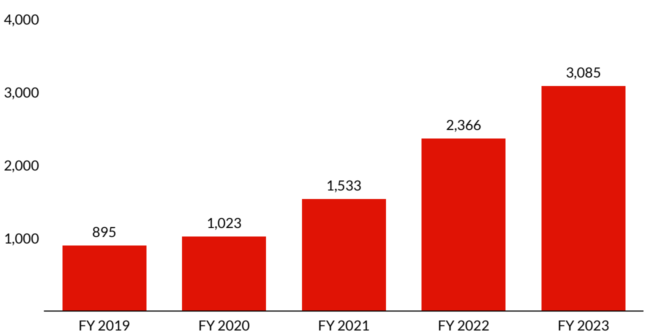
***64,124 cases** were reported in FY23;*

19,066 involved drugs,[1]

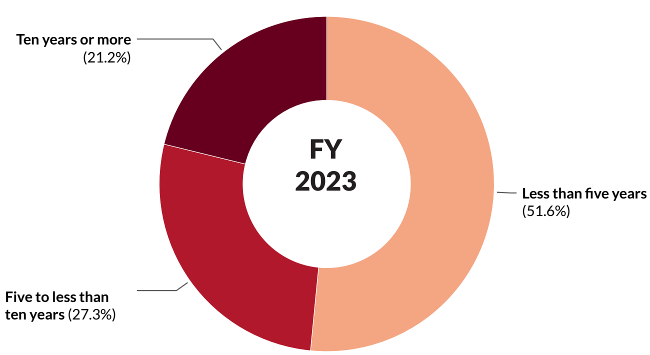
18,939 involved drug trafficking.[2]

16.3% of such cases involved fentanyl[3], up **244.7%** since FY 2019.

Number of Fentanyl Trafficking Offenses



Sentence Length



Individual and Offense Characteristics[4]

- 82.1% of individuals sentenced for fentanyl trafficking were men.
- 39.5% were Hispanic, 37.8% were Black, 20.0% were White, and 2.7% were Other races.
- Their average age was 34 years.
- 86.4% were United States citizens.
- 41.1% had little or no prior criminal history (Criminal History Category I); 5.2% were individuals sentenced under the career offender guideline (§4B1.1).
- The median base offense level in these cases was 28, corresponding to between 280 and 400 grams of fentanyl.
- Sentences were increased for:
  - possessing a weapon (30.2%);
  - a leadership or supervisory role in the offense (4.8%).
- Sentences were decreased for:
  - minor or minimal participation in the offense (21.3%);
  - meeting the safety valve criteria in the sentencing guidelines (30.7%).
- The top six districts for fentanyl trafficking offenses were:
  - Southern District of California (229);
  - District of Arizona (177);
  - Western District of Texas (128);
  - Southern District of New York (94);
  - District of Massachusetts (90);
  - Eastern District of Missouri (90).

Punishment

- The average sentence for fentanyl traffickers was 71 months.
- 97.6% were sentenced to prison.
- 53.4% were convicted of an offense carrying a mandatory minimum penalty; 50.9% of those individuals were relieved of that penalty.

Means of Relief from Mandatory Minimum Penalty for Fentanyl Traffickers

	Percent
Safety Valve	29.0%
Substantial Assistance	13.5%
Both	8.3%

This document was produced and published at U.S. taxpayer expense.

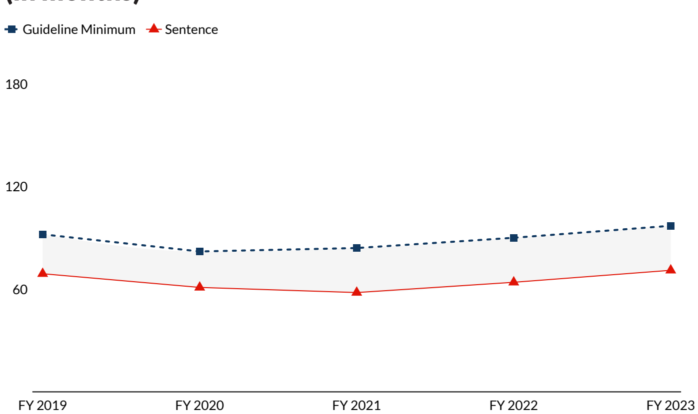
QuickFacts

Fentanyl Trafficking

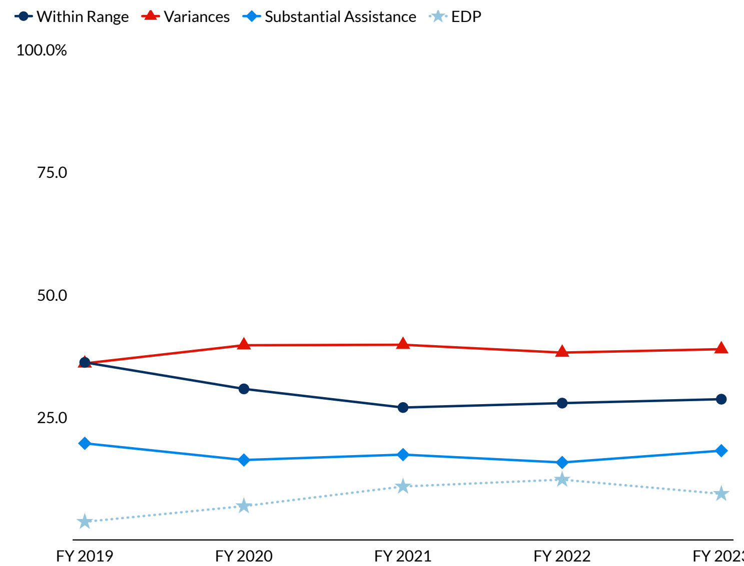
Sentences Relative to the Guideline Range

- Of the 61.1% of individuals sentenced for fentanyl trafficking under the *Guidelines Manual*:
  - 47.1% were sentenced within the guideline range.
  - 29.7% received a substantial assistance departure.
    - *Their average sentence reduction was 54.8%.*
  - 15.4% received an Early Disposition Program (EDP) departure.[5]
    - *Their average sentence reduction was 64.7%.*
  - 6.4% received some other downward departure.
    - *Their average sentence reduction was 48.4%.*
- 38.9% received a variance; of those individuals:
  - 93.7% received a downward variance.
    - *Their average sentence reduction was 39.4%.*
  - 6.3% received an upward variance.
    - *Their average sentence increase was 150.1%.*
- The average guideline minimum and the average sentence slightly increased over the past five years.
  - The average guideline minimum increased from 92 months in fiscal year 2019 to 97 months in fiscal year 2023.
  - The average sentence was 69 months in fiscal year 2019 and 71 months in fiscal year 2023.

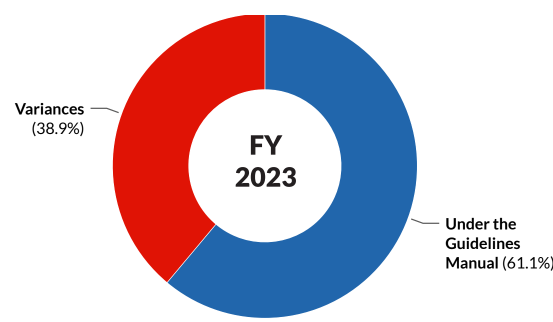
Average Guideline Minimum and Average Sentence (in months)

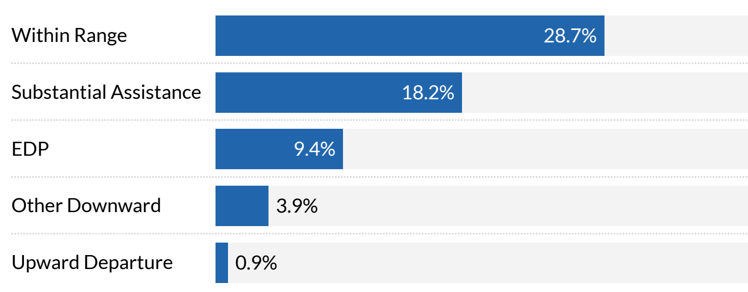


Sentences Relative to the Guideline Range



Sentences Relative to the Guideline Range





[1] Drug offenses include cases where individuals were sentenced under USSG Chapter Two, Part D (Drugs). There were 3,110 individuals sentenced for fentanyl offenses under USSG Chapter Two, Part D (Drugs) in FY 2023.

[2] Individuals sentenced for drug trafficking were sentenced under USSG §§2D1.1 (Drug Trafficking), 2D1.2 (Protected Locations), 2D1.5 (Continuing Criminal Enterprise), 2D1.6 (Use of a Communication Facility), 2D1.8 (Rent/Manage Drug Establishment), 2D1.10 (Endangering Human Life), or 2D1.14 (Narco-Terrorism).

[3] Fentanyl includes Fentanyl (N-phenyl-N-[1-(2-phenylethyl)-4-piperidinyl] Propanamide). Offenses involving fentanyl analogues are discussed in a separate Quick Facts publication.

[4] Cases with incomplete sentencing information were excluded from the analysis.

[5] "Early Disposition Program" (or EDP) departures are departures where the government sought a sentence below the guideline range because the defendant participated in the government's Early Disposition Program, through which cases are resolved in an expedited manner. See USSG §5K3.1.

SOURCE: United States Sentencing Commission, FY 2019 through FY 2023 Datafiles, USSCFY19-USSCFY23.

EXHIBIT 200

Centers for Disease Control and Prevention

MMWR

Morbidity and Mortality Weekly Report

Weekly / Vol. 70 / No. 15 April 16, 2021

State-Level Economic Costs of Opioid Use Disorder and Fatal Opioid Overdose — United States, 2017

Feijun Luo, PhD[1]; Mengyao Li, PhD[1]; Curtis Florence, PhD[1]

Approximately 47,000 persons in the United States died from an opioid-involved overdose in 2018 (*1*), and 2.0 million persons met the diagnostic criteria for an opioid use disorder in 2017 (*2*). The economic cost of the U.S. opioid epidemic in 2017 was estimated at $1,021 billion, including cost of opioid use disorder estimated at $471 billion and cost of fatal opioid overdose estimated at $550 billion (*3*). CDC used national-level cost estimates to estimate the state-level economic cost of opioid use disorder and fatal opioid overdose during 2017. Cases and costs of state-level opioid use disorder and fatal opioid overdose and per capita costs were calculated for each of the 38 states and the District of Columbia (DC) that met drug specificity requirements for mortality data (*4*). Combined costs of opioid use disorder and fatal opioid overdose (combined costs) varied substantially, ranging from $985 million in Wyoming to $72,583 million in Ohio. Per capita combined costs also varied considerably, ranging from $1,204 in Hawaii to $7,247 in West Virginia. States with high per capita combined costs were mainly in two regions: the Ohio Valley and New England. Federal and state public health agencies can use these data to help guide decisions regarding research, prevention and response activities, and resource allocation.

Estimated case counts of state-level opioid use disorder were extracted from the National Survey on Drug Use and Health (NSDUH) 2-Year Restricted-Use Data Analysis System (2016–2017) provided by the Substance Abuse and Mental Health Services Administration (*5*). NSDUH is a nationally representative sample of the U.S. civilian noninstitutionalized population aged ≥12 years. Cases of opioid use disorder were identified by using questions on opioid abuse or dependence during the past year.* Case counts of state-level fatal opioid overdose and population estimates in 2017 were extracted from CDC's WONDER database (*6*). Cases of fatal opioid overdose were identified using *International Classification of Diseases, Tenth Revision* underlying cause-of-death codes X40–X44, X60–X64, X85, and Y10–Y14 and then multiple causes-of-death codes T40.0–T40.4 and T40.6.† This report is limited to DC and the 38 states that met the requirement that at least one specific drug is named on the death certificate (*4*).

* NSDUH classified respondents as having opioid use disorder during the past year if they had a heroin use disorder (dependence or abuse), pain reliever use disorder (dependence or abuse), or both during the past year.

† Cases of fatal opioid overdose include all opioid-related overdose deaths regardless of intent (intentional, unintentional, homicide, or undetermined).

INSIDE

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Cost per case of opioid use disorder ($221,219) was derived by dividing the total U.S. cost of opioid use disorder ($470,975 million) during 2017 by the number of opioid use disorder cases the same year (2.129 million) (*3*). Cost per case of fatal opioid overdose ($11.548 million) was derived by dividing the total cost of fatal opioid overdose ($549,691 million) by the number of fatal opioid overdose cases (47,600) (*3*). State-level cost of opioid use disorder was calculated by multiplying the U.S. cost of opioid use disorder per case by the number of cases of opioid use disorder in each state. State-level cost of fatal opioid overdose was calculated by multiplying the U.S. cost of fatal opioid overdose per death by the number of deaths in each state. To facilitate comparison across states, CDC divided state-level combined costs of opioid use disorder and fatal opioid overdose by state population to generate per capita costs. The 38 states and DC were ranked by per capita combined costs. Cost components of opioid use disorder and fatal opioid overdose include the costs of health care, substance use treatment, criminal justice, lost productivity, reduced quality of life, and the value of statistical life lost. These components were calculated by multiplying the number of state cases of opioid use disorder or fatal opioid overdose by national cost estimates per case for each component (*3*).[§]

[§] Cost estimates per case for components of opioid use disorder based on the value of a statistical life were as follows: health care, $14,705; substance use treatment, $1,660; criminal justice, $6,961; lost productivity, $14,707; and reduced quality of life, $183,186. Cost estimates per case for components of fatal opioid overdose were as follows: health care, $5,462; lost productivity, $1.443 million; and value of statistical life, $10.1 million.

Cases of opioid use disorder and fatal opioid overdose varied substantially among states, and the combined costs ranged from $985 million in Wyoming to $72,583 million in Ohio (Table 1). Per capita combined costs also varied widely among states, ranging from $1,204 in Hawaii to $7,247 in West Virginia. The state-level per capita combined costs exhibited geographic patterns (Figure); states with high per capita combined costs were located mainly in the Ohio Valley and New England. Three adjacent states in the Ohio Valley (West Virginia, Ohio, and Kentucky) had the first, second, and fourth highest per capita combined costs ($7,247, $6,226, and $5,491, respectively). Per capita costs of fatal opioid overdose were highest in West Virginia ($5,298) and Ohio ($4,252). Per capita combined costs in four neighboring New England states were among the eight highest: New Hampshire (third highest, $5,953), Massachusetts (fifth highest, $5,381), Maine (sixth highest, $5,099), and Connecticut (eighth highest, $4,800).

States with lower per capita combined costs were mainly in western regions: California, Hawaii, and Wyoming in the West; Minnesota in the Midwest; and Texas in the Southwest. Combined per capita costs were lowest in Hawaii ($1,204) and Minnesota ($1,509). Per capita cost of fatal opioid overdose was the lowest in Hawaii ($429), and per capita cost of opioid use disorder was the lowest in Minnesota ($635). The two most populous states (California and Texas) and the least populous state (Wyoming) were among the states with the lowest per capita combined costs: California, third lowest

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Suggested citation: [Author names; first three, then et al., if more than six.] [Report title]. MMWR Morb Mortal Wkly Rep 2021;70:[inclusive page numbers].

TABLE 1. Case counts and costs of opioid use disorder and fatal opioid overdose and per capita cost, by jurisdiction — 38 states and the District of Columbia, 2017*

Jurisdiction†	Estimated case count of opioid use disorder	Case count of fatal opioid overdose	Cost of opioid use disorder, $ (millions)	Cost of fatal opioid overdose, $ (millions)	Combined cost of opioid use disorder and fatal opioid overdose, $ (millions)	Per capita cost of opioid use disorder, $	Per capita cost of fatal opioid overdose, $	Per capita combined cost of opioid use disorder and fatal opioid overdose, $
Hawaii	5,000	53	1,106.1	612.1	1,718.1	775	429	1,204
Minnesota	16,000	422	3,539.5	4,873.3	8,412.8	635	874	1,509
California	165,000	2,199	36,501.1	25,394.3	61,895.5	923	642	1,566
Wyoming	2,000	47	442.4	542.8	985.2	764	937	1,701
Texas	146,000	1,458	32,298.0	16,837.2	49,135.1	1,141	595	1,736
Iowa	17,000	206	3,760.7	2,378.9	6,139.6	1,196	756	1,952
Georgia	41,000	1,014	9,070.0	11,709.8	20,779.8	870	1,123	1,992
Mississippi	20,000	185	4,424.4	2,136.4	6,560.8	1,483	716	2,199
Colorado	35,000	578	7,742.7	6,674.8	14,417.5	1,381	1,190	2,571
Oklahoma	26,000	388	5,751.7	4,480.7	10,232.4	1,463	1,140	2,603
Oregon	37,000	344	8,185.1	3,972.6	12,157.7	1,976	959	2,935
New York	103,000	3,224	22,785.5	37,231.2	60,016.7	1,148	1,876	3,024
Missouri	34,000	952	7,521.4	10,993.8	18,515.3	1,230	1,798	3,029
Arizona	50,000	928	11,060.9	10,716.7	21,777.6	1,576	1,527	3,104
New Mexico	12,000	332	2,654.6	3,834.0	6,488.6	1,271	1,836	3,107
Washington	68,000	742	15,042.9	8,568.7	23,611.6	2,031	1,157	3,188
Wisconsin	36,000	926	7,963.9	10,693.6	18,657.4	1,374	1,845	3,219
Illinois	73,000	2,202	16,149.0	25,429.0	41,578.0	1,261	1,986	3,248
Florida	140,000	3,245	30,970.6	37,473.7	68,444.3	1,476	1,786	3,262
Virginia	63,000	1,241	13,936.8	14,331.2	28,268.0	1,645	1,692	3,337
South Carolina	37,000	749	8,185.1	8,649.5	16,834.6	1,629	1,722	3,351
Alaska	6,000	102	1,327.3	1,177.9	2,505.2	1,794	1,592	3,386
Tennessee	44,000	1,269	9,733.6	14,654.6	24,388.2	1,449	2,182	3,631
North Carolina	76,000	1,953	16,812.6	22,553.5	39,366.1	1,637	2,195	3,832
Utah	30,000	456	6,636.6	5,265.9	11,902.5	2,140	1,698	3,837
Vermont	5,000	114	1,106.1	1,316.5	2,422.6	1,774	2,111	3,884
Indiana	56,000	1,176	12,388.3	13,580.6	25,968.9	1,858	2,037	3,895
Nevada	34,000	412	7,521.4	4,757.8	12,279.3	2,509	1,587	4,096
Michigan	81,000	2,033	17,918.7	23,477.3	41,396.1	1,799	2,357	4,155
Rhode Island	6,000	277	1,327.3	3,198.8	4,526.1	1,253	3,019	4,271
District of Columbia	2,000	244	442.4	2,817.7	3,260.2	638	4,060	4,698
Connecticut	28,000	955	6,194.1	11,028.5	17,222.6	1,726	3,074	4,800
Maryland	30,000	1,985	6,636.6	22,923.0	29,559.6	1,097	3,788	4,884
Maine	12,000	360	2,654.6	4,157.3	6,812.0	1,987	3,112	5,099
Massachusetts	67,000	1,913	14,821.7	22,091.6	36,913.2	2,161	3,220	5,381
Kentucky	50,000	1,160	11,060.9	13,395.8	24,456.8	2,483	3,007	5,491
New Hampshire	14,000	424	3,097.1	4,896.4	7,993.5	2,306	3,646	5,953
Ohio	104,000	4,293	23,006.8	49,576.1	72,582.9	1,973	4,252	6,226
West Virginia	16,000	833	3,539.5	9,619.6	13,159.1	1,949	5,298	7,247

Source: Florence C, Luo F, Rice K. The economic burden of opioid use disorder and fatal opioid overdose in the United States, 2017. Drug Alcohol Depend 2021;218:108350. https://linkinghub.elsevier.com/retrieve/pii/S0376871620305159

* Estimated case counts of opioid use disorder in 2017 were extracted from the National Survey on Drug Use and Health's 2-Year Restricted-Use Data Analysis System (2016–2017); cases of opioid use disorder were identified by using questions on opioid abuse or dependence during the past year; case counts of fatal opioid overdose and population estimates in 2017 were extracted from CDC's WONDER database; cases of fatal opioid overdose were identified using *International Classification of Diseases, Tenth Revision* codes for the underlying cause-of-death (X40–X44, X60–X64, X85, and Y10–Y14) and then for multiple causes-of-death (T40.0–T40.4 and T40.6).

† Jurisdictions are listed in ascending order of per capita combined cost of opioid use disorder and fatal opioid overdose.

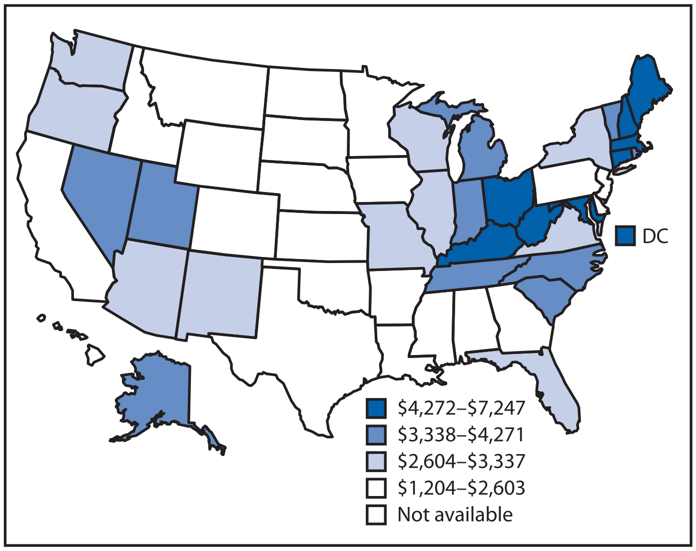
($1,566), Wyoming, fourth lowest ($1,701) and Texas, fifth lowest ($1,736).

Reduced quality of life was the largest component of the cost of opioid use disorder, and the value of statistical life lost was the largest component of the cost of fatal opioid overdose (Table 2). These two components together accounted for approximately 84% of combined costs, followed by lost productivity.

Discussion

The opioid overdose epidemic had a substantial economic impact on the United States during 2017. Individual states differed widely in overall and per capita economic cost. Per capita combined costs of opioid use disorder and fatal opioid overdose were highest in states in the Ohio Valley and New England

FIGURE. Per capita combined costs* of opioid use disorder and fatal opioid overdose — United States, 2017



Abbreviation: DC= District of Columbia.
* Per capita combined costs are combined costs of opioid use disorder and fatal opioid overdose divided by state population and are expressed in 2017 U.S. dollars.

Summary

What is already known about this topic?

The U.S. economic cost of opioid use disorder ($471 billion) and fatal opioid overdose ($550 billion) during 2017 totaled $1,021 billion.

What is added by this report?

In the 39 jurisdictions studied, combined costs of opioid use disorder and fatal opioid overdose varied from $985 million in Wyoming to $72,583 million in Ohio. Per capita combined costs varied from $1,204 in Hawaii to $7,247 in West Virginia. States with high per capita combined costs were located mainly in the Ohio Valley and New England.

What are the implications for public health practice?

Federal and state public health agencies can use these data to help guide decisions regarding research, prevention and response activities, and resource allocation.

regions. Three states in New England (Connecticut, Maine, and Massachusetts) had high per capita combined costs in 2017. However, previous reports have shown that these states had low per capita lifetime medical and work-loss costs from all fatal injuries (including opioid overdose) in 2014 (*7*). Further investigation is needed to ascertain why states that have relatively low costs for other types of injuries have relatively high costs related to opioid use disorder and fatal overdose.

Several effective strategies have been identified to improve opioid prescribing consistent with clinical guidelines, treat opioid use disorder, and prevent fatal overdose. Pain clinic laws and combined implementation of mandated provider review of state-run prescription drug monitoring program data have reduced the amounts of opioids prescribed and prescription opioid overdose death rates (*8*). Treatment with Food and Drug Administration–approved medications (methadone, buprenorphine, or naltrexone) is the most effective form of treatment for opioid use disorder (*9*). Overdose education and nasal naloxone distribution programs reduced opioid overdose mortality rates in Massachusetts (*10*).

The findings in this report are subject to at least four limitations. First, this study is limited to the 38 states and DC that met drug specificity requirements for mortality data, so the rankings of combined costs and per capita costs do not apply to all 50 states. Second, the cost of opioid use disorder was measured for a single year rather than a lifetime, even though opioid use disorder might have a long-lasting effect on a person's life. Third, the estimated case counts of opioid use disorder likely underrepresent the true prevalence of opioid use disorder because NSDUH does not include persons who are incarcerated or experiencing homelessness, two groups that often have high rates of opioid use disorder. Finally, this study did not directly calculate state costs per case of opioid use disorder and fatal opioid overdose but rather applied the national costs per case of opioid use disorder and fatal opioid overdose to individual states. Population characteristics of opioid use disorder and fatal opioid overdose cases at the state level might differ from those at the national level, potentially biasing state cost estimates.

These estimated costs of opioid use disorder and fatal opioid overdose and their per capita costs at the state level can assist federal and state decision makers in understanding the magnitude of opioid use disorder and fatal opioid overdose in their jurisdictions. Federal and state public health agencies can use these data to help guide decisions regarding research, prevention and response activities, and resource allocation.

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All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. No potential conflicts of interest were disclosed.

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1. Hedegaard H, Miniño AM, Warner M. Drug overdose deaths in the United States, 1999–2018. NCHS data brief, no 356. Hyattsville, MD: US Department of Health and Human Services, CDC, National Center for Health Statistics; 2020. https://www.cdc.gov/nchs/data/databriefs/db356-h.pdf
2. Center for Behavioral Health Statistics and Quality. Results from the 2018 National Survey on Drug Use and Health: detailed tables. Rockville, MD: US Department of Health and Human Services, Substance Abuse and Mental Health Services Administration; 2019. https://www.samhsa.gov/data/report/2018-nsduh-detailed-tables

TABLE 2. Cost components of opioid use disorder and fatal opioid overdose, by jurisdiction — 38 states and the District of Columbia, 2017*

Jurisdiction†	Estimated case counts of opioid use disorder	Cost components of opioid use disorder, $ (millions)					Case counts of fatal opioid overdose	Cost components of fatal opioid overdose, $ (millions)		
		Health care	Substance use treatment	Criminal justice	Lost productivity	Reduced quality of life		Health care	Lost productivity	Value of statistical life lost
Hawaii	5,000	73.5	8.3	34.8	73.5	915.9	53	0.3	76.5	535.3
Minnesota	16,000	235.3	26.6	111.4	235.3	2,931.0	422	2.3	609.0	4,262.0
California	165,000	2,426.4	273.9	1,148.5	2,426.6	30,225.7	2,199	12.0	3,173.5	22,208.8
Wyoming	2,000	29.4	3.3	13.9	29.4	366.4	47	0.3	67.8	474.7
Texas	146,000	2,147.0	242.4	1,016.2	2,147.2	26,745.2	1,458	8.0	2,104.1	14,725.1
Iowa	17,000	250.0	28.2	118.3	250.0	3,114.2	206	1.1	297.3	2,080.5
Georgia	41,000	602.9	68.1	285.4	603.0	7,510.6	1,014	5.5	1,463.4	10,240.9
Mississippi	20,000	294.1	33.2	139.2	294.1	3,663.7	185	1.0	267.0	1,868.4
Colorado	35,000	514.7	58.1	243.6	514.7	6,411.5	578	3.2	834.1	5,837.5
Oklahoma	26,000	382.3	43.2	181.0	382.4	4,762.8	388	2.1	559.9	3,918.6
Oregon	37,000	544.1	61.4	257.5	544.2	6,777.9	344	1.9	496.4	3,474.2
New York	103,000	1,514.7	171.0	716.9	1,514.8	18,868.2	3,224	17.6	4,652.7	32,560.8
Missouri	34,000	500.0	56.4	236.7	500.0	6,228.3	952	5.2	1,373.9	9,614.7
Arizona	50,000	735.3	83.0	348.0	735.3	9,159.3	928	5.1	1,339.2	9,372.4
New Mexico	12,000	176.5	19.9	83.5	176.5	2,198.2	332	1.8	479.1	3,353.0
Washington	68,000	1,000.0	112.9	473.3	1,000.1	12,456.6	742	4.1	1,070.8	7,493.8
Wisconsin	36,000	529.4	59.8	250.6	529.4	6,594.7	926	5.1	1,336.4	9,352.2
Illinois	73,000	1,073.5	121.2	508.1	1,073.6	13,372.6	2,202	12.0	3,177.8	22,239.1
Florida	140,000	2,058.8	232.4	974.5	2,059.0	25,646.0	3,245	17.7	4,683.0	32,772.9
Virginia	63,000	926.4	104.6	438.5	926.5	11,540.7	1,241	6.8	1,791.0	12,533.5
South Carolina	37,000	544.1	61.4	257.5	544.2	6,777.9	749	4.1	1,080.9	7,564.5
Alaska	6,000	88.2	10.0	41.8	88.2	1,099.1	102	0.6	147.2	1,030.2
Tennessee	44,000	647.0	73.0	306.3	647.1	8,060.2	1,269	6.9	1,831.4	12,816.3
North Carolina	76,000	1,117.6	126.2	529.0	1,117.7	13,922.1	1,953	10.7	2,818.5	19,724.4
Utah	30,000	441.2	49.8	208.8	441.2	5,495.6	456	2.5	658.1	4,605.4
Vermont	5,000	73.5	8.3	34.8	73.5	915.9	114	0.6	164.5	1,151.3
Indiana	56,000	823.5	93.0	389.8	823.6	10,258.4	1,176	6.4	1,697.1	11,877.0
Nevada	34,000	500.0	56.4	236.7	500.0	6,228.3	412	2.3	594.6	4,161.0
Michigan	81,000	1,191.1	134.5	563.8	1,191.3	14,838.1	2,033	11.1	2,933.9	20,532.3
Rhode Island	6,000	88.2	10.0	41.8	88.2	1,099.1	277	1.5	399.8	2,797.6
District of Columbia	2,000	29.4	3.3	13.9	29.4	366.4	244	1.3	352.1	2,464.3
Connecticut	28,000	411.8	46.5	194.9	411.8	5,129.2	955	5.2	1,378.2	9,645.0
Maryland	30,000	441.2	49.8	208.8	441.2	5,495.6	1,985	10.8	2,864.7	20,047.5
Maine	12,000	176.5	19.9	83.5	176.5	2,198.2	360	2.0	519.5	3,635.8
Massachusetts	67,000	985.3	111.2	466.4	985.4	12,273.5	1,913	10.4	2,760.7	19,320.4
Kentucky	50,000	735.3	83.0	348.0	735.3	9,159.3	1,160	6.3	1,674.1	11,715.4
New Hampshire	14,000	205.9	23.2	97.4	205.9	2,564.6	424	2.3	611.9	4,282.2
Ohio	104,000	1,529.4	172.6	723.9	1,529.5	19,051.3	4,293	23.4	6,195.4	43,357.2
West Virginia	16,000	235.3	26.6	111.4	235.3	2,931.0	833	4.6	1,202.1	8,412.9

Source: Florence C, Luo F, Rice K. The economic burden of opioid use disorder and fatal opioid overdose in the United States, 2017. Drug Alcohol Depend 2021;218:108350. https://linkinghub.elsevier.com/retrieve/pii/S0376871620305159

* Estimated case counts of opioid use disorder in 2017 were extracted from the National Survey on Drug Use and Health's 2-Year Restricted-Use Data Analysis System (2016–2017); cases of opioid use disorder were identified by using questions on opioid abuse or dependence during the past year; case counts of fatal opioid overdose and population estimates in 2017 were extracted from CDC's WONDER database; cases of fatal opioid overdose were identified by using *International Classification of Diseases, Tenth Revision* codes for the underlying cause-of-death (X40–X44, X60–X64, X85, and Y10–Y14) and then for multiple causes-of-death (T40.0–T40.4 and T40.6).

† Jurisdictions are listed in ascending order of per capita combined cost of opioid use disorder and fatal opioid overdose.

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7. Luo F, Florence C. State-level lifetime medical and work-loss costs of fatal injuries—United States, 2014. MMWR Morb Mortal Wkly Rep 2017;66:1–11. PMID:28081055 https://doi.org/10.15585/mmwr.mm6601a1
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9. National Academies of Sciences, Engineering, and Medicine. Medications for opioid use disorder save lives. Washington, DC: The National Academies Press; 2019.
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EXHIBIT 201

Methodology

The Form DS–4131 is available by download from the Department's website. The information will be submitted by U.S. organizers of tourist and other non-governmental expeditions to Antarctica by means of this form. The form should be submitted via email, although signed originals submitted by regular mail are also valid.

Elizabeth Kim,

Director, Office of Ocean and Polar Affairs, Bureau of Oceans and International Environmental and Scientific Affairs, Department of State.

[FR Doc. 2024–21163 Filed 9–17–24; 8:45 am]

BILLING CODE 4710–09–P

TENNESSEE VALLEY AUTHORITY

Meeting of the Regional Energy Resource Council

AGENCY: Tennessee Valley Authority (TVA).

ACTION: Notice of meeting.

SUMMARY: The TVA Regional Energy Resource Council (RERC) will hold a meeting on October 3, 2024, to receive an update and discuss the September publication and results of TVA's Draft 2025 Integrated Resource Plan (IRP) and associated Draft Environmental Impact Statement (EIS). The IRP provides strategic direction on how TVA will continue to provide low-cost, reliable, resilient, and increasingly cleaner electricity to the 10 million residents of the Valley region. The RERC will also receive an update on TVA's Innovation Research efforts.

DATES: The meeting will be held in Chattanooga, Tennessee, at The Westin Chattanooga on Thursday, October 3, 2024, from 9:00 a.m. to 3:30 p.m. ET. RERC members are invited to attend the meeting in person. The public is invited to view the meeting virtually or attend in person. A one-hour public listening session for the public to present comments virtually or in person will be held October 3, 2024, at 1:00 p.m. ET. A link and instructions to view the meeting will be posted on TVA's RERC website at *www.tva.com/rerc* prior to the meeting.

ADDRESSES: The meeting will take place at The Westin Chattanooga at 801 Pine St., Chattanooga, TN 37402. The meeting will also be available virtually to the public. Instructions to view the meeting will be posted at *www.tva.com/rerc* prior to the meeting. Persons who wish to speak virtually during the public listening session must pre-register by 5:00 p.m. ET Monday, September 30, 2024, by emailing *bhaliti@tva.gov*. Persons wishing to speak in person are requested to register either at the door between 9:00 a.m. and 10:30 a.m. ET on Thursday, October 3, 2024, or in advance by emailing *bhaliti@tva.gov*. Anyone needing special accommodations should let the contact below know at least one week in advance.

FOR FURTHER INFORMATION CONTACT: Bekim Haliti, *bhaliti@tva.gov* or 931–349–1894.

SUPPLEMENTARY INFORMATION: The RERC was established to advise TVA on its energy resource activities and the priorities among competing objectives and values. Notice of this meeting is given under the Federal Advisory Committee Act (FACA), 5 U.S.C. 10.

The meeting agenda includes the following:

October 3

1. Welcome and Introductions
2. RERC and TVA Meeting Update
3. Integrated Resource Plan Updates
4. Public Listening Session
5. Innovation Research Update

The RERC will hear views of citizens by providing a one-hour public comment session starting October 3 at 1:00 p.m. ET. Persons wishing to speak virtually must register by sending an email to *bhaliti@tva.gov* or by calling 931–349–1894 by 5:00 p.m. ET, on Monday, September 30, 2024. Persons wishing to speak in person are requested to register either at the door between 9:00 a.m. and 10:30 a.m. ET on Thursday, October 3, 2024, or in advance by emailing *bhaliti@tva.gov*. Persons registered will be called on during the public listening session to share their views for up to five minutes, depending on number of registrants. Written comments are also invited and may be emailed to *bhaliti@tva.gov*.

The DFO of the Tennessee Valley Authority and Vice President of Valley Engagement and Support, Melanie Farrell, having reviewed and approved this document, is delegating the authority to sign this document to Bekim Haliti, Specialist of Valley Alliances for publication in the **Federal Register**.

Dated: September 13, 2024.

Bekim Haliti,

Specialist, Valley Alliances, Tennessee Valley Authority.

[FR Doc. 2024–21234 Filed 9–17–24; 8:45 am]

BILLING CODE 8120–08–P

OFFICE OF THE UNITED STATES TRADE REPRESENTATIVE

Notice of Modification: China's Acts, Policies and Practices Related to Technology Transfer, Intellectual Property and Innovation

AGENCY: Office of the United States Trade Representative (USTR).

ACTION: Notice of modification of actions.

SUMMARY: In connection with the Four-Year Review of actions taken in the section 301 investigation of China's acts, policies, and practices related to technology transfer, intellectual property, and innovation, and in accordance with the specific direction of the President, the U.S. Trade Representative has determined to: modify the actions being taken in the investigation by imposing additional section 301 duties or increasing the rate of existing section 301 duties, on certain products of China in strategic sectors; propose increasing tariff rates for certain tungsten products, wafers, and polysilicon, with a public comment process to be set out via separate notice; provide a list of subheadings eligible for consideration of temporary exclusion under an exclusion process for certain machinery used in domestic manufacturing; and modify the actions to temporarily exclude from section 301 duties certain solar manufacturing equipment.

DATES: Tariff increases in 2024 are applicable with respect to products that are entered for consumption, or withdrawn from warehouse for consumption, on or after September 27, 2024. Tariff increases in 2025 and 2026 are applicable with respect to products that are entered for consumption, or withdrawn from warehouse for consumption, on or after January 1 of the corresponding year. Exclusions for solar equipment included in Annex B are retroactive and applicable with respect to products that are entered for consumption, or withdrawn from warehouse for consumption, on or after January 1, 2024, and through May 31, 2025.

FOR FURTHER INFORMATION CONTACT: For general questions about this notice, contact Philip Butler and Megan Grimball, Chairs of the Section 301 Committee at 202.395.5725. For specific questions on customs classification or implementation of the product exclusions, contact *traderemedy@cbp.dhs.gov*.

SUPPLEMENTARY INFORMATION:

A. Background

On August 24, 2017, the U.S. Trade Representative initiated an investigation into certain acts, policies, and practices of the Government of China related to technology transfer, intellectual property, and innovation under section 301 of the Trade Act of 1974, as amended (Trade Act) (19 U.S.C. 2411). *See* 82 FR 40213. In a notice published on April 6, 2018, the U.S. Trade Representative determined that acts, policies, and practices of the Government of China related to technology transfer, intellectual property, and innovation were unreasonable or discriminatory, and burdened or restricted U.S. commerce, and thus were actionable under section 301(b) of the Trade Act (19 U.S.C. 2411(b)). *See* 83 FR 14906.

Following a notice and comment process on the proposed action to be taken in the investigation, the U.S. Trade Representative took two actions under section 301 of the Trade Act: the July 6, 2018, action, covering an approximate annual trade value of $34 billion (List 1), and the August 23, 2018, action, covering an approximate annual trade value of $16 billion (List 2). *See* 83 FR 28710 (July 6, 2018, action) and 83 FR 40823 (August 23, 2018, action). These actions subsequently were modified by imposing additional duties on supplemental lists of products, known as Lists 3 and 4, as well as by the temporary removal of duties on certain products through product exclusions.

On May 5, 2022, USTR announced that under section 307(c)(2) of the Trade Act (19 U.S.C. 2417(c)(2)), the July 6, 2018, and August 23, 2018, actions, as modified, were subject to possible termination on their respective four-year anniversary dates (*i.e.,* July 6, 2022, and August 23, 2022) and of the opportunity for representatives of domestic industries that benefit from the trade actions to request continuation of the actions during the last 60 days of such four-year periods. *See* 87 FR 26797.

On September 8, 2022, USTR announced that the July 6, 2018 and the August 23, 2018 actions, as modified, would remain in effect because at least one representative of a domestic industry that benefits from each action submitted to the U.S. Trade Representative a request for continuation of the actions. *See* 87 FR 55073. The notice also announced that in accordance with section 307(c)(3) of the Trade Act (19 U.S.C. 2417(c)(3)), the U.S. Trade Representative would conduct a review of the July 6, 2018 and the August 23, 2018 actions, as modified. *See* 87 FR 55073.

To aid in this review, on November 15, 2022, USTR opened a docket for interested persons to submit comments with respect to a number of considerations concerning the review. *See* 87 FR 62914. USTR received approximately 1,500 comments.

Based on information obtained during the review, including the public comments, USTR, in consultation with the Section 301 Committee, prepared a comprehensive report that included findings on the effectiveness of the July 6, 2018 and the August 23, 2018 actions, as modified, in achieving the objectives of the investigation, other actions that could be taken, and the effects of such actions on the United States economy, including consumers. The report, *Four-Year Review of Actions Taken in the Section 301 Investigation: China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation* (Report), was published on May 14, 2024, and is available on the USTR website.

As detailed in the Report, the U.S. Trade Representative found that:

- The section 301 actions have been effective in encouraging China to take steps toward eliminating some of its technology transfer-related acts, policies, and practices, and have reduced some of the exposure of U.S. persons and businesses to these technology transfer-related acts, policies, and practices.
- China has not eliminated many of its technology transfer-related acts, policies, and practices, which continue to impose a burden or restriction on U.S. commerce. Instead of pursuing fundamental reform, China has persisted, and even become more aggressive, particularly through cyber intrusions and cybertheft, in its attempts to acquire and absorb foreign technology, which further burden or restrict U.S. commerce.
- Economic analyses generally find that the duties have had small negative effects on U.S. aggregate economic welfare, positive impacts on U.S. production in the ten sectors most directly affected by the duties, and minimal impacts on economy-wide prices and employment.
- Economic analyses, including the principal U.S. Government analysis published by the U.S. International Trade Commission, generally find that the section 301 tariffs have contributed to reducing U.S. imports of goods from China and increasing imports from alternate sources, including U.S. allies and partners, thereby potentially supporting U.S. supply chain diversification and resilience.

Based on the Report findings, the U.S. Trade Representative recommended to the President to maintain the section 301 tariffs on the covered products. To further encourage China to eliminate the investigated acts, policies, and practices, the U.S. Trade Representative also recommended enhancing the effectiveness of the tariff actions by adding or increasing section 301 tariffs on certain products in strategic sectors, including sectors targeted by China for dominance, or sectors where the United States recently made significant domestic investments. The U.S. Trade Representative found that ''increasing or adding section 301 tariffs on products targeted by China for dominance will help encourage the elimination of investigated technology transfer-related acts, policies, and practices by encouraging alternative sourcing in strategic sectors of the economy, reducing U.S. reliance on China, while also reducing exposure to China's technology transfer-related acts, policies, and practices, and helping to maintain resilient, diverse, and secure supply chains.''

On May 14, 2024, taking into consideration the U.S. Trade Representative's findings in the Report and recommendations, the President issued a Memorandum (President's Memorandum) that directed the U.S. Trade Representative to: ''maintain, as appropriate and consistent with this memorandum, the *ad valorem* rates of duty and lists of products subject to the [actions] taken under the section 301 investigation'' and ''[t]o further encourage China to eliminate the acts, policies, and practices at issue, and to counteract the burden or restriction of these acts, policies, and practices, the Trade Representative shall modify the [actions taken in the investigation] to increase section 301 *ad valorem* rates of duty'' for certain specified products of China. *See https://www.whitehouse.gov/briefing-room/presidential-actions/2024/05/14/memorandum-on-actions-by-the-united-states-related-to-the-statutory-4-year-review-of-the-section-301-investigation-of-chinas-acts-policies-and-practices-related-to-technology-transfer-intellectua/.* In particular, the President's Memorandum specified categories of products for proposed tariff increases, tariff rates for those products, and year for tariff increases. With respect to tariff increases, the President directed increases on the following products:

- Battery parts (non-lithium-ion batteries)—Increase rate to 25% in 2024
- Electric vehicles—Increase rate to 100% in 2024
- Facemasks—Increase rate to *no less* than 25% in 2024
- Lithium-ion electrical vehicle batteries—Increase rate to 25% in 2024
- Lithium-ion non-electrical vehicle batteries—Increase rate to 25% in 2026
- Medical gloves—Increase rate to *no less* than 25% in 2026
- Natural graphite—Increase rate to 25% in 2026
- Other critical minerals—Increase rate to 25% in 2024
- Permanent magnets—Increase rate to 25% in 2026
- Semiconductors—Increase rate to 50% in 2025
- Ship-to-shore cranes—Increase rate to 25% in 2024
- Solar cells (whether or not assembled into modules)—Increase rate to 50% in 2024
- Steel and aluminum products—Increase rate to 25% in 2024
- Syringes and needles—Increase rate to *no less* than 50% in 2024

The President also directed the U.S. Trade Representative to establish a process by which interested persons may request that particular machinery used in domestic manufacturing classified within a subheading under Chapters 84 and 85 of the Harmonized Tariff Schedule of the United States (HTSUS) be temporarily excluded from section 301 tariffs, and directed the U.S. Trade Representative to prioritize, in particular, exclusions for certain solar manufacturing equipment.

Additionally, the White House released a statement further explaining how China's acts, policies, and practices have contributed to China's significant control of global production for the critical inputs necessary for U.S. technologies, infrastructure, energy, and healthcare and China's growing overcapacity and export surges, and how such control threatens U.S. supply chains and economic security. *See https://www.whitehouse.gov/briefing-room/statements-releases/2024/05/14/fact-sheet-president-biden-takes-action-to-protect-american-workers-and-businesses-from-chinas-unfair-trade-practices/.*

B. Proposed Modification to the Actions

Consistent with the President's direction, USTR issued a **Federal Register** notice with proposed modifications. *See* 89 FR 46252 (May 28, 2024) (May 28 notice). In the May 28 notice, the U.S. Trade Representative proposed increasing section 301 duties on 382 HTSUS subheadings and 5 statistical reporting numbers of the HTSUS, with an approximate annual trade value of $18 billion (2023). Additionally, the U.S. Trade Representative proposed subheadings eligible for consideration for temporary exclusion under a process by which interested persons may request that particular machinery used in domestic manufacturing and classified within certain subheadings under Chapters 84 and 85 of HTSUS be temporarily excluded. Finally, the U.S. Trade Representative proposed 19 temporary exclusions for solar manufacturing equipment. In accordance with section 307(a)(2) of the Trade Act (19 U.S.C. 2417(a)(2)), USTR invited comments from interested persons with respect to the proposed modifications, the scope of the machinery exclusion process, and the temporary exclusions for solar manufacturing equipment. USTR opened a 30-day docket on May 29, 2024.

With respect to the proposed tariff increases, USTR requested commenters to address the effectiveness of the proposed modification, the effects of the proposed modification on the U.S. economy, including consumers, and whether the tariff subheadings or statistical reporting numbers identified for each product or sector adequately cover the products and sectors included in the President's direction to the U.S. Trade Representative. In addition, for facemasks, needles and syringes, and medical gloves, consistent with the President's direction to increase tariffs *no less* than specified rates, USTR requested comment on whether the rates of additional duty should be higher than the proposed rates, and with respect to facemasks, whether additional statistical reporting numbers under HTSUS subheading 6307.90.98 should be included.

With respect to the machinery exclusion process, USTR requested comments on whether the subheadings proposed should or should not be eligible for consideration in the machinery exclusion process and whether certain subheadings under Chapters 84 and 85 that cover machinery used in domestic manufacturing were omitted and should be included. Finally, with respect to the 19 proposed solar manufacturing machinery exclusions, USTR requested comments on the scope of each exclusion, including suggested amendments to the product description.

In response to the May 28 notice, USTR received more than 1,100 comments. Of the comments received, approximately 420 comments expressed views about the proposed tariff increases on certain products, approximately 656 comments expressed views about the proposed subheadings eligible for consideration of temporary exclusions under an exclusion process for machinery used in domestic manufacturing, and approximately 80 comments expressed views about the proposed 19 temporary exclusions for solar manufacturing equipment. The public submissions are available at *https://comments.ustr.gov,* docket number USTR–2024–0007.

C. Determination To Modify the Actions

Pursuant to sections 307(c) and 307(a)(1) of the Trade Act (19 U.S.C. 2417(c), (a)(1)), the U.S. Trade Representative may modify or terminate any action, subject to the specific direction, if any, of the President with respect to such action, that is being taken under section 301 if the burden or restriction on U.S. commerce of the acts, policies, and practices that are the subject of such action has increased or decreased, or such action is being taken under section 301(b) and no longer is appropriate.

As detailed in USTR's Report, modification of the action is warranted under section 307(a)(1)(B) as many of the technology transfer-related acts, policies, and practices described in the original section 301 Report persist and increasingly burden or restrict U.S. commerce. Rather than eliminate the technology transfer-related acts, policies, and practices that are the subject of the section 301 investigation, the Report reviews how China has become more aggressive, particularly through cybertheft and cyber intrusions, in its attempts to acquire and absorb foreign technology and IP on a nonconsensual basis from U.S. companies, costing U.S. companies and consumers billions of dollars, and adding to the burden or restriction on U.S. commerce.

Modification of the actions also is appropriate under section 307(a)(1)(C). The term "appropriate'" as used in subsection C refers to section 301(b), which requires the U.S, Trade Representative to "take all appropriate and feasible action authorized under [section 301(c)] to obtain the elimination of [the] act, policy, or practice." The specific action that will obtain the elimination of an act, policy, or practice is a matter of predictive judgment, to be exercised by the U.S. Trade Representative, subject to any specific direction of the President. China's actions over the review period, as discussed in USTR's Report has shown that maintaining the current action is no longer appropriate in order to induce China to eliminate its acts, policies, or practices.

Modification of the actions is further warranted considering the findings in USTR's Report on the effectiveness of the prior actions in achieving the objectives of the investigation other actions that could be taken, and the effects of such actions on the U.S. economy, including consumers.

The President has exercised his authority under section 307 to direct the U.S. Trade Representative to modify the actions being taken in the investigation. Specifically, as discussed above, the President directed the U.S. Trade Representative to increase the rates of duty for specified goods, with specified rates and timing. Additionally, the President directed the U.S. Trade Representative to establish an exclusion process for machinery used in domestic manufacturing classified within a subheading under Chapters 84 and 85 of the HTSUS and to prioritize, in particular, exclusions for certain solar manufacturing equipment.

The modifications to the actions are set out in the Annexes to this notice. The U.S. Trade Representative's determination takes account of the public comments, the President's direction of May 14, 2024, the policy rationale underlying the President's direction, as well as the advice of the interagency section 301 committee and appropriate advisory committees.

Section 301(c)(3)(B) of the Trade Act (19 U.S.C. 2411(c)(3)(B)) authorizes the U.S. Trade Representative to take action against any goods or economic sector of the foreign country concerned regardless of whether or not such goods or economic sector are involved in the act, policy, or practice subject to investigation. The modifications include increasing section 301 duties on 382 HTSUS subheadings and 7 statistical reporting numbers of the HTSUS under 14 product groups. Additionally, the U.S. Trade Representative is modifying the actions to temporarily exclude from additional duties certain solar manufacturing equipment under 14 product specific exclusions.

As outlined below, in consideration of public comments and the advice of the section 301 committee, the U.S. Trade Representative has made certain adjustments to the modifications proposed in May 28 notice. The adjustments and the reasons for them are discussed below in USTR's response to significant comments.

Annex A contains an informal table of the tariff increases under the 14 product groups specified by the President and the 382 subheadings and 7 statistical reporting numbers, the tariff rates, and years for tariff increases. Annex B contains the 14 temporary exclusions for solar manufacturing equipment. Annex C contains the HTSUS modifications to impose additional duties, to increase rates of additional duties, and to exclude certain solar manufacturing equipment from additional duties. Annex D contains the Importer Certification for ship-to-shore cranes entering under the exclusion. Annex E contains a list of HTSUS subheadings eligible for consideration of temporary exclusion under the machinery exclusion process.

Any product listed in the Annexes to this notice, which is subject to the additional duties imposed by this determination, and that is admitted into a U.S. foreign trade zone, except any product that is eligible for admission under ''domestic status'' as defined in 19 CFR 146.43, only may be admitted as ''privileged foreign status,'' as defined in 19 CFR 146.41, effective as of the date that the additional duties are imposed. Products of China that are provided for in headings 9903.91.01, 9903.91.02, and 9903.91.03, and listed in subdivisions (b), (c) and (d), respectively, of U.S. note 31 to subchapter III of chapter 99 of the HTSUS, as well as products of China that are provided for in HTSUS subheading 9903.92.10, which are admitted into a U.S. foreign trade zone on or after 12:01 a.m. eastern daylight time on September 27, 2024, only may be admitted as ''privileged foreign status.'' Products of China that are provided for in headings 9903.91.04 and 9903.91.05, and listed in subdivisions (e) and (f) of U.S. note 31 to subchapter III of chapter 99 of the HTSUS that are admitted into a U.S. foreign trade zone on or after 12:01 a.m. eastern daylight time on January 1, 2025, only may be admitted as ''privileged foreign status.'' Products of China that are provided for in headings 9903.91.06, 9903.91.07, and 9903.91.08, and listed in subdivisions (g), (h) and (i), respectively, of U.S. note 31 to subchapter III of chapter 99 of the HTSUS that are admitted into a U.S. foreign trade zone on or after 12:01 a.m. eastern daylight time on January 1, 2026, only may be admitted as ''privileged foreign status.'' All such products will be subject upon entry for consumption to any ad valorem rates of duty or quantitative limitations related to the classification under the applicable HTSUS subheading.

D. USTR's Responses to Significant Comments

As discussed above, in light of findings in USTR's Report, the U.S. Trade Representative recommended to the President that duties be added or increased on certain products in strategic sectors. The U.S. Trade Representative limited recommendations to the President to categories of products targeted by China for dominance and/or sectors where the U.S. recently made significant domestic investments, thus incentivizing China to eliminate the investigated acts, policies, and practices, and mitigating possible harm to the U.S. economy. The President agreed with the U.S. Trade Representative's recommendation and has exercised his authority to direct specific modifications to the actions being taken in the investigation.

Response to Significant Comments on Proposed Tariff Increases

Battery Parts (Non-Lithium-ion Batteries): The President directed the U.S. Trade Representative to increase tariffs on battery parts for non-lithium-ion batteries to 25 percent in 2024. In response to the President's direction, the U.S. Trade Representative proposed increasing tariffs on one HTSUS subheading: 8507.90.40 (Parts of lead-acid storage batteries, including separators therefor).

The single comment on the proposed modification notes that broad tariffs have not significantly altered China's acts, policies, and practices and suggests that new U.S. initiatives, such as the Inflation Reduction Act would be more effective. Additionally, the comment notes that the proposed modifications will slow U.S. efforts to boost domestic production and adoption of electric vehicles.

For the final determination, the U.S. Trade Representative has determined not to amend the proposed modification. As noted in USTR's Report, the proposed modifications complement the significant investments as a result of the Inflation Reduction Act and the Bipartisan Infrastructure Law into clean energy technology, clean energy supply chains, and clean energy manufacturing. Increasing section 301 duties on tariff lines covering certain sectors will help support these investments, encourage diversification away from Chinese sources, and provide additional leverage with China to eliminate the investigated acts, policies, and practices.

Electric Vehicles: The President directed the U.S. Trade Representative to increase additional duties on electric vehicles to 100 percent in 2024. In response to the President's direction, the U.S. Trade Representative proposed increasing duties on eight HTSUS subheadings.

Some comments request that USTR narrow the scope of products covered by the eight subheadings by distinguishing between low-speed vehicles, such as passenger shuttles and mobility scooters, and higher speed passenger vehicles that operate on public roads and highways. While the comments urge the U.S. Trade Representative to distinguish between vehicles based on maximum speed or road readiness, the U.S. Trade Representative's proposal, consistent with Presidential direction, was intended to cover a wide range of electric motor vehicles that incorporate high-tech motors and batteries. The products included under the proposed subheadings meet the objective to target sophisticated technologies where China seeks dominance and where the individual products are part of the same continuum of products.

One comment requests that electric buses that fulfill contracts executed prior to the proposed modification be excluded from the additional duties. Unlike with ship-to-shore cranes (discussed below), where multiple comments allege broad economic consequences, the single comment, when considering China's industrial policies targeting electric vehicles could threaten federal investment in the sector, does not demonstrate broad economic consequences such that an exclusion is warranted.

Comments also request that USTR broaden the scope of products covered. One comment remarks that the proposed modifications do not adequately cover the full scope of products included in the President's direction because the proposal does not include motorcycles (including mopeds) and electric bicycles under HTSUS subheading 8711.60.00. Another comment asserts that the proposed modification should be expanded to include HTSUS subheading 8703.10.50 (golf carts and similar vehicles).

With respect to motorcycles and electric bicycles, in reviewing the President's direction, the U.S. Trade Representative has determined that electric bicycles and motorcycles are distinct from what is traditionally understood as ''electric vehicles'' and fall outside the specific direction of the President. Similarly, electric golf carts and similar vehicles may be understood to fall outside the specific direction of the President. While these subheadings may include products with some overlapping technology to the subheadings covered, limiting the modification to the primary subheading covering traditional electric vehicles is most consistent with the President's direction.

As a result of China's efforts to dominate the electric vehicles market, China now produces 70 percent of the world's electric cars—jeopardizing productive investments elsewhere. The U.S. Trade Representative has determined that modification to increase the duties on electric vehicles will encourage diversification from Chinese sources, while also advancing U.S. policy to incentivize the development of, and investments in, a robust electric vehicle market, reducing exposure to China's technology transfer-related acts, policies, and practices, and providing additional leverage with China to eliminate the investigated acts, policies, and practices.

Facemasks: The President directed the U.S. Trade Representative to increase tariffs on facemasks to *no less* than 25 percent in 2024. In response, the U.S. Trade Representative proposed three statistical reporting numbers. These included 6307.90.9845 (N95 Respirators of textiles); 6307.90.9850 (respirators of textiles, other than N95); and 6307.90.9875 (face masks of textiles, other than disposable). USTR requested commenters to address whether additional statistical reporting codes under HTSUS subheading 6307.90.98 should be included and whether the tariff rates should be higher than the proposed 25 percent rate.

Several commenters note that as of January 1, 2023, statistical reporting number 6307.90.9845 (N95 Respirators of Textiles) was replaced with two statistical reporting numbers. For the final modifications, USTR has replaced statistical reporting number 6307.90.9845 (N95 Respirators of Textiles) with statistical reporting numbers 6307.90.9842 (surgical N95 respirators) and 6307.90.9844 (other N95 respirators). This adjustment does not change the scope of the products covered.

Other comments express concerns about the availability of facemasks outside of China and possible disruption to the supply of facemasks and higher costs for healthcare providers. As USTR found in the Report, increasing section 301 duties on certain personal protective equipment will help protect recent investments in increasing domestic production and in U.S. preparedness. As a result of those investments, the United States has, or is expected to have, sufficient domestic capacity. Several commenters agreed with this finding. Additionally, increasing tariffs on facemasks will encourage diversification away from China, improve supply chain resiliency, and create greater leverage with China to eliminate the investigated acts, policies, and practices.

A number of comments suggest adding statistical reporting number 6307.90.9870 (face masks of textile, disposable). Additional comments suggest adding textile subheadings that cover personal protective equipment, but not facemasks. Regarding the proposed tariff rate, several comments suggest rates higher than the proposed tariff rate, including 50 percent, 100 percent, and ''the highest rate possible.'' A few comments suggest that any rate increase be gradual due to possible limitations on availability outside of China.

Considering the public comments, the advice of the Section 301 Committee, and consistent with the President's direction, the U.S. Trade Representative has determined to add statistical reporting number 6307.90.9870 (face masks of textile, disposable), but not to add additional textile subheadings that do not cover facemasks. Additionally, for most statistical reporting numbers, the U.S. Trade Representative has determined to increase tariff rates to 25 percent in 2024 and to further increase rates in 2026 to 50 percent. Delaying the increase to 50 percent in 2026 is consistent with the President's direction, but balances requests for a rate higher than 25 percent with the public comments requesting that rates increase gradually. For statistical reporting number 6307.90.9870 (face masks of textile, disposable), the U.S. Trade Representative has determined to increase the tariff rate to 25 percent in 2025 and to further increase the rate in 2026 to 50 percent.

Lithium-ion Batteries: The President directed the U.S. Trade Representative to increase tariffs on lithium-ion batteries to 25 percent, with ''lithium-ion electrical vehicle batteries'' increasing in 2024 and ''lithium-ion non-electrical vehicle batteries'' increasing in 2026. In response, the U.S. Trade Representative proposed increasing tariffs on two statistical reporting numbers. One covers lithium-ion batteries for passenger vehicles (8507.60.0010), and a second covers lithium-ion batteries for a broad range of applications, including electric vehicles, other than passenger vehicles (8507.60.0020). The U.S. Trade Representative proposed increasing tariffs on 8507.60.0010 (Lithium-ion batteries of a kind used as the primary source of electrical power for electrically powered vehicles of subheadings 8703.40, 8703.50, 8703.60, 8703.70 or 8703.80) in 2024 and on 8507.60.0020 (Lithium-ion batteries: Other) in 2026.

Several commenters request that additional codes be added, including for a subheading covering certain inputs or precursor materials used to manufacture lithium-ion batteries. Additionally, USTR received comments requesting that certain lithium-ion batteries covered by the proposed subheadings, but intended for a particular use, be excluded.

The U.S. Trade Representative has determined that the requests to remove particular batteries are inconsistent with the President's direction, which broadly covers all lithium-ion batteries, and are inconsistent with the goals of diversifying supply chains and of reducing our reliance on China in an industry targeted by China for dominance. With respect to the inputs and precursor materials used in the production of lithium-ion batteries, these products are beyond the scope of the President's direction, which is limited to complete batteries.

Medical Gloves: The President directed the U.S. Trade Representative to increase tariffs on medical gloves to *no less* than 25 percent in 2026. In response, the U.S. Trade Representative proposed increasing tariffs to 25 percent in 2026 on one statistical reporting number.

Comments opposing the proposed modification allege that increasing duties on medical gloves will raise medical care costs and impact patient care. Additional comments request that the increase in tariffs be delayed. Comments generally assert that the production of medical gloves is centralized in China and Malaysia, and that additional duties would push production to Malaysia, rather than to the United States. They also assert there is no large-scale domestic production capacity for nitrile gloves, specifically citing a January 2024 Made in America Act Waiver statement by Federal agencies concerning domestic availability of nitrile gloves.

In general, comments supporting the proposed modification suggest that, given the artificially low prices of imports from China, the modification would be more effective if tariffs rates were increased to 100 percent or higher, increased prior to 2026, and possibly increased gradually. One comment also suggested including gloves falling under HTSUS 4015.19 that are not for medical or surgical use.

Considering the public comments, the specific direction of the President to increase tariffs on medical gloves *no less* than 25 percent in 2026, and the advice of the Section 301 Committee, particularly agencies involved in U.S. medical preparedness, the U.S. Trade Representative has determined to increase the rate of additional duties on medical gloves to 50 percent in 2025 and to 100 percent in 2026.

The United States expects domestic production of nitrile gloves will increase over the next year, due in part to domestic investments for critical medical supplies, including medical gloves. Recent investments include CARES Act funding that aims to continue support of U.S. preparedness and of domestic production of critical medical supplies following the COVID pandemic. Increasing tariffs to 50 percent in 2025 will help protect those investments and will encourage diversification to sources other than China. While China currently accounts for a significant share of U.S. imports of nitrile gloves, the increasing availability from U.S. sources and third-country sources will provide the U.S. healthcare systems with alternative sourcing. An additional increase in tariff rates in 2026 is warranted, considering the expected increase in U.S. and third-country sources, and is responsive to those comments requesting a higher tariff, and will provide additional leverage with China to eliminate the investigated acts, policies, and practices.

With respect to additional gloves that are not for medical or surgical use, these products are beyond the scope of the President's direction, which is limited to medical gloves. Accordingly, the U.S. Trade Representative has determined not to amend the proposed modification to include these products.

Natural Graphite: The President directed the U.S. Trade Representative to increase tariffs on natural graphite to 25 percent in 2026. In response to the President's direction, the U.S. Trade Representative proposed to increase tariffs on three subheadings covering three different forms of natural graphite.

Most comments supported the proposed increase in tariffs, with some comments requesting a higher tariff rate than the proposed rate. Several of these comments also requested that certain additional inputs for lithium-ion batteries be included and treated similarly to natural graphite. The few comments opposing the additional duties generally assert that the proposed modifications would result in higher prices, would not be effective in obtaining the elimination of China's acts, policies, and practices, and could result in possible retaliation from China. China has targeted the processing of critical minerals to become the global leader in the critical minerals supply chains. Continued reliance on China for refining capacity of critical minerals, including natural graphite, leaves U.S. supply chains vulnerable and puts U.S. national security and clean energy goals at risk. Increasing the tariffs on natural graphite would encourage diversification away from China and would provide additional leverage with China to eliminate the investigated acts, policies, and practices. Tariffs would also protect U.S. investments in a sufficient domestic industrial base for natural graphite and would improve the resiliency of the U.S. battery supply chain.

For these reasons, and considering the President's direction, and the advice of the Section 301 Committee, the U.S. Trade Representative has determined not to amend the proposed modifications.

Other Critical Minerals: The President directed the U.S. Trade Representative to increase tariffs on certain critical minerals to 25 percent in 2024. In response to the President's direction, the U.S. Trade Representative proposed increasing tariffs on 26 subheadings.

The majority of comments opposing increases specifically oppose increasing tariffs on 2606.00.00 (aluminum ores and concentrates) and 2849.90.30 (tungsten carbides). They assert limited availability of the minerals outside of China and higher costs. Other comments suggest the removal of five additional subheadings. Only three of these subheadings received more than one comment requesting removal: 8103.20.00 (Tantalum, unwrought (including bars and rods obtained simply by sintering); tantalum powders); 8112.21.00 (Chromium, unwrought; chromium powders); and 8112.92.30 (Indium, unwrought; indium powders).

The majority of comments supporting the proposed modifications specifically support increasing tariffs on the four subheadings covering tungsten products. These comments state that tariffs on various tungsten-related inputs will benefit domestic manufacturing by reducing domestic reliance on Chinese imports, establishing an independent domestic supply chain, and reducing Chinese access to the intellectual property and technologies of U.S. companies. Several comments emphasize the importance of tungsten-related inputs to various critical sectors, such as aerospace, automotive, defense, medical, and oil and gas sectors. Some of these comments request that the tariffs on tungsten-related products be increased to 50 percent.

The remaining comments supporting higher tariffs cover various critical minerals; most support the higher tariffs to counteract China's dominance in the market and note that current tariff levels are insufficient. Most of these comments also note that higher tariffs will have a minimal impact on the domestic economy due to current availability of products from sources outside of China or availability from new sources. Comments also note that higher tariffs are critical to the new investments that help to diversify supply chains.

In addition to supporting the proposed modifications, several comments also request that additional subheadings be added, including three subheadings covering additional tungsten products. Additional comments request the addition of certain uranium subheadings, as well as a subheading covering vanadium chlorides.

Considering the public comments and the advice of the Section 301 Committee, the U.S. Trade Representative has determined not to remove any subheadings. China has targeted the processing of critical minerals to become the global leader in the critical minerals supply chains for electric vehicle batteries, solar products, semiconductors, and other key products. The concentration of critical minerals mining and refining capacity in China leaves our supply chains vulnerable and puts our national security and clean energy goals at risk. Additionally, for many of the products with comments requesting removal, U.S. import data show that in recent years China has attempted to dominate supply chains by significantly increasing its share of imports. For these products, additional duties will help to maintain existing diversity in the supply chains and increase leverage with China to eliminate the investigated acts, policies, and practices. Regarding 2606.00.00 (aluminum ores and concentrates), U.S. import data show that China's share is relatively small (less than 20 percent). While China's share of imports under statistical reporting number 2606.00.00.30 (bauxite, calcined: refractory grade) is more significant, Guyana, a second source, is almost as large as China, and higher tariffs may help to encourage greater diversification. Regarding 2849.90.30 (tungsten carbides), imports from China have increased significantly in recent years, but alternative sources remain. Increasing tariffs will support current supply chain diversity. Additionally, public comments note recent investments in domestic refining.

The U.S. Trade Representative also has determined not to add certain proposed subheadings for uranium and vanadium chlorides. These subheadings are either already subject to section 301 tariffs of 25 percent, or China's share of imports is small and declining. Regarding the three tariff subheadings covering tungsten products and requested for addition, the U.S. Trade Representative has determined to propose increasing tariff rates for these three subheadings to 25 percent. To that end, USTR will publish a separate notice with procedures for interested parties to provide views on increasing tariffs on subheadings: 8101.94.00 (Tungsten, unwrought (including bars and rods obtained simply by sintering)); 8101.99.10 (Tungsten bars and rods (o/ than those obtained simply by sintering), profiles, plates, sheets, strip and foil); and 8101.99.80 (Tungsten, articles nesoi).

Permanent Magnets: The President directed the U.S. Trade Representative to impose tariffs of 25 percent on permanent magnets in 2026. In response to the President's direction, the U.S. Trade Representative proposed additional duties on products under one subheading (8505.11.00).

Several comments request that tariffs on permanent magnets not be increased, noting that permanent magnets are an intermediate good used in a variety of applications and products, including consumer goods. Citing a Department of Commerce report from 2023, comments assert limited availability of permanent magnets outside of China, including from domestic sources.

Comments in support of the proposed modification highlight the vulnerability of the U.S. economy and national security as a result of our continued reliance on China for permanent magnets, and in particular NdFeB, which are critical for electric vehicle motors (an area where China seeks dominance), as well as defense applications. The comments assert that the potential impact on U.S. consumers from the proposed modification would be minimal, as permanent magnets generally account for a low percentage of the total cost of final goods.

Considering the comments and the advice of the Section 301 Committee, and consistent with the President's direction, the U.S. Trade Representative has determined to impose additional tariffs on products falling under subheading 8505.11.00. The 2023 Department of Commerce report indicates that at the time of the report the demand for permanent magnets outpaced domestic manufacturing capacity, but the report also notes federal investments and other efforts in support of reestablishing domestic production capacity, as well as plans for three U.S.-headquartered firms to establish U.S. NdFeB magnet manufacturing facilities by 2026. Increasing tariffs on permanent magnets in 2026 accounts for the current limited availability of permanent magnets outside of China, complements the upcoming investments in domestic production, and further encourages domestic investments.

Semiconductors: The President directed the U.S. Trade Representative to increase tariffs on semiconductors to 50 percent in 2025. In response to the President's direction, the U.S. Trade Representative proposed increasing tariffs on 16 subheadings.

Several comments highlight the importance of semiconductors in a variety applications and critical sectors, including the healthcare and solar industries. Comments note that following the enactment of the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act in 2022, the United States has made progress in investing in domestic production and in recapturing semiconductor manufacturing from China's dominance. Comments also assert that imports from China undermine that progress and the incentives under the CHIPS Act. Comments assert that the tariffs have helped to stimulate domestic manufacturing, support supply chain resiliency, and reduce our dependence on China. One comment suggests broadening the modifications to capture semiconductors entering the United States in downstream products.

Comments opposing the increase in tariffs on semiconductors primarily comment on the financial impact of the tariffs on U.S. companies and the U.S. economy. These commenters assert that the increased duties will increase domestic manufacturing costs, will be passed on to consumers, will contribute to domestic inflation, and will reduce the competitiveness of U.S. products in the global market. Comments also state that increased manufacturing costs may encourage U.S. companies to move manufacturing out of the United States to third countries.

Aside from advocating for the removal of the tariffs, comments opposing the tariffs also propose several alternatives to increased duties. One commenter argues that an effective alternative to the tariffs would be bilateral policy discussions between the United States and China. Another commenter suggests additional programs that strengthen domestic manufacturing, such as under the CHIPS and Science Act and the Inflation Reduction Act, would be more effective than imposing higher tariffs. Alternatively, the same commenter suggests a longer transition time to allow for additional manufacturing, noting that CHIPS funding has yet to be fully disbursed and it may take several years before domestic semiconductors will be available. Some comments request the removal of certain subheadings. They generally assert that the tariffs would increase prices and harm domestic manufacturing. One comment asserts that the tariffs are counterproductive to the Administration's goals to increase domestic production of electric vehicles.

Considering the public comments, the advice of the Section 301 Committee, and consistent with the direction of the President, the U.S. Trade Representative has determined that excluding particular products or subheadings is not warranted. China has targeted the semiconductor sector for dominance and is rapidly expanding its capacity, particularly for foundational semiconductors. Through the CHIPS and Science Act, the United States is making a nearly $53 billion investment in American semiconductor manufacturing capacity, research, innovation, and workforce. This investment will encourage diversification to alternative sources, providing additional leverage with China to eliminate the investigated acts, policies, and practices, and will help counteract decades of disinvestment and offshoring that has reduced the United States' capacity to manufacture semiconductors domestically. Raising the tariff rate on semiconductors is an important initial step to complement the sustainability of these investments. Accordingly, the U.S. Trade Representative has determined to increase tariffs on the 16 proposed subheadings.

Ship-to-shore cranes: The President directed the U.S. Trade Representative to increase tariffs on ship-to-shore cranes to 25 percent in 2024. In response to the President's direction, the U.S. Trade Representative proposed increasing tariffs on certain ship-to-shore cranes (transporter cranes, gantry cranes, and bridge cranes) under subheading 8426.19.00.

In addressing the effectiveness and impact of the proposed tariff increase, a number of commenters assert that because the lead time for purchasing ship-to-shore cranes is often more than two years, the additional duties would increase costs significantly on purchases contracted for well before the proposed modification. Additionally, due to purchase contracts, the increased tariffs would not be effective in obtaining the elimination of, or in counteracting China's acts, policies, and practices and would broadly impact U.S. ports and the U.S. economy. The majority of comments suggest delaying the additional duties until 2026 to allow cranes under contracts executed prior to the announced proposed modifications to enter without the section 301 duties.

Considering the possible broad economic impact discussed in the comments, and consistent with the President's direction, the U.S. Trade Representative has determined to increase duties on ship-to-shore cranes in 2024, but will allow for exclusions for cranes that fulfill contracts executed prior to May 14, 2024, and that enter the United States prior to May 14, 2026. The exclusion balances the possible impact on the U.S. economy with the security interests of the United States from the threat of Chinese state-sponsored cyber intrusions of critical infrastructure.

Ship-to-shore gantry cranes, configured as a high- or low-profile steel superstructure and designed to unload intermodal containers from vessels with coupling devices for containers, including spreaders or twist-locks (provided for in subheadings 8426.19.00), will be exempt, provided: (1) they are fulfilling in whole or in part an executed contract for sale dated prior to May 14, 2024, for goods that are entered for consumption, or withdrawn from warehouse for consumption, in the United States prior to May 14, 2026, and (2) the importer completes the certification in Annex D to this notice and provides the completed certification as part of the importer's electronic entry summary to U.S. Customs and Border Protection by uploading it to the Document Imaging System in the Automated Commercial Environment at the time that classification is declared under heading 9903.91.09 of the HTSUS.

Solar Cells (whether or not assembled into modules): The President directed the U.S. Trade Representative to increase tariffs on solar cells to 50 percent in 2024. In response to the President's direction, the U.S. Trade Representative proposed increasing tariffs on two subheadings.

Comments supporting the tariff increases assert that the tariffs are critical to counter China's unfair policies and practices that target the solar industry. They note that China has invested in the long-term dominance of the global solar supply chain, which has resulted in limited alternatives and increasing dependence on Chinese suppliers. The comments assert that increasing the tariffs will allow the burgeoning domestic industry to compete, creating a more resilient domestic supply chain, improving U.S. energy security, and promoting clean energy initiatives.

Comments also note that initiatives, such as the Inflation Reduction Act and the CHIPS and Science Act, provide critical incentives to the shift solar supply chains to the United States, but these incentives are threatened by solar imports from China. Two comments suggest that additional subheadings be added to cover certain inputs used in manufacturing solar cells. The two subheadings are: 2804.61.00 (Silicon containing by weight not less than 99.99 percent of silicon); and 3818.00.00 (Chemical elements doped for use in electronics, in the form of discs, wafers etc., chemical compounds doped for electronic use).

There were no comments opposing the proposed subheading, but one comment requested that a statistical reporting number under one of the subheadings be excluded (8541.43.0010). The commenter asserts that the products covered by the statistical reporting number should be excluded because they are not the subject of technology-transfer agreements and increasing the tariffs will result in higher prices.

Considering the comments, and the advice of Section 301 Committee, and consistent with the direction of the President to increase tariffs on solar cells (whether or not assembled into modules), the U.S. Trade Representative has determined that removing statistical reporting number 8541.43.0010 is not warranted merely because it has not been subject to China's acts, policies, and practices or may result in higher prices. *See* section 301(c)(3)(B) of the Trade Act (19 U.S.C. 2411(c)(3)(B)).

Regarding the request to add subheadings 2804.61.00 and 3818.00.00, the U.S. Trade Representative has determined to propose increasing tariff rates for these two subheadings to 50 percent. The polysilicon and wafers that are imported under these two subheadings are critical for manufacturing solar cells and semiconductors. As noted in USTR's Report, China now dominates manufacturing capacity for polysilicon and wafers, accounting for 93 percent of polysilicon manufacturing capacity and 95 percent of wafer capacity. China's dominance in the manufacturing of wafers and polysilicon is likely to undermine new investments in domestic manufacturing, impede the resiliency of U.S. supply chains for solar cells and semiconductors, and undermine the effectiveness of the tariffs on solar cells and semiconductors. Accordingly, USTR will publish a separate notice with procedures for interested parties to provide views on increasing tariffs on subheadings: 2804.61.00 (Silicon containing by weight not less than 99.99 percent of silicon); and 3818.00.00 (Chemical elements doped for use in electronics, in the form of discs, wafers etc., chemical compounds doped for electronic use).

Increasing tariffs on the two proposed subheadings will encourage the diversification of supply chains and will lessen dependence on China for these products, providing additional leverage with China to eliminate the investigated acts, policies, and practices. The tariffs also complement other Administration goals that seek to defend the United States against China's policy-driven non-market excess capacity, which has led to extreme concentration of production in China and underpriced exports. Accordingly, the U.S. Trade Representative has determined to increase tariffs on the two proposed subheadings.

Steel and Aluminum: The President directed the U.S. Trade Representative to increase tariffs on steel and aluminum products to 25 percent in 2024. In response to the President's direction, the U.S. Trade Representative proposed increasing or adding tariffs on 321 steel and aluminum subheadings in 2024.

The 321 subheadings are within the scope of products subject to additional duties under section 232 of the Trade Expansion Act of 1962, as amended, but are not currently subject to 25 percent duties under section 301. Increasing or adding duties to these 321 subheadings would make nearly all of the steel and aluminum subheadings that are within the scope of the section 232 investigations of steel and aluminum subject to 25 percent duties under section 301and will reduce opportunities for circumvention, making the actions more effective. USTR did not propose adding or increasing section 301 duties on 17 subheadings within the scope of products covered by section 232. Data from the Department of Commerce's section 232 exclusion process show that a majority of exclusions requested for products under the 17 subheadings were granted, and there is limited availability for the products outside of China.

Several commenters suggest USTR include additional tariff codes covering upstream and downstream products related to steel and aluminum, but outside the scope of the section 232 investigations. The U.S. Trade Representative has determined not to add subheadings outside the scope of the section 232 investigations on steel and aluminum and has determined that it is appropriate to use the same scope of products covered by the section 232 investigations that were defined by Presidential proclamation. *See* Proclamation 9704 of March 8, 2018 (Adjusting Import of Aluminum into the United States), and Proclamation 9705 of March 8, 2018 (Adjusting Imports of Steel into the United States).

Some commenters suggest USTR include the 17 subheadings covered by the section 232 investigations that were not proposed for tariff increases. Under the Department of Commerce's exclusion process for section 232 products, products are granted exclusion either where they are not produced in the United States in sufficient and reasonably available amounts, or where there is a specific national security consideration. As noted above, for products under these 17 subheadings, Commerce granted exclusions, and data indicates that these products have limited availability outside of China. Accordingly, the U.S. Trade Representative has determined that it would not be appropriate to increase tariffs on these 17 subheadings.

Syringes and needles: The President directed the U.S. Trade Representative to increase tariffs on syringes and needles to no less than 50 percent. In response to the President's direction, the U.S. Trade Representative proposed increasing tariffs on two subheadings. USTR requested commenters to address whether the tariff rate should be higher than the proposed rate.

Regarding the proposed rate, several comments suggest that higher rates would help support domestic manufacturing and recommended rates as high as 100 percent. Most comments opposing the proposed increase simply note that prices would likely increase. However, a large number of comments report a limited availability of enteral syringes outside of China and assert that the proposed increase would impact the supply of enteral syringes, which are necessary for vulnerable patients. These comments request that enteral syringes be excluded.

Considering the comments and the advice of Section 301 Committee, and recognizing that syringes and needles are critical to U.S. preparedness in responding to public health emergencies and the need to maintain alternative sources, consistent with the President's direction, the U.S. Trade Representative has determined to increase tariffs on syringes and needles under the two subheadings to 100 percent in 2024. To address the possible shortages of enteral syringes, the U.S. Trade Representative has determined to exclude enteral syringes through January 1, 2026.

USTR's Response to Significant Comments on Machinery Exclusion Process

The President directed the U.S. Trade Representative to establish a process by which interested persons may request that particular machinery used in domestic manufacturing classified within a subheading under Chapters 84 and 85 of the HTSUS be temporarily excluded from section 301 tariffs, and to prioritize, in particular, exclusions for certain solar manufacturing. In response to the President's direction, the U.S. Trade Representative proposed 312 subheadings eligible for consideration of temporary exclusion, and proposed 19 temporary exclusions for solar manufacturing equipment.

Chapters 84 and 85 of the HTSUS cover most machinery used in manufacturing processes. The 312 subheadings proposed, include machines used to physically alter a good in the manufacturing process. The limited scope of the exclusion process strikes a balance between mitigating U.S. companies' costs in expanding domestic production capacity while maintaining the appropriate amount of leverage with China to encourage China to eliminate the acts, policies, and practices that are the subject of the investigation.

In response to USTR's request for comments on whether the 312 subheadings proposed should or should not be eligible in the machinery exclusion process and whether certain subheading under Chapters 84 and 85 that cover machinery used in domestic manufacturing were omitted and should be included, USTR received more than 650 comments, with approximately half of the comments proposing additional subheadings under Chapters 84 and 85. The remaining comments either opposed including certain subheadings, supported proposed subheadings, or proposed subheadings not under Chapters 84 and 85.

Considering the comments, and the advice of the Section 301 Committee, and consistent with the direction of the President, the U.S. Trade Representative has determined to add five additional subheadings to be eligible for consideration of temporary exclusions. These five subheadings are: 8421.21.00 (Machinery and apparatus for filtering or purifying water); 8421.29.00 (Filtering or purifying machinery and apparatus for liquids, nesoi); 8421.39.01 (Filtering or purifying machinery and apparatus for gases, other than intake air filters or catalytic conv. for internal combustion engines); 8428.70.00 (Industrial robots); and 8443.19.30 (Printing machinery, nesoi). These subheadings appear to include machinery used to physically alter goods in the manufacturing process.

Consistent with the President's direction, the U.S. Trade Representative has determined not to add subheadings outside of Chapters 84 and 85 or subheadings that only include parts, accessories, consumables, or general equipment that is unable to physically change a good. Additionally, the U.S. Trade Representative has determined not to remove any of the proposed subheadings. Comments requesting that subheadings be removed generally assert that machines covered by the subheading were available from sources outside of China. Under the exclusion process, commenters both supporting and opposing particular exclusions for machines under any of these subheadings will have an opportunity to provide their views. This will provide USTR with greater opportunity to gather more specific information about the machinery requested for exclusion, including the availability of products outside of China.

Nineteen Proposed Solar Manufacturing Equipment Exclusions

The President directed the U.S. Trade Representative to prioritize exclusions for certain solar manufacturing equipment. In response to the President's direction, the U.S. Trade Representative proposed 19 exclusions covering solar manufacturing equipment. The exclusions included five exclusions for equipment to manufacture solar modules, six exclusions for equipment to manufacture solar cells, and eight exclusions for equipment to manufacture solar wafers.

USTR received several comments requesting that the exclusions for solar manufacturing equipment be made effective prior to May 28, 2024. USTR received a number of comments opposing the exclusions based on the assertion that certain equipment is available from alternative sources. Specifically, with respect to the five exclusions for solar module manufacturing equipment and the six exclusions for solar cell manufacturing equipment, a number of comments assert that alternative sources for the machinery are available, both domestically and in Europe. Several comments noted that excluding Chinese equipment would disincentivize companies to purchase from alternative sources and negatively impact burgeoning supply chains. Comments supporting the exclusions focus primarily on Chinese equipment being low-cost equipment, but some also assert that China is the only source for most solar equipment.

Considering the public comments, the specific direction of the President to prioritize exclusions for solar equipment, and the advice of the Section 301 Committee, particularly agencies involved in efforts to build capacity for domestic production of solar products, the U.S. Trade Representative has determined not to adopt the five exclusions covering solar manufacturing equipment for modules. Available information indicates that there is sufficient availability of the products covered by the exclusions outside of China, such that the exclusions are not warranted and could harm alternative sourcing currently available.

Regarding proposals to temporarily exclude wafer and cell manufacturing equipment, the U.S. Trade Representative has determined to adopt the 14 exclusions for this manufacturing equipment. There is limited information regarding the availability and pricing of the cell manufacturing equipment covered by these exclusions outside of China, but some of the risks of granting the exclusions are mitigated by the short prospective duration of the exclusions. The exclusion period will allow for the development of strategies to reduce U.S. reliance on Chinese cell manufacturing equipment, and for greater supply chain resilience and enhanced domestic manufacturing more generally. Regarding the wafer manufacturing equipment, available information indicates that alternative sources do not currently have sufficient supply of the equipment covered by these exclusions. Regarding requests for a longer retroactive period for the exclusions for solar manufacturing equipment, the U.S. Trade Representative has determined to make the exclusions effective January 1, 2024, and through May 31, 2025. The additional time will support those investments in domestic production that were made in 2024, but prior to USTR's announced proposals. With the goal of reducing reliance on China, and to ensure that imports under the exclusions support both greater domestic production of solar products and supply chain resilience, USTR will actively monitor imports under the 14 temporary exclusions. Additionally, based on the public comments, the U.S. Trade Representative has made certain amendments to the proposed product descriptions for the exclusions. The final product descriptions for the adopted exclusions are included in Annex B of this notice.

The U.S. Trade Representative will continue to consider the actions taken in this investigation. In the event that further modifications are appropriate, the U.S. Trade Representative intends to take into account the extensive public comments provided in response to the May 28 notice.

Juan Millan,

Acting General Counsel, Office of the United States Trade Representative.

Annex A—Tariff Increases

HTSUS subheading	Product description	Rate (%)	Timing
Battery Parts (Non-lithium-ion Batteries)			
8507.90.40	Parts of lead-acid storage batteries, including separators therefor	25	2024
Electric Vehicles			
8702.40.31	Motor vehicles w/electric motor, to transport 16 or more persons, incl driver	100	2024
8702.40.61	Motor vehicles w/electric motor, to transport 10 to 15 persons, incl driver	100	2024
8702.90.31	Motor vehicles nesoi, to transport 16 or more persons, incl driver	100	2024
8702.90.61	Motor vehicles nesoi, to transport 10 to 15 persons, incl driver	100	2024
8703.60.00	Motor vehicles to transport persons, w/spark-ign. IC recip. piston engine & elec motor capable of charge by plug to external source.	100	2024
8703.70.00	Motor vehicles to transport persons, w/diesel engine & elec motor capable of charge by plug to external source.	100	2024

HTSUS subheading	Product description	Rate (%)	Timing
8703.80.00	Motor vehicles to transport persons, w/electric motor for propulsion	100	2024
8703.90.01	Motor vehicles to transport persons, nesoi	100	2024
Facemasks			
6307.90.9842	Surgical N95 Respirators of Textile	25	2024
		50	2026
6307.90.9844	Non-surgical N95 Respirators of Textiles	25	2024
		50	2026
6307.90.9850	Respirators of Textiles, Other than N95	25	2024
		50	2026
6307.90.9870	Face Masks of Textiles, Disposable	25	2025
		50	2026
6307.90.9875	Face Masks of Textiles, Other than Disposable	25	2024
		50	2026
Lithium-ion Electrical Vehicle Batteries			
8507.60.0010	Lithium-ion batteries of a kind used as the primary source of electrical power for electrically powered vehicles of subheadings 8703.40, 8703.50, 8703.60, 8703.70 or 8703.80.	25	2024
Lithium-ion Non-electrical Vehicle Batteries			
8507.60.0020	Lithium-ion batteries: Other	25	2026
Medical Gloves			
4015.12.10	Medical or surgical gloves of vulcanized rubber other than hard rubber	50	2025
		100	2026
Natural Graphite			
2504.10.10	Natural graphite, crystalline flake (not including flake dust)	25	2026
2504.10.50	Natural graphite in powder or flakes (other than crystalline flake)	25	2026
2504.90.00	Natural graphite, other than in powder or in flakes	25	2026
Other Critical Minerals			
2602.00.00	Manganese ores and concentrates including ferruginous manganese ores & concentrates with manganese content over 20% calculated on dry weight.	25	2024
2605.00.00	Cobalt ores and concentrates	25	2024
2606.00.00	Aluminum ores and concentrates	25	2024
2608.00.00	Zinc ores and concentrates	25	2024
2610.00.00	Chromium ores and concentrates	25	2024
2611.00.60	Tungsten concentrates	25	2024
2825.90.30	Tungsten oxides	25	2024
2841.80.00	Tungstates (wolframates)	25	2024
2844.41.00	Tritium and its compounds, alloys, dispersions, ceramic products and mixtures thereof	25	2024
2844.42.00	Actinium, californium, curium, einsteinium, gadolinium, polonium, radium, uranium & their compounds, alloys, dispersions, ceramic products & mixtures.	25	2024
2844.43.00	Other radioactive elements, isotopes, compounds, nesoi; alloys, dispersions, ceramic products and mixtures thereof.	25	2024
2844.44.00	Radioactive residues	25	2024
2849.90.30	Tungsten carbide	25	2024
7202.60.00	Ferronickel	25	2024
7202.93.40	Ferroniobium containing by weight less than 0.02 percent of phosphorus or sulfur or less than 0.4 percent of silicon.	25	2024
7202.93.80	Ferroniobium, nesoi	25	2024
7901.11.00	Zinc (o/than alloy), unwrought, containing o/99.99% by weight of zinc	25	2024
7901.12.10	Zinc (o/than alloy), unwrought, casting-grade zinc, containing at least 97.5% but less than 99.99% by weight of zinc.	25	2024
7901.12.50	Zinc (o/than alloy), unwrought, o/than casting-grade zinc, containing at least 97.5% but less than 99.99% by wt. of zinc.	25	2024
7901.20.00	Zinc alloy, unwrought	25	2024
8001.10.00	Tin (o/than alloy), unwrought	25	2024
8001.20.00	Tin alloy, unwrought	25	2024
8101.10.00	Tungsten, powders	25	2024
8103.20.00	Tantalum, unwrought (including bars and rods obtained simply by sintering); tantalum powders.	25	2024
8112.21.00	Chromium, unwrought; chromium powders	25	2024
8112.92.30	Indium, unwrought; indium powders	25	2024

HTSUS subheading	Product description	Rate (%)	Timing
	Permanent Magnets		
8505.11.00	Permanent magnets and articles intended to become permanent magnets after magnetization, of metal.	25	2026
	Semiconductors		
8541.10.00	Diodes, other than photosensitive or light-emitting diodes	50	2025
8541.21.00	Transistors, other than photosensitive transistors, with a dissipation rating of less than 1 W.	50	2025
8541.29.00	Transistors, other than photosensitive transistors, with a dissipation rating of 1 W or more.	50	2025
8541.30.00	Thyristors, diacs and triacs, other than photosensitive devices	50	2025
8541.49.10	Other photosensitive semiconductor diodes, other than light-emitting	50	2025
8541.49.70	Photosensitive transistors	50	2025
8541.49.80	Photosensitive semiconductor devices nesoi, optical coupled isolators	50	2025
8541.49.95	Other photosensitive semiconductor devices, other than diodes or transistors, nesoi	50	2025
8541.51.00	Other semiconductor-based transducers, other than photosensitive transducers	50	2025
8541.59.00	Other semiconductor devices, other than semiconductor-based transducers, other than photosensitive devices, nesoi.	50	2025
8541.90.00	Parts of diodes, transistors, similar semiconductor devices, photosensitive semiconductor devices, LED's and mounted piezoelectric crystals.	50	2025
8542.31.00	Electronic integrated circuits: processors and controllers	50	2025
8542.32.00	Electronic integrated circuits: memories	50	2025
8542.33.00	Electronic integrated circuits: amplifiers	50	2025
8542.39.00	Electronic integrated circuits: other	50	2025
8542.90.00	Parts of electronic integrated circuits and microassemblies	50	2025
	Ship-to-Shore Cranes		
	Ship-to-shore gantry cranes, configured as a high- or low-profile steel superstructure and designed to unload intermodal containers from vessels with coupling devices for containers, including spreaders or twist-locks (provided for in subheading 8426.19.00), except for such cranes provided for in subheading 8426.19.00, that are fulfilling in whole or in part an executed contract for sale dated prior to May 14, 2024, for goods that are entered for consumption, or withdrawn from warehouse for consumption, in the United States prior to May 14, 2026.	25	2024
	Solar Cells (whether or not assembled into modules)		
8541.42.00	Photovoltaic cells, not assembled in modules or made up into panels	50	2024
8541.43.00	Photovoltaic cells assembled in modules or made up into panels	50	2024
	Steel and Aluminum Products		
7206.10.00	Iron and nonalloy steel ingots	25	2024
7206.90.00	Iron and nonalloy steel in primary forms (o/than ingots)	25	2024
7207.11.00	Iron or nonalloy steel semifinished products, w/less than 0.25% carbon, w/rect. cross sect.(incl. sq.), w/width less than twice thickness.	25	2024
7207.12.00	Iron or nonalloy steel semifinished products, w/less than 0.25% carbon, w/rect. cross sect. (exclud. sq.), nesoi.	25	2024
7207.19.00	Iron or nonalloy steel semifinished products, w/less than 0.25% carbon, o/than w/rect. cross section.	25	2024
7207.20.00	Iron or nonalloy steel semifinished products, w/0.25% or more of carbon	25	2024
7208.10.15	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled products, w/patterns in relief, in coils, pickled, not clad/plated/coated.	25	2024
7208.10.30	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled product, in coil, w/pattern in relief, w/thick 4.75mm+, not pickld, not clad/plated/coatd.	25	2024
7208.10.60	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled product, in coil, w/pattern in relief, w/thick <4.75mm, not pickld, not clad/plated/coatd.	25	2024
7208.25.30	Nonalloy hi-strength steel, width 600mm+, hot-rolled flat-rolled products, in coils, w/thick 4.75mm+, pickled, not clad/plated/coated.	25	2024
7208.25.60	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled products, in coils, w/thick 4.7mm or more, pickled, not clad/plated/coated.	25	2024
7208.26.00	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled products, in coils, w/thick 3mm or mor but less 4.75mm, pickled, not clad/plated.	25	2024
7208.27.00	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled products, in coils, w/thick less than 3mm, pickled, not clad/plated/coated.	25	2024
7208.36.00	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled products, in coils, w/thick o/10mm, not pickled/clad/plated/coated.	25	2024
7208.37.00	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled products, in coils, w/thick 4.75mm or more & n/o 10mm, not pickled/clad/plated.	25	2024
7208.38.00	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled products, in coils, w/thick 3mm or more & less 4.75mm, not pickld/clad/plated.	25	2024

HTSUS subheading	Product description	Rate (%)	Timing
7208.39.00	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled products, in coils, w/thick less than 3mm, not pickled/clad/plated/coated.	25	2024
7208.40.30	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled products, w/pattern in relief, not coils, w/thick 4.75 or more, n/clad/plated/coated.	25	2024
7208.40.60	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled products, w/pattern in relief, not coils, w/thick <4.75mm, not clad/plated/coated.	25	2024
7208.51.00	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled products, nesoi, not in coils, w/thick o/10mm, not clad/plated/coated.	25	2024
7208.52.00	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled products, neosi, not in coils, w/thick 4.75mm+ but n/o 10mm, not clad/plated/.	25	2024
7208.53.00	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled products, neosi, not in coils, w/thick 3mm+ but <4.75mm, not clad/plated/coated.	25	2024
7208.54.00	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled products, neosi, not in coils, w/thick less than 3mm, not clad/plated/coated.	25	2024
7208.90.00	Iron/nonalloy steel, width 600mm+, hot-rolled flat-rolled products, nesoi, not clad/plated/coated.	25	2024
7209.15.00	Iron/nonalloy steel, width 600mm+, cold-rolled flat-rolled products, in coils, w/thick 3mm+, not clad/plated/coated.	25	2024
7209.16.00	Iron/nonalloy steel, width 600mm+, cold-rolled flat-rolled products, in coils, w/thick o/1mm but less than 3mm, not clad/plated/coated.	25	2024
7209.17.00	Iron/nonalloy steel, width 600mm+, cold-rolled flat-rolled products, in coils, w/thick 0.5mm or more but n/o 1mm, not clad/plated/coated.	25	2024
7209.18.15	Nonalloy hi-strength steel, width 600mm+, cold-rolled flat-rolled products, in coils, w/thick less than 0.5mm, not clad/plated/coated.	25	2024
7209.18.25	Nonalloy steel(blackplate), width 600mm+, cold-rolled flat-rolled products, in coils, w/thick less than 0.361mm, not clad/plated/coated.	25	2024
7209.18.60	Iron/nonalloy steel, width 600mm+, cold-rolled flat-rolled products, in coils, w/thick 0.361mm+ but less 5mm, not clad/plated/coated.	25	2024
7209.25.00	Iron/nonalloy steel, width 600mm+, cold-rolled flat-rolled products, not in coils, w/thick 3mm or more, not clad/plated/coated.	25	2024
7209.26.00	Iron/nonalloy steel, width 600mm+, cold-rolled flat-rolled products, not in coils, w/thick o/1mm but less than 3mm, not clad/plated/coated.	25	2024
7209.27.00	Iron/nonalloy steel, width 600mm+, cold-rolled flat-rolled products, not in coils, w/thick 0.5mm+ but n/o 1mm, not clad/plated/coated.	25	2024
7209.28.00	Iron/nonalloy steel, width 600mm+, cold-rolled flat-rolled products, not in coils, w/thick less than 0.5mm, not clad/plated/coated.	25	2024
7209.90.00	Iron/nonalloy steel, width 600mm+, flat-rolled products further worked than cold-rolled, not clad/plated/coated, nesoi.	25	2024
7210.11.00	Iron/nonalloy steel, width 600mm+, flat-rolled products, plated or coated with tin, w/thick. 0.5 mm or more.	25	2024
7210.12.00	Iron/nonalloy steel, width 600mm+, flat-rolled products, plated or coated with tin, less than 0.5 mm thick.	25	2024
7210.20.00	Iron/nonalloy steel, width 600mm+, flat-rolled products, plated or coated with lead, including terneplate.	25	2024
7210.30.00	Iron/nonalloy steel, width 600mm+, flat-rolled products, electrolytically plated or coated with zinc.	25	2024
7210.41.00	Iron/nonalloy steel, width 600mm+, flat-rolled products, plated or coated with zinc (other than electrolytically), corrugated.	25	2024
7210.49.00	Iron/nonalloy steel, width 600mm+, flat-rolled products, plated or coated with zinc (other than electrolytically), not corrugated.	25	2024
7210.50.00	Iron/nonalloy steel, width 600mm+, flat-rolled products, plated or coated with chromium oxides or with chromium and chromium oxides.	25	2024
7210.61.00	Iron/nonalloy steel, width 600mm+, flat-rolled products, plated or coated with aluminum-zinc alloys.	25	2024
7210.69.00	Iron/nonalloy steel, width 600mm+, flat-rolled products, plated or coated with aluminum o/than aluminum-zinc alloy.	25	2024
7210.70.30	Iron/nonalloy steel, width 600mm+, flat-rolled products, painted/varnished or coated w/plastic but not plated/coated or clad w/metal.	25	2024
7210.70.60	Iron/nonalloy steel, width 600mm+, flat-rolled products, painted/varnished or coated w/plastic, nesoi.	25	2024
7210.90.10	Iron/nonalloy steel, width 600mm+, flat-rolled products, clad	25	2024
7210.90.60	Iron/nonalloy steel, width 600mm+, flat-rolled products, electrolytically coated or plated with base metal, nesoi.	25	2024
7210.90.90	Iron/nonalloy steel, width 600mm+, flat-rolled products, plated or coated, nesoi	25	2024
7211.13.00	Iron/nonalloy steel, width less th/600mm, hot-rolled flat-rolled universal mill plate, not clad/plated/coated.	25	2024
7211.14.00	Iron/nonalloy steel, width less th/600mm, hot-rolled flat-rolled products, nesoi, w/thick of 4.75mm or more, not clad/plated/coated.	25	2024
7211.19.15	Nonalloy hi-strength steel, width less th/300mm, hot-rolled flat-rolled products, not clad/plated/coated.	25	2024
7211.19.20	Iron/nonalloy steel, neosi, width less th/300mm, hot-rolled flat-rolled products, w/thick o/1.25 mm but n/o 4.75 mm, n/clad/plated/coated.	25	2024

HTSUS subheading	Product description	Rate (%)	Timing
7211.19.30	Iron/nonalloy steel, neosi, width less th/300mm, hot-rolled flat-rolled products, w/thick 1.25mm or less, not clad/plated/coated.	25	2024
7211.19.45	Nonalloy hi-strength steel, width 300mm+ but less th/600mm, hot-rolled flat-rolled products, not clad/plated/coated.	25	2024
7211.19.60	Iron/nonalloy steel, neosi, width 300mm+ but less th/600mm, hot-rolled flat-rolled products, pickled, not clad/plated/coated.	25	2024
7211.19.75	Iron/nonalloy steel, neosi, width 300mm+ but less th/600mm, hot-rolled flat-rolled products, not pickled, not clad/plated/coated.	25	2024
7211.23.15	Nonalloy hi-strength steel, width less th/300mm, cold-rolled flat-rolled, <0.25% carbon, w/thick o/1.25mm, not clad/plated/coated.	25	2024
7211.23.20	Iron/nonalloy steel, nesoi, width less th/300mm, cold-rolled flat-rolled, <0.25% carbon, w/thick o/1.25mm, not clad/plated/coated.	25	2024
7211.23.30	Iron/nonalloy steel, nesoi, width less th/300mm, cold-rolled flat-rolled, <0.25% carbon, w/thick o/0.25mm n/o 1.25mm, not clad/plated.	25	2024
7211.23.45	Iron/nonalloy steel, nesoi, width less th/300mm, cold-rolled flat-rolled, <0.25% carbon, w/thick n/o 0.25mm, not clad/plated/coated.	25	2024
7211.23.60	Iron/nonalloy steel, nesoi, width 300mm+ but less th/600mm, cold-rolled flat-rolled, <0.25% carbon, not clad/plated/coated.	25	2024
7211.29.20	Iron/nonalloy steel, width less th/300mm, cold-rolled flat-rolled, w/0.25% or more carbon, w/thick o/0.25mm, not clad/plated/coated.	25	2024
7211.29.45	Iron/nonalloy steel, width less th/300mm, cold-rolled flat-rolled, w/0.25% or more carbon, w/thick 0.25mm or less, not clad/plated/coated.	25	2024
7211.29.60	Iron/nonalloy steel, width 300mm+ but less th/600mm, cold-rolled flat-rolled, w/0.25% or more carbon, not clad/plated/coated.	25	2024
7211.90.00	Iron/nonalloy steel, width less th/600mm, flat-rolled further worked than cold-rolled, not clad, plated or coated.	25	2024
7212.10.00	Iron/nonalloy steel, width less th/600mm, flat-rolled products, plated or coated with tin	25	2024
7212.20.00	Iron/nonalloy steel, width less th/600mm, flat-rolled products, electrolytically plated or coated with zinc.	25	2024
7212.30.10	Iron/nonalloy steel, width less th/300mm, flat-rolled products, plated/coated with zinc (other than electrolytically), w/thick o/0.25 mm.	25	2024
7212.30.30	Iron/nonalloy steel, width less th/300mm, flat-rolled products, plated/coated w/zinc (other than electrolytically), w/thick 0.25 mm or less.	25	2024
7212.30.50	Iron/nonalloy steel, width 300+ but less th/600mm, flat-rolled products, plated or coated with zinc (other than electrolytically).	25	2024
7212.40.10	Iron/nonalloy steel, width less th/300mm, flat-rolled products, painted, varnished or coated w/plastic.	25	2024
7212.40.50	Iron/nonalloy steel, width 300+ but less th/600mm, flat-rolled products, painted, varnished or coated w/plastic.	25	2024
7212.50.00	Iron/nonalloy steel, width less th/600mm, flat-rolled products, plated or coated nesoi	25	2024
7212.60.00	Iron/nonalloy steel, width less th/600mm, flat-rolled products, clad	25	2024
7213.10.00	Iron/nonalloy, concrete reinforcing bars and rods in irregularly wound coils, hot-rolled	25	2024
7213.20.00	Free-cutting steel, bars and rods in irregularly wound coils, hot-rolled	25	2024
7213.91.30	Iron/nonalloy steel, nesoi, hot-rolled bars & rods in irregularly wound coils, w/cir. x-sect. diam. <14mm, n/tempered/treated/partly mfd.	25	2024
7213.91.45	Iron/nonalloy steel, nesoi, hot-rolled bars & rods in irregularly wound coils, w/cir. x-sect. diam. <14mm, w/0.6+ of carbon, nesoi.	25	2024
7213.91.60	Iron/nonalloy steel, nesoi, hot-rolled bars & rods in irregularly wound coils, w/cir. x-sect. diam. <14mm, w/less th/0.6 carbon, nesoi.	25	2024
7213.99.00	Iron/nonalloy steel, nesoi, hot-rolled bars & rods, w/cir. x-sect. diam 14+mm or non-circ. x-sect., in irregularly wound coils, nesoi.	25	2024
7214.20.00	Iron/nonalloy steel, concrete reinforcing bars and rods, not further worked than hot-rolled, hot-drawn or hot-extruded, n/coils.	25	2024
7214.30.00	Free-cutting steel, bars and rods, not further worked than hot-rolled, hot-drawn or hot-extruded, n/coils, nesoi.	25	2024
7214.91.00	Iron/nonalloy steel, bars and rods, not further worked than hot-rolled, hot-drawn or hot-extruded, w/rectangular (o/than square) X-section.	25	2024
7214.99.00	Iron/nonalloy steel, bars and rods, not further worked than hot-rolled, hot-drawn or hot-extruded, w/non-rectangular X-sect, not in coils.	25	2024
7215.10.00	Free-cutting steel, bars and rods, not further worked than cold-formed or cold-finished, not in coils.	25	2024
7215.50.00	Iron/nonalloy steel nesoi, bars and rods, not further wkd. than cold-formed or cold-finished, not in coils.	25	2024
7215.90.10	Iron/nonalloy steel, bars and rods, not cold-formed, plated or coated with metal	25	2024
7215.90.30	Iron/nonalloy steel, bars and rods, cold-formed, plated or coated with metal	25	2024
7215.90.50	Iron/nonalloy steel, bars and rods, further worked than cold-formed or cold-finished, nesoi.	25	2024
7216.10.00	Iron/nonalloy steel, U, I or H-sections, not further worked than hot-rolled, hot-drawn or extruded, w/height under 80 mm.	25	2024
7216.21.00	Iron/nonalloy steel, L-sections, not further worked than hot-rolled, hot-drawn or extruded, w/height under 80 mm.	25	2024
7216.22.00	Iron/nonalloy steel, T-sections, not further worked than hot-rolled, hot-drawn or extruded, w/height under 80 mm.	25	2024

HTSUS subheading	Product description	Rate (%)	Timing
7216.31.00	Iron/nonalloy steel, U-sections, not further worked than hot-rolled, hot-drawn or extruded, w/height of 80 mm or more.	25	2024
7216.32.00	Iron/nonalloy steel, I-sections (standard beams), not further worked than hot-rolled, hot-drawn or extruded, w/height 80 mm or more.	25	2024
7216.33.00	Iron/nonalloy steel, H-sections, not further worked than hot-rolled, hot-drawn or extruded, w/height 80 mm or more.	25	2024
7216.40.00	Iron/nonalloy steel, L or T-sections, not further worked than hot-rolled, hot-drawn or extruded, w/height 80 mm or more.	25	2024
7216.50.00	Iron/nonalloy steel, angles, shapes & sections nesoi, not further worked than hot-rolled, hot-drawn or extruded.	25	2024
7216.99.00	Iron/nonalloy steel, angles, shapes & sections nesoi, further wkd. than cold-formed or cold-finished and not from flat-rolled products.	25	2024
7217.10.10	Iron/nonalloy steel, flat wire, <0.25% carbon, not plated or coated, w/thick n/o 0.25 mm	25	2024
7217.10.20	Iron/nonalloy steel, flat wire, <0.25% carbon, not plated or coated, w/thick o/0.25mm but n/o 1.25 mm.	25	2024
7217.10.30	Iron/nonalloy steel, flat wire, <0.25% carbon, not plated or coated, w/thick o/1.25 mm	25	2024
7217.10.50	Iron/nonalloy steel, round wire, <0.25% carbon, not plated or coated, w/diameter of 1.5 mm or more.	25	2024
7217.10.60	Iron/nonalloy steel, wire (other than flat or round), <0.25% carbon, not plated or coated	25	2024
7217.10.70	Iron/nonalloy steel, flat wire, w/0.25% or more carbon, not plated or coated	25	2024
7217.10.80	Iron/nonalloy steel, round wire, w/0.25% or more carbon, not plated or coated	25	2024
7217.10.90	Iron/nonalloy steel, wire (other than flat or round), w/0.25% or more of carbon, not plated or coated.	25	2024
7217.20.15	Iron/nonalloy steel, flat wire, plated or coated with zinc	25	2024
7217.20.30	Iron/nonalloy steel, round wire, <0.25% carbon, plated or coated with zinc, w/diameter of 1.5 mm or more.	25	2024
7217.20.45	Iron/nonalloy steel, round wire, w/0.25% or more carbon and/or <1.5mm diam, plated or coated with zinc.	25	2024
7217.20.60	Iron/nonalloy steel, wire (other than flat or round), <0.25% carbon, plated or coated with zinc.	25	2024
7217.20.75	Iron/nonalloy steel, wire (other than flat or round), w/0.25% or more of carbon, plated or coated with zinc.	25	2024
7217.30.15	Iron/nonalloy steel, flat wire, plated or coated with base metal other than zinc	25	2024
7217.30.30	Iron/nonalloy steel, round wire, <0.25% carbon, plated or coated with base metal other than zinc, w/diam. of 1.5 mm or more.	25	2024
7217.30.60	Iron/nonalloy steel, wire (other than flat or round), <0.25% carbon, plated or coated with base metal other than zinc.	25	2024
7217.30.75	Iron/nonalloy steel, wire (other than flat or round), w/0.25% or more of carbon, plated or coated with base metal other than zinc.	25	2024
7217.90.10	Iron/nonalloy steel, wire, coated with plastics	25	2024
7217.90.50	Iron/nonalloy steel, wire, plated or coated with materials other than base metals or plastics.	25	2024
7218.10.00	Stainless steel, ingots and other primary forms	25	2024
7218.91.00	Stainless steel, semifinished products of rectangular (other than square) cross-section	25	2024
7218.99.00	Stainless steel, semifinished products, other than of rectangular (other than square) cross-section.	25	2024
7219.11.00	Stainless steel, width 600mm+, hot-rolled flat-rolled products, in coils, w/thickness o/10 mm.	25	2024
7219.12.00	Stainless steel, width 600mm+, hot-rolled flat-rolled products, in coils, w/thick. 4.75 mm or more but n/o 10 mm.	25	2024
7219.13.00	Stainless steel, width 600mm+, hot-rolled flat-rolled products, in coils, w/thick. 3 mm or more but less than 4.75 mm.	25	2024
7219.14.00	Stainless steel, width 600mm+, hot-rolled flat-rolled products, in coils, w/thickness less than 3 mm.	25	2024
7219.21.00	Stainless steel, width 600mm+, hot-rolled flat-rolled products, not in coils, w/thickness o/10 mm.	25	2024
7219.22.00	Stainless steel, width 600mm+, hot-rolled flat-rolled products, not in coils, w/thick. 4.75 mm or more but n/o 10 mm.	25	2024
7219.23.00	Stainless steel, width 600mm+, hot-rolled flat-rolled products, not in coils, w/thick. 3 mm or more but less than 4.75 mm.	25	2024
7219.24.00	Stainless steel, width 600mm+, hot-rolled flat-rolled products, not in coils, w/thickness less than 3 mm.	25	2024
7219.31.00	Stainless steel, width 600mm+, cold-rolled flat-rolled products, w/thickness of 4.75 mm or more.	25	2024
7219.32.00	Stainless steel, width 600mm+, cold-rolled flat-rolled products, w/thickness of 3 mm or more but less than 4.75 mm.	25	2024
7219.33.00	Stainless steel, width 600mm+, cold-rolled flat-rolled products, w/thickness o/1 mm but less than 3 mm.	25	2024
7219.34.00	Stainless steel, width 600mm+, cold-rolled flat-rolled products, w/thickness of 0.5 mm or more but n/o 1 mm.	25	2024
7219.35.00	Stainless steel, width 600mm+, cold-rolled flat-rolled products, w/thickness of less than 0.5 mm.	25	2024

HTSUS subheading	Product description	Rate (%)	Timing
7219.90.00	Stainless steel, width 600mm+, flat-rolled products, nesoi, further worked than cold-rolled.	25	2024
7220.12.10	Stainless steel, width 300m+ but less th/600mm, hot-rolled flat-rolled products, w/thickness of less than 4.75 mm.	25	2024
7220.12.50	Stainless steel, width less th/300mm, hot-rolled flat-rolled products, w/thickness of less than 4.75 mm.	25	2024
7220.20.10	Stainless steel, width 300+ but less th/600mm, cold-rolled flat-rolled products	25	2024
7220.20.60	Stainless steel, width less th/300mm, cold-rolled flat-rolled products, w/thickness o/1.25 mm.	25	2024
7220.20.70	Stainless steel, width less th/300mm, cold-rolled flat-rolled products, w/thickness of 0.25 mm but n/o 1.25 mm.	25	2024
7220.20.80	Stainless razor blade steel, width less th/300mm, cold-rolled flat-rolled, w/thickness n/o 0.25 mm.	25	2024
7220.90.00	Stainless steel, width less th/600mm, flat-rolled products further worked than cold-rolled.	25	2024
7221.00.00	Stainless steel, bars and rods in irregularly wound coils, hot-rolled	25	2024
7222.11.00	Stainless steel, bars and rods, hot-rolled, hot-drawn or extruded, of circular cross-section.	25	2024
7222.19.00	Stainless steel, bars and rods, hot-rolled, hot-drawn or extruded, other than of circular cross-section.	25	2024
7222.20.00	Stainless steel, bars and rods, not further worked than cold-formed or cold-finished, nesoi.	25	2024
7222.30.00	Stainless steel, bars and rods, further worked than cold-formed or cold-finished, nesoi	25	2024
7222.40.30	Stainless steel, angles, shapes & sections, hot-rolled, not drilled/punched or otherwise advanced.	25	2024
7222.40.60	Stainless steel, angles, shapes & sections, other than hot-rolled and not drilled/punched or otherwise advanced.	25	2024
7223.00.10	Stainless steel, round wire	25	2024
7223.00.50	Stainless steel, flat wire	25	2024
7223.00.90	Stainless steel, wire (other than round or flat wire)	25	2024
7224.10.00	Alloy (o/than stainless) steel, ingots and other primary forms	25	2024
7224.90.00	Alloy (o/than stainless) steel, semifinished products	25	2024
7225.11.00	Alloy silicon electrical steel (grain-oriented), width 600mm+, flat-rolled products	25	2024
7225.19.00	Alloy silicon electrical steel (other than grain-oriented), width 600mm+, flat-rolled products.	25	2024
7225.30.11	Alloy tool steel, width 600mm+, hot-rolled flat-rolled products, in coils, w/thick. of 4.75 mm or more.	25	2024
7225.30.30	Alloy (o/th stainless, silicon elect., hi-speed, or tool) steel, width 600mm+, hot-rolled flat-rolled products, in coils, w/thick 4.75mm+.	25	2024
7225.30.51	Alloy tool steel, width 600mm+, hot-rolled flat-rolled products, in coils, w/thick. of less than 4.75 mm.	25	2024
7225.30.70	Alloy (o/th stainless, silicon elect., hi-speed, or tool) steel, width 600mm+, hot-rolled flat-rolled prod., in coils, w/thick less 4.75mm.	25	2024
7225.40.11	Alloy tool steel, width 600mm+, hot-rolled flat-rolled products, n/coils, w/thick. of 4.75 mm or more.	25	2024
7225.40.30	Alloy (o/th stainless, silicon elect., hi-speed, or tool) steel, width 600mm+, hot-rolled flat-rolled products, n/coils, w/thick 4.75mm+.	25	2024
7225.40.51	Alloy tool steel, width 600mm+, hot-rolled flat-rolled products, n/coils, w/thick. of less than 4.75 mm.	25	2024
7225.40.70	Alloy (o/th stainless, silicon elect., hi-speed, or tool) steel, width 600mm+, hot-rolled flat-rolled prod., n/coils, w/thick less 4.75mm.	25	2024
7225.50.11	Alloy tool steel, width 600mm+, cold-rolled flat-rolled products	25	2024
7225.50.60	Alloy steel (o/than tool), width 600mm+, cold-rolled flat-rolled products, w/thickness 4.75 mm or more.	25	2024
7225.50.70	Alloy heat-resisting steel, width 600mm+, cold-rolled flat-rolled products, w/thickness less than 4.75 mm.	25	2024
7225.50.80	Alloy steel (o/th heat-resisting), width 600mm+, cold-rolled flat-rolled products, w/thickness less than 4.75 mm.	25	2024
7225.91.00	Alloy steel, width 600mm+, flat-rolled products further worked than cold-rolled, electrolytically plated or coated with zinc.	25	2024
7225.92.00	Alloy steel, width 600mm+, flat-rolled products further worked than cold-rolled, plated or coated with zinc (o/than electrolytically).	25	2024
7225.99.00	Alloy steel, width 600mm+, flat-rolled products further worked than cold-rolled, nesoi	25	2024
7226.11.10	Alloy silicon electrical steel (grain-oriented), width 300mm+ but less th/600mm, flat-rolled products.	25	2024
7226.11.90	Alloy silicon electrical steel (grain-oriented), width less th/300mm, flat-rolled products	25	2024
7226.19.10	Alloy silicon electrical steel (o/than grain-oriented), width 300mm+ but less th/600mm, flat-rolled products.	25	2024
7226.19.90	Alloy silicon electrical steel (o/than grain-oriented), width less th/300mm, flat-rolled products.	25	2024
7226.20.00	Alloy high-speed steel, width less th/600mm, flat-rolled products of high-speed steel	25	2024
7226.91.05	Alloy chipper knife tool steel (o/than hi-speed), width less th/600mm, hot-rolled flat-rolled products.	25	2024

HTSUS subheading	Product description	Rate (%)	Timing
7226.91.15	Alloy tool steel (o/than hi-speed/chipper knife), width 300mm+ but less th/600mm, hot-rolled flat-rolled products.	25	2024
7226.91.25	Alloy tool steel (o/than hi-speed/chipper knife), width less th/300mm, hot-rolled flat-rolled products.	25	2024
7226.91.50	Alloy steel (o/than silicon elect./tool), width less th/600mm, hot-rolled flat-rolled products, w/thickness of 4.75 mm or more.	25	2024
7226.91.70	Alloy steel (o/than silicon elect./tool), width 300mm+ but less th/600mm, hot-rolled flat-rolled products, w/thickness less than 4.75 mm.	25	2024
7226.91.80	Alloy steel (o/than silicon elect./tool), width less th/300mm, hot-rolled flat-rolled products, w/thickness less than 4.75 mm.	25	2024
7226.92.10	Alloy tool steel (o/than hi-speed), width 300mm+ but less th/600mm, cold-rolled flat-rolled products.	25	2024
7226.92.30	Alloy tool steel (o/than hi-speed), width less th/300mm, cold-rolled flat-rolled products	25	2024
7226.92.50	Alloy steel (o/than tool), width 300mm+ but less th/600mm, cold-rolled flat-rolled products.	25	2024
7226.92.70	Alloy steel (o/than tool), width less th/300mm, cold-rolled flat-rolled products, w/thickness n/o 0.25 mm.	25	2024
7226.92.80	Alloy steel (o/than tool), width less th/300mm, cold-rolled flat-rolled products, w/thickness o/0.25 mm.	25	2024
7226.99.01	Alloy steel, width less than 600mm, flat-rolled products further worked than cold-rolled, nesoi.	25	2024
7227.10.00	Alloy high-speed steel, bars and rods in irregularly wound coils, hot-rolled	25	2024
7227.20.00	Alloy silico-manganese steel, bars and rods in irregularly wound coils, hot-rolled	25	2024
7227.90.10	Alloy tool steel (o/than hi-speed), bars & rods in irregular wound coils, hot-rolled, n/tempered, treated or partly manufactured.	25	2024
7227.90.20	Alloy tool steel (o/than hi-speed), bars and rods in irregularly wound coils, hot-rolled, nesoi.	25	2024
7227.90.60	Alloy steel (o/than hi-speed/silico-mang./tool) steel, bars and rods in irregularly wound coils, hot-rolled.	25	2024
7228.20.10	Alloy silico-manganese steel, bars and rods, not cold-formed, o/than hot-rolled and in irregularly wound coils.	25	2024
7228.20.50	Alloy silico-manganese steel, bars and rods, cold formed, o/than hot-rolled and in irregularly wound coils.	25	2024
7228.30.40	Alloy chipper knife tool steel, bars and rods, not cold-formed & not further worked than hot-rolled, hot-drawn or extruded.	25	2024
7228.30.60	Alloy tool steel (o/than ball-bearing/chipper knife), bars and rods, not further worked than hot-rolled, hot-drawn or extruded.	25	2024
7228.30.80	Alloy steel (o/than hi-speed, silico-mang./tool), bars and rods, not further worked than hot-rolled, hot-drawn or extruded.	25	2024
7228.40.00	Alloy steel, bars and rods, not further worked than forged	25	2024
7228.50.10	Alloy tool steel (o/than hi-speed), bars and rods, not further worked than cold-formed or cold-finished.	25	2024
7228.50.50	Alloy steel (o/than tool), bars and rods, not further worked than cold-formed or cold-finished.	25	2024
7228.60.10	Alloy tool steel (o/than hi-speed), bars and rods, further worked than hot-rolled, forged, cold-formed or cold-finished.	25	2024
7228.60.60	Alloy steel (o/than tool), bars and rods, further worked than hot-rolled, forged but not cold-formed.	25	2024
7228.60.80	Alloy steel (o/than tool), bars and rods, cold-formed	25	2024
7228.70.30	Alloy steel, angles, shapes and sections, hot-rolled & not drilled/not punched and not otherwise advanced.	25	2024
7228.70.60	Alloy steel, angles, shapes and sections, o/than hot-rolled & not drilled/punced and not otherwise advanced.	25	2024
7229.20.00	Alloy silico-manganese steel, wire	25	2024
7229.90.10	Alloy steel (o/than hi-speed/silico-mang.), flat wire	25	2024
7229.90.50	Alloy steel (o/than hi-speed/silico-mang.), round wire	25	2024
7229.90.90	Alloy steel (o/than hi-speed/silico-mang.), wire (o/than flat or round wire)	25	2024
7301.10.00	Iron or steel sheet piling, whether or not drilled, punched or made from assembled elements.	25	2024
7302.10.10	Iron or nonalloy steel, rails for railway or tramway tracks	25	2024
7302.10.50	Alloy steel, rails for railway or tramway tracks	25	2024
7302.40.00	Iron or steel, fish plates and sole plates for jointing or fixing rails	25	2024
7302.90.10	Sleepers (cross-ties) for railway or tramway track construction of iron or steel	25	2024
7302.90.90	Railway or tramway track construction material and other materials specialized for jointing or fixing rails, of iron or steel, nesoi.	25	2024
7304.11.00	Stainless steel, seamless line pipe used for oil or gas pipelines	25	2024
7304.19.10	Iron (o/than cast) or nonalloy steel, seamless line pipe used for oil and gas pipelines	25	2024
7304.19.50	Alloy (other than stainless) steel, seamless line pipe used for oil or gas pipelines	25	2024
7304.22.00	Stainless steel, seamless drill pipe, of a kind used in drilling for oil or gas	25	2024
7304.23.30	Iron (o/than cast) or nonalloy steel, seamless drill pipe, of a kind used in drilling for oil or gas.	25	2024
7304.23.60	Alloy (other than stainless) steel, seamless drill pipe, of a kind used in drilling for oil or gas.	25	2024

HTSUS subheading	Product description	Rate (%)	Timing
7304.24.30	Stainless steel, seamless casing pipe, threaded or coupled, of a kind used in drilling for oil or gas.	25	2024
7304.24.40	Stainless steel, seamless casing pipe, not threaded or coupled, of a kind used in drilling for oil or gas.	25	2024
7304.24.60	Stainless steel, seamless tubing, of a kind used in drilling for oil or gas	25	2024
7304.29.10	Iron (o/than cast) or nonalloy steel, seamless casing pipe, threaded or coupled, of a kind used in drilling for oil or gas.	25	2024
7304.29.20	Iron (o/than cast) or nonalloy steel, seamless casing pipe, not threaded or coupled, of a kind used in drilling for oil or gas.	25	2024
7304.29.31	Alloy (other than stainless) steel, seamless casing pipe, threaded or coupled, of a kind used in drilling for oil or gas.	25	2024
7304.29.41	Alloy (other than stainless) steel, seamless casing pipe, not threaded or coupled, of a kind used in drilling for oil or gas.	25	2024
7304.29.50	Iron (o/than cast) or nonalloy, seamless tubing, of a kind used in drilling for oil or gas	25	2024
7304.29.61	Alloy (other than stainless) steel, seamless tubing, of a kind used in drilling for oil or gas.	25	2024
7304.31.30	Iron (o/than cast) or nonalloy steel, seamless, cold-drawn or cold-rolled, hollow bars w/circular cross section.	25	2024
7304.31.60	Iron (o/than cast) or nonalloy steel, seamless, cold-drawn or cold-rolled, tubes, pipes & hollow profiles, w/circular cross section, nesoi.	25	2024
7304.39.00	Iron (o/than cast) or nonalloy steel, seamless, not cold-drawn or cold-rolled, tubes, pipes and hollow prof., w/circular cross sect., nesoi.	25	2024
7304.49.00	Stainless steel, seamless, not cold-drawn/cold-rolled, tubes, pipes and hollow profiles, w/circular cross section.	25	2024
7304.51.10	Alloy steel (o/than stainless), seamless, cold-drawn/cold-rolled, tubes, pipes, etc., w/circ. cross sect., for mfr of ball/roller bearings.	25	2024
7304.51.50	Alloy steel (o/than stainless), seamless, cold-drawn/cold-rolled, tubes, pipes and hollow profiles, w/circular cross section, nesoi.	25	2024
7304.59.10	Alloy steel (o/than stainless), seamless, n/cold-drawn/cold-rolled, tubes, pipes, etc. w/circ. cross sect., for mfr ball/roller bearings.	25	2024
7304.59.20	Alloy steel (o/than stainless), seamless, n/cold-drawn/cold-rolled, tubes, pipes, etc. w/circ. cross sect., for boilers, heaters, etc.	25	2024
7304.59.60	Heat-resisting alloy steel (o/than stainless), seamless, n/cold-drawn/cold-rolled, tubes, pipes, etc., w/circ. cross sect., nesoi.	25	2024
7304.59.80	Alloy steel (o/than heat-resist or stainless), seamless, n/cold-drawn/cold-rolled, tubes, pipes and hollow prof., w/circ. cross sect., nesoi.	25	2024
7304.90.10	Iron (o/than cast) or nonalloy steel, seamless, tubes, pipes and hollow profiles, o/than circ. cross sect., w/wall thickness of 4 mm or more.	25	2024
7304.90.70	Alloy steel (o/than stainless), seamless, tubes, pipes and hollow profiles, o/than circ. cross sect., w/wall thickness less than 4 mm.	25	2024
7305.11.10	Iron or nonalloy steel, seamed, w/circ. cross sect. & ext. diam o/406.4mm, line pipe, long. submerg. arc weld., used for oil/gas.	25	2024
7305.11.50	Alloy steel, seamed, circ. w/cross sect. & ext. diam o/406.4mm, line pipe, long. submerg. arc weld., used for oil/gas pipelines.	25	2024
7305.12.10	Iron or nonalloy steel, seamed, w/circ. cross sect. & ext. diam o/406.4mm, line pipe, long. welded nesoi, used for oil/gas.	25	2024
7305.12.50	Alloy steel, seamed, w/circ. cross sect. & ext. diam o/406.4mm, line pipe, long. welded nesoi, used for oil/gas pipelines.	25	2024
7305.19.10	Iron or nonalloy steel, seamed, w/circ. cross sect.& ext. diam o/406.4mm, line pipe, not long. welded, used for oil/gas.	25	2024
7305.19.50	Alloy steel, seamed, w/circ. cross sect. & ext. diam o/406.4mm, line pipe, not long. welded, used for oil/gas pipelines.	25	2024
7305.20.20	Iron or nonalloy steel, seamed, w/circ. cross sect. & ext. diam. o/406.4mm, casing pipe, threaded/coupled, of kind for drilling for oil/gas.	25	2024
7305.20.40	Iron or nonalloy steel, seamed, w/circ. cross sect. & ext. diam. o/406.4mm, casing pipe, n/threaded/coupled, of kind for drill. for oil/gas.	25	2024
7305.20.60	Alloy steel, seamed, w/circ. cross sect. & ext. diam. o/406.4mm, casing pipe, threaded/coupled, of kind for drilling for oil/gas.	25	2024
7305.20.80	Alloy steel, seamed, w/circ. cross sect. & ext. diam. o/406.4mm, casing pipe, n/threaded/coupled, of kind for drilling for oil/gas.	25	2024
7305.31.20	Steel, long. welded, w/circ. cross sect & ext. diam o/406.4mm, tapered pipes and tubes principally used as pts of illuminating arts.	25	2024
7305.31.40	Iron or nonalloy steel, long. welded, w/circ. cross sect. & ext. diam. o/406.4mm, tubes and pipes, o/th used in oil/gas drill.etc.	25	2024
7305.31.60	Alloy steel, long. welded, w/circ. cross sect. & ext. diam. o/406.4mm, tubes and pipes, o/than used in oil/gas drill. or pipelines.	25	2024
7305.39.10	Iron or nonalloy steel, weld. o/than long. weld., w/circ. x-sect. & ext. diam. o/406.4mm, tubes and pipes, o/th used in oil/gas drill.etc.	25	2024
7305.39.50	Alloy steel, weld. o/than long. weld., w/circ. x-sect. & ext. diam. o/406.4mm, tubes and pipes, o/than used in oil/gas drill. or pipelines.	25	2024
7305.90.10	Iron or nonalloy steel, seamed, w/circ. cross sect. & ext. diam. o/406.4mm, not welded, tubes and pipes, o/th used in oil/gas drill.etc.	25	2024

HTSUS subheading	Product description	Rate (%)	Timing
7305.90.50	Alloy steel, seamed, w/circ. cross sect. & ext. diam. o/406.4mm, not welded, tubes and pipes, o/than used in oil/gas drill. or pipelines.	25	2024
7306.11.00	Welded stainless steel, w/ext. diam 406.4mm or less or o/than circ. x-sect, line pipe of a kind used for oil and gas pipelines.	25	2024
7306.19.10	Iron or nonalloy steel, seamed, w/ext. diam. 406.4mm or less or o/than circ. x-sect, line pipe of a kind used for oil and gas pipelines.	25	2024
7306.19.51	Alloy steel, seamed (o/than welded stainless steel), w/ext. diam 406.4mm or less or o/than circ. x-sect, line pipe of a kind used for oil an.	25	2024
7306.21.30	Welded stainless steel, w/ext. diam 406.4mm or less or o/than circ. x-sect, threaded/coupled, casing of kind used in drilling for oil/gas.	25	2024
7306.21.40	Welded stainless steel, w/ext. diam 406.4mm or less or o/than circ. x-sect, n/threaded/coupled, casing of kind used in drilling for oil/gas.	25	2024
7306.21.80	Welded stainless steel, w/ext. diam 406.4mm or less or o/than circ. x-sect, tubing of a kind used for drilling for oil/gas.	25	2024
7306.29.10	Iron or nonalloy steel, seamed, w/ext. diam 406.4mm or less or o/than circ. x-sect, threaded/coupled, casing of kind used in drill. oil/gas.	25	2024
7306.29.20	Iron or nonalloy steel, seamed, w/ext. diam 406.4mm or less or o/than circ. x-sect, n/threaded/coupled, casing kind used drill for oil/gas.	25	2024
7306.29.31	Alloy steel, seamed (o/than welded stainless steel), w/ext. diam 406.4mm or less or o/than circ. x-sect, threaded/coupled, casing of kind us.	25	2024
7306.29.41	Alloy steel, seamed (o/than welded stainless steel), w/ext. diam 406.4mm or less or o/than circ. x-sect, n/threaded/coupled, casing of kind.	25	2024
7306.29.60	Iron or nonalloy steel, seamed, w/ext. diam. 406.4mm or less or o/than circ. x-sect, tubing of a kind used for drilling for oil/gas.	25	2024
7306.29.81	Alloy steel, seamed (o/than welded stainless steel), w/ext. diam 406.4mm or less or o/than circ. x-sect, tubing of a kind used for drilling.	25	2024
7306.30.10	Iron or nonalloy steel, welded, w/circ. x-sect & ext. diam. 406.4mm or less, tubes, pipes, hollow profiles, w/wall thick. less than 1.65 mm.	25	2024
7306.30.30	Nonalloy steel, welded, w/circ. x-sect & ext. diam. 406.4mm or less, tapered pipes & tubes, w/wall thick. of 1.65 mm+, pts. of illum. arts..	25	2024
7306.30.50	Iron or nonalloy steel, welded, w/circ. x-sect & ext. diam. 406.4mm or less, pipes, tubes & holl. prof., w/wall thick. of 1.65 mm or more.	25	2024
7306.40.10	Stainless steel, welded, w/circ. x-sect & ext. diam. 406.4mm or less, tubes, pipes, hollow profiles, w/wall thick. less than 1.65 mm.	25	2024
7306.40.50	Stainless steel, welded, w/circ. x-sect & ext. diam. 406.4mm or less, tubes, pipes, hollow profiles, w/wall thick. of 1.65 mm or more.	25	2024
7306.50.10	Alloy steel (o/stainless), welded, w/circ. x-sect & ext. diam. 406.4mm or less, tubes, pipes, hollow prof., w/wall thick. less th/1.65 mm.	25	2024
7306.50.30	Alloy steel (o/stainless), welded, w/circ. x-sect & ext. diam. 406.4mm or less, tapered pipes & tubes, w/wall thick. of 1.65 mm+, pts. illum.	25	2024
7306.50.50	Alloy steel (o/stainless), welded, w/circ. x-sect & ext. diam. 406.4mm or less, tubes, pipes, hollow prof., w/wall thick. of 1.65 mm+.	25	2024
7306.61.10	Iron or nonalloy steel, welded, w/square or rectangular x-sect, tubes, pipes and hollow profiles, w/wall thickness of 4 mm or more.	25	2024
7306.61.30	Alloy steel, welded, w/square or rectangular x-sect, tubes, pipes and hollow profiles, w/wall thickness of 4 mm or more.	25	2024
7306.61.50	Iron or nonalloy steel, welded, w/square or rectangular x-sect, tubes, pipes and hollow profiles, w/wall thickness less than 4 mm.	25	2024
7306.61.70	Alloy steel, welded, w/square or rectangular x-sect, tubes, pipes and hollow profiles, w/wall thickness less than 4 mm.	25	2024
7306.69.10	Iron or nonalloy steel, welded, w/other non-circ. x-sect, tubes, pipes and hollow profiles, w/wall thickness of 4 mm or more.	25	2024
7306.69.30	Alloy steel, welded, w/other non-circ. x-sect, tubes, pipes and hollow profiles, w/wall thickness of 4 mm or more.	25	2024
7306.69.70	Alloy steel, welded, w/other non-circ. x-sect, tubes, pipes and hollow profiles, w/wall thickness less than 4 mm.	25	2024
7306.90.10	Iron or nonalloy steel, seamed o/welded, w/non-circ. x-sect. or circ. x-sect. w/ext. diam. 406.4mm or less, tubes, pipes & hollow profiles.	25	2024
7306.90.50	Alloy steel, seamed o/than welded, w/non-circ. x-sect or circ. x-sect w/ext. diam. 406.4mm or less, tubes, pipes and hollow profiles.	25	2024
7601.10.30	Aluminum (o/than alloy), unwrought, in coils, w/uniform x-section throughout length & w/least cross-sectional dimension n/o 9.5 mm.	25	2024
7601.10.60	Aluminum (o/than alloy), unwrought nesoi	25	2024
7601.20.30	Aluminum alloys, unwrought, in coils, w/uniform x-section throughout length & w/least cross-sectional dimension n/o 9.5 mm.	25	2024
7601.20.60	Aluminum alloys, w/25 or more by weight of silicon, unwrought nesoi	25	2024
7601.20.90	Aluminum alloys nesoi, unwrought nesoi	25	2024
7604.10.10	Aluminum (o/than alloy), profiles	25	2024
7604.10.30	Aluminum (o/than alloy), bar and rods, with a round cross section	25	2024
7604.10.50	Aluminum (o/than alloy), bar and rods, other than with a round cross section	25	2024
7604.21.00	Aluminum alloy, hollow profiles	25	2024
7604.29.10	Aluminum alloy, profiles (o/than hollow profiles)	25	2024
7604.29.30	Aluminum alloy, bars and rods, having a round cross section	25	2024

HTSUS subheading	Product description	Rate (%)	Timing
7604.29.50	Aluminum alloy, bars and rods, other than with a round cross section	25	2024
7605.11.00	Aluminum (o/than alloy), wire, with a maximum cross-sectional dimension over 7 mm	25	2024
7605.19.00	Aluminum (o/than alloy), wire, with a maximum cross-sectional dimension of 7 mm or less.	25	2024
7605.21.00	Aluminum alloy, wire, with a maximum cross-sectional dimension over 7 mm	25	2024
7605.29.00	Aluminum alloy, wire, with a maximum cross-sectional dimension of 7 mm or less	25	2024
7606.11.30	Aluminum (o/than alloy), plates/sheets/strip, w/thick. o/0.2mm, rectangular (incl. sq), not clad.	25	2024
7606.11.60	Aluminum (o/than alloy), plates/sheets/strip, w/thick. o/0.2mm, rectangular (incl. sq), clad.	25	2024
7606.12.30	Aluminum alloy, plates/sheets/strip, w/thick. o/0.2mm, rectangular (incl. sq), not clad	25	2024
7606.12.60	Aluminum alloy, plates/sheets/strip, w/thick. o/0.2mm, rectangular (incl. sq), clad	25	2024
7606.91.30	Aluminum (o/than alloy), plates/sheets/strip, w/thick. o/0.2mm, o/than rectangular (incl. sq), not clad.	25	2024
7606.91.60	Aluminum (o/than alloy), plates/sheets/strip, w/thick. o/0.2mm, o/than rectangular (incl. sq), clad.	25	2024
7606.92.30	Aluminum alloy, plates/sheets/st rip, w/thick. o/0.2mm, o/than rectangular (incl. sq), not clad.	25	2024
7606.92.60	Aluminum alloy, plates/sheets/strip, w/thick. o/0.2mm, o/than rectangular (incl. sq), clad	25	2024
7607.11.30	Aluminum, foil, w/thickness n/o 0.01 mm, rolled but not further worked, not backed	25	2024
7607.11.60	Aluminum, foil, w/thickness over 0.01 mm but n/o 0.15 mm, rolled but not further worked, not backed.	25	2024
7607.11.90	Aluminum, foil, w/thickness over 0.15 mm but n/o 0.2 mm, rolled but not further worked, not backed.	25	2024
7607.19.60	Aluminum, foil nesoi, w/thickness o/0.15mm but n/o 0.2 mm or 0.15mm or less & not cut to shape, not rolled, not backed, nesoi.	25	2024
7607.20.10	Aluminum, foil, w/thickness n/o 0.2 mm, backed, covered or decorated with a character, design, fancy effect or pattern.	25	2024
7608.10.00	Aluminum (o/than alloy), tubes and pipes	25	2024
7608.20.00	Aluminum alloy, tubes and pipes	25	2024
7609.00.00	Aluminum, fittings for tubes and pipes	25	2024
	Syringes and Needles		
9018.31.00	Syringes, with or without their needles; parts and accessories thereof; except enteral syringes provided for in heading 9903.91.10, entered before January 1, 2026 (described in statistical reporting number 9018.31.0080).	100	2024
9018.32.00	Tubular metal needles and needles for sutures, used in medical, surgical, dental or veterinary sciences, and parts and accessories thereof.	100	2024

Annex B—Exclusions for Solar Manufacturing Equipment

Exclusion Product Description
Silicon growth furnaces, including Czochralski crystal growth furnaces, designed for growing monocrystalline silicon ingots (boules) of a mass exceeding 700 kg, for use in solar wafer manufacturing (described in statistical reporting number 8486.10.0000).
Band saws designed for cutting or slicing cylindrical monocrystalline silicon ingots (boules) of an initial mass exceeding 400 kg into square or rectangular ingots (boules), for use in solar wafer manufacturing (described in statistical reporting number 8486.10.0000).
Machines designed to align and adhere square or rectangular monocrystalline silicon ingots (boules) of an initial mass exceeding 200 kg to plastic support boards on metal mounting plates to provide support during diamond wire sawing, for use in solar wafer manufacturing (described in statistical reporting number 8486.10.0000).
Diamond wire saws designed for cutting or slicing square or rectangular monocrystalline silicon ingots (boules) of an initial mass exceeding 400 kg into solar wafers of a thickness not exceeding 200 micrometers (described in statistical reporting number 8486.10.0000).
Wire guide roller machines, presented with diamond wire saws designed for slicing square or rectangular monocrystalline silicon ingots (boules) of an initial mass exceeding 400 kg into solar wafers of a thickness not exceeding 200 micrometers, all of the foregoing for use in solar wafer manufacturing (described in statistical reporting number 8486.10.0000).
Coolant fluid recycling machines, presented with diamond wire saws designed for slicing square or rectangular monocrystalline silicon ingots (boules) of an initial mass exceeding 400 kg into solar wafers of a thickness not exceeding 200 micrometers, all of the foregoing for use in solar wafer manufacturing (described in statistical reporting number 8486.10.0000).
Degumming machines designed to remove adhesives from solar wafers (described in statistical reporting number 8486.10.0000).
Texturing, etching, polishing, and cleaning machines designed to prepare, repair, clean, etch, polish or texture the solar wafer substrate, whether or not integrated with automation equipment for transferring solar wafers from one process station to the next, all the foregoing for use in solar wafer manufacturing (described in statistical reporting number 8486.20.0000).
Thermal diffusion quartz-tube furnaces, designed to diffuse dopant impurities into square or rectangular silicon wafers, whether or not integrated with automation equipment for transferring solar wafers from one process station to the next or boat loading or unloading machines, all the foregoing for use in solar cell manufacturing (described in statistical reporting number 8486.20.0000).
Plasma-enhanced or low-pressure chemical vapor deposition machines designed to deposit amorphous or nanocrystalline layers on one or both surfaces of a solar wafer, whether or not integrated with automation equipment for transferring solar wafers from one process station to the next, all the foregoing for use in solar cell manufacturing (described in statistical reporting number 8486.20.0000).

EXCLUSION PRODUCT DESCRIPTION—Continued

Physical vapor deposition (PVD) machines, designed to deposit a thin film of transparent conducting oxide on one or both surfaces of a solar wafer, whether or not integrated with automation equipment for transferring solar wafers from one process station to the next, all the foregoing for use in solar cell manufacturing (described in statistical reporting number 8486.20.0000).
Screen printing line machines, including sintering furnaces for printing conducting contacts on both surfaces of a solar wafer, whether or not integrated with automation equipment for transferring solar wafers from one process station to the next, and whether or not integrated with equipment for solar cell testing, all the foregoing for use in solar cell manufacturing (described in statistical reporting number 8486.20.0000).
Machines designed for transporting polysilicon material to growth furnaces and machines designed for transporting monocrystalline ingots (boules) and wafers throughout the solar wafer manufacturing process, including machines for loading or unloading solar wafers during the diamond wire slicing process (described in statistical reporting number 8486.40.0030).
Machines designed for lifting, handling, loading, or unloading of solar wafers of a thickness not exceeding 200 micrometers, for use in solar wafer manufacturing (described in statistical reporting number 8486.40.0030).

Annex C—Changes to Harmonized Tariff Schedule of the United States

1. Effective with respect to goods entered for consumption, or withdrawn from warehouse for consumption, on or after 12:01 a.m. eastern daylight time on September 27, 2024, subchapter III of chapter 99 of the Harmonized Tariff Schedule of the United States (HTSUS) is modified by inserting the following new headings 9903.91.01, 9903.91.02 and 9903.91.03 in numerical sequence, with the material in the new headings inserted in the columns of the HTSUS labeled ''Heading/Subheading'', ''Article Description'', ''Rates of Duty 1—General'', ''Rates of Duty 1—Special'' and ''Rates of Duty 2'', respectively:

Heading/ subheading	Article description	Rates of duty		
		1		2
		General	Special	
"9903.91.01	Effective with respect to entries on or after September 27, 2024, articles the product of China, as provided for in subdivision (b) of U.S. note 31 to this subchapter.	The duty provided in the applicable subheading + 25%.		
9903.91.02	Effective with respect to entries on or after September 27, 2024, articles the product of China, as provided for in subdivision (c) of U.S. note 31 to this subchapter.	The duty provided in the applicable subheading + 50%.		
9903.91.03	Except as provided in heading 9903.91.10, effective with respect to entries on or after September 27, 2024, articles the product of China, as provided for in subdivision (d) of U.S. note 31 to this subchapter.	The duty provided in the applicable subheading + 100%".		

2. Effective with respect to goods entered for consumption, or withdrawn from warehouse for consumption, on or after 12:01 a.m. eastern standard time on January 1, 2025, subchapter III of chapter 99 of the HTSUS is modified by inserting the following new headings 9903.91.04 and 9903.91.05 in numerical sequence, with the material in the new heading inserted in the columns of the HTSUS labeled ''Heading/Subheading'', ''Article Description'', ''Rates of Duty 1—General'', ''Rates of Duty 1—Special'' and ''Rates of Duty 2'', respectively:

Heading/ subheading	Article description	Rates of duty		
		1		2
		General	Special	
"9903.91.04	Effective with respect to entries on or after January 1, 2025, and before January 1, 2026, articles the product of China, as provided for in subdivision (e) of U.S. note 31 to this subchapter.	The duty provided in the applicable subheading + 25%.		
9903.91.05	Effective with respect to entries on or after January 1, 2025, articles the product of China, as provided for in subdivision (f) of U.S. note 31 to this subchapter.	The duty provided in the applicable subheading + 50%".		

3. Effective with respect to goods entered for consumption, or withdrawn from warehouse for consumption, on or after 12:01 a.m. eastern standard time on January 1, 2026, subchapter III of chapter 99 of the HTSUS is modified by inserting the following new headings 9903.91.06, 9903.91.07, and 9903.91.08 in numerical sequence, with the material in the new heading inserted in the columns of the HTSUS labeled ''Heading/Subheading'', ''Article Description'', ''Rates of Duty 1—General'', ''Rates of Duty 1—Special'' and ''Rates of Duty 2'', respectively:

Heading/ subheading	Article description	Rates of duty		
		1		2
		General	Special	
"9903.91.06	Effective with respect to entries on or after January 1, 2026, articles the product of China, as provided for in subdivision (g) of U.S. note 31 to this subchapter.	The duty provided in the applicable subheading + 25%.		
9903.91.07	Effective with respect to entries on or after January 1, 2026, articles the product of China, as provided for in subdivision (h) of U.S. note 31 to this subchapter.	The duty provided in the applicable subheading + 50%.		
9903.91.08	Effective with respect to entries on or after January 1, 2026, articles the product of China, as provided for in subdivision (i) of U.S. note 31 to this subchapter.			

4. Effective on September 27, 2024, subchapter III of chapter 99 of the HTSUS is modified by inserting the following new U.S. note 31 in numerical sequence:

"31. (a) As provided in headings 9903.91.01, 9903.91.02, 9903.91.03, 9903.91.04, 9903.91.05, 9903.91.06, 9903.91.07 and 9903.91.08 and subheading 9903.92.10, products of China shall be subject to additional *ad valorem* rates of duty, as provided for in this note. The products of China that are subject to additional *ad valorem* rates of duty in accordance with this note are products of China that are classified in the subheadings, or described in the statistical reporting numbers, enumerated in this note.

"Notwithstanding U.S. note 1 to this subchapter, all products of China that are subject to the additional *ad valorem* rate of duty imposed by headings 9903.91.01, 9903.91.02, 9903.91.03, 9903.91.04, 9903.91.05, 9903.91.06, 9903.91.07 and 9903.91.08 and subheading 9903.92.10, shall also be subject to the general rates of duty imposed on products of China classified in the subheadings, or described in the statistical reporting numbers, enumerated in this note.

"Products of China that are classified in the subheadings, or described in the statistical reporting numbers, enumerated in this note that are eligible for special tariff treatment under general note 3(c)(i) to the HTSUS, or that are eligible for temporary duty exemptions or reductions under subchapter II to chapter 99, shall be subject to the additional *ad valorem* rate of duty imposed by headings 9903.91.01, 9903.91.02, 9903.91.03, 9903.91.04, 9903.91.05, 9903.91.06, 9903.91.07 and 9903.91.08 and subheading 9903.92.10.

"The additional duties imposed by headings 9903.91.01, 9903.91.02, 9903.91.03, 9903.91.04, 9903.91.05, 9903.91.06, 9903.91.07 and 9903.91.08 and subheading 9903.92.10, do not apply to goods for which entry is properly claimed under a provision of chapter 98 of the HTSUS, except for goods entered under subheadings 9802.00.40, 9802.00.50, and 9802.00.60, and heading 9802.00.80. For subheadings 9802.00.40, 9802.00.50, and 9802.00.60, the additional duties apply to the value of repairs, alterations, or processing performed abroad, as described in the applicable subheading. For heading 9802.00.80, the additional duties apply to the value of the article less the cost or value of such products of the United States, as described in heading 9802.00.80.

"Products of China that are provided for in headings 9903.91.01, 9903.91.02, 9903.91.03, 9903.91.04, 9903.91.05, 9903.91.06, 9903.91.07 and 9903.91.08 and subheading 9903.92.10 and classified in one of the subheadings, or described in the statistical reporting numbers, enumerated in this note shall continue to be subject to antidumping, countervailing, or other duties, fees, exactions and charges that apply to such products, as well as to the additional *ad valorem* rate of duty imposed by headings 9903.91.01, 9903.91.02, 9903.91.03, 9903.91.04, 9903.91.05, 9903.91.06, 9903.91.07, and 9903.91.08 and subheading 9903.92.10."

"(b) Heading 9903.91.01 applies to products of China that are classified in the 8-digit subheadings, or described in the 10-digit statistical reporting numbers, enumerated in this subdivision, effective with respect to goods entered for consumption, or withdrawn from warehouse for consumption, on or after 12:01 a.m. eastern daylight time on September 27, 2024:

(1) N95 respirators of textiles, described in statistical reporting numbers 6307.90.9842 or 6307.90.9844
(2) Respirators of textiles, other than N95 respirators, described in statistical reporting number 6307.90.9850
(3) Face masks of textiles, other than disposable, described in statistical reporting number 6307.90.9875
(4) Lithium-ion batteries of a kind used as the primary source of electrical power for electrically powered vehicles of subheadings 8703.40, 8703.50, 8703.60, 8703.70 or 8703.80, described in statistical reporting number 8507.60.0010
(5) 2602.00.00
(6) 2605.00.00
(7) 2606.00.00
(8) 2608.00.00
(9) 2610.00.00
(10) 2611.00.60
(11) 2825.90.30
(12) 2841.80.00
(13) 2844.41.00
(14) 2844.42.00
(15) 2844.43.00
(16) 2844.44.00
(17) 2849.90.30
(18) 7202.60.00
(19) 7202.93.40
(20) 7202.93.80
(21) 7206.10.00
(22) 7206.90.00
(23) 7207.11.00
(24) 7207.12.00
(25) 7207.19.00
(26) 7207.20.00
(27) 7208.10.15
(28) 7208.10.30
(29) 7208.10.60
(30) 7208.25.30
(31) 7208.25.60
(32) 7208.26.00
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(45) 7209.15.00
(46) 7209.16.00
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(49) 7209.18.25
(50) 7209.18.60
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(53) 7209.27.00
(54) 7209.28.00
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(66) 7210.70.60
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(266) 7305.12.10
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(339) 7608.10.00
(340) 7608.20.00
(341) 7609.00.00
(342) 7901.11.00
(343) 7901.12.10
(344) 7901.12.50
(345) 7901.20.00
(346) 8001.10.00
(347) 8001.20.00
(348) 8101.10.00
(349) 8103.20.00
(350) 8112.21.00
(351) 8112.92.30
(352) 8507.90.40''.

''(c) Heading 9903.91.02 applies to products of China that are classified in the following 8-digit subheadings, effective with respect to goods entered for consumption, or withdrawn from warehouse for consumption, on or after 12:01 a.m. eastern daylight time on September 27, 2024:

(1) 8541.42.00
(2) 8541.43.00''.

''(d) Heading 9903.91.03 applies to products of China that are classified in the following 8-digit subheadings, effective with respect to goods entered for consumption, or withdrawn from warehouse for consumption, on or after 12:01 a.m. eastern daylight time on September 27, 2024:

(1) 8702.40.31
(2) 8702.40.61
(3) 8702.90.31
(4) 8702.90.61
(5) 8703.60.00
(6) 8703.70.00
(7) 8703.80.00
(8) 8703.90.01
(9) 9018.31.00
(10) 9018.32.00''.

''(e) Heading 9903.91.04 applies to facemasks of textiles, disposable, of China, described in statistical reporting number 6307.90.9870, effective with respect to goods entered for consumption, or withdrawn from warehouse for consumption, on or after 12:01 a.m. eastern standard time on January 1, 2025, and before January 1, 2026.''

''(f) Heading 9903.91.05 applies to products of China that are classified in the following 8-digit subheadings, effective with respect to goods entered for consumption, or withdrawn from warehouse for consumption, on or after 12:01 a.m. eastern standard time on January 1, 2025:

(1) 4015.12.10
(2) 8541.10.00
(3) 8541.21.00
(4) 8541.29.00
(5) 8541.30.00
(6) 8541.49.10
(7) 8541.49.70
(8) 8541.49.80
(9) 8541.49.95
(10) 8541.51.00
(11) 8541.59.00
(12) 8541.90.00
(13) 8542.31.00
(14) 8542.32.00
(15) 8542.33.00
(16) 8542.39.00
(17) 8542.90.00''.

''(g) Heading 9903.91.06 applies to products of China that are classified in the following 8-digit subheadings, effective with respect to goods entered for consumption, or withdrawn from warehouse for consumption, on or after 12:01 a.m. eastern standard time on January 1, 2026:

(1) 2504.10.10
(2) 2504.10.50
(3) 2504.90.00
(4) 8505.11.00
(5) 8507.60.00''.

''(h) Heading 9903.91.07 applies to products of China that are described in the following 10-digit statistical reporting numbers, effective with respect to goods entered for consumption, or withdrawn from warehouse for consumption, on or after 12:01 a.m. eastern standard time on January 1, 2026:

(1) N95 respirators of textiles, described in statistical reporting numbers 6307.90.9842 or 6307.90.9844
(2) Respirators of textiles, other than N95 respirators, described in statistical reporting number 6307.90.9850
(3) Face masks of textiles, described in statistical reporting numbers 6307.90.9870 or 6307.90.9875''.

''(i) Heading 9903.91.08 applies to products of China classified in 8-digit subheading 4015.12.10, effective with respect to goods entered for consumption, or withdrawn from warehouse for consumption, on or after

12:01 a.m. eastern standard time on January 1, 2026.''

5. Effective with respect to goods of China entered for consumption, or withdrawn from warehouse for consumption, on or after 12:01 a.m. eastern daylight time on September 27, 2024, subchapter III of chapter 99 of the HTSUS is modified by inserting the following new heading 9903.92 and new subheadings 9903.92.10 and 9903.92.80 in numerical sequence, with the material in the new headings and subheadings inserted in the columns of the HTSUS labeled ''Heading/ Subheading'', ''Article Description'', ''Rates of Duty 1—General'', ''Rates of Duty 1—Special'' and ''Rates of Duty 2'', respectively:

Heading/ subheading	Article description	Rates of duty 1 General	Rates of duty 1 Special	Rates of duty 2
''9903.92	Effective with respect to entries, on or after September 27, 2024, of overhead traveling cranes, transporter cranes, gantry cranes, bridge cranes and mobile lifting frames, other than overhead traveling cranes on fixed support and other than mobile lifting frames on tires, articles the product of China (provided for in subheading 8426.19.00):			
9903.92.10	Except as provided in heading 9903.91.09, ship-to-shore gantry cranes, configured as a high- or low-profile steel superstructure and designed to unload intermodal containers from vessels with coupling devices for containers, including spreaders or twist-locks (provided for in subheading 8426.19.00).	The duty provided in the applicable subheading + 25%.		
9903.92.80	Other (provided for in subheading 8426.19.00	The duty provided in the applicable subheading''.		

6. Effective with respect to products of China that are entered for consumption, or withdrawn from warehouse for consumption, on or after 12:01 a.m. eastern daylight time on September 27, 2024, and before May 14, 2026, subchapter III of chapter 99 of the HTSUS is modified by inserting the following new heading 9903.91.09 in numerical sequence, with the material in the new heading inserted in the columns of the HTSUS labeled ''Heading/Subheading'', ''Article Description'', ''Rates of Duty 1—General'', ''Rates of Duty 1—Special'' and ''Rates of Duty 2'', respectively:

Heading/ subheading	Article description	Rates of duty 1 General	Rates of duty 1 Special	Rates of duty 2
''9903.91.09	Notwithstanding subheading 9903.92.10, effective with respect to entries, on or after September 27, 2024, of ship-to-shore gantry cranes, configured as a high- or low-profile steel superstructure and designed to unload intermodal containers from vessels with coupling devices for containers, including spreaders or twist-locks, articles the product of China (provided for in subheading 8426.19.00), that are fulfilling in whole or in part an executed contract for sale dated prior to May 14, 2024 for goods that are entered for consumption, or withdrawn from warehouse for consumption, in the United States prior to May 14, 2026.	The duty provided in the applicable subheading''.		

7. Effective with respect to products of China that are entered for consumption, or withdrawn from warehouse for consumption, on or after 12:01 a.m. eastern daylight time on September 27, 2024, and before January 1, 2026, subchapter III of chapter 99 of the HTSUS is modified by inserting the following new heading 9903.91.10 in numerical sequence, with the material in the new heading inserted in the columns of the HTSUS labeled ''Heading/Subheading'', ''Article Description'', ''Rates of Duty 1—General'', ''Rates of Duty 1—Special'' and ''Rates of Duty 2'', respectively:

Heading/ subheading	Article description	Rates of duty		
		1		2
		General	Special	
“9903.91.10	Notwithstanding heading 9903.91.03, effective with respect to entries of enteral syringes, of China, on or after September 27, 2024, and before January 1, 2026 (described in statistical reporting number 9018.31.0080).	The duty provided in the applicable subheading”.		

8. Effective with respect to products of China that are entered for consumption, or withdrawn from warehouse for consumption, on or after 12:01 a.m. eastern daylight time on January 1, 2024, and before June 1, 2025, subchapter III of chapter 99 of the HTSUS is modified:

(a) by inserting the following new heading 9903.88.70 in numerical sequence, with the material in the new heading inserted in the columns of the HTSUS labeled ‘‘Heading/Subheading’’, ‘‘Article Description’’, ‘‘Rates of Duty 1—General’’, ‘‘Rates of Duty 1—Special’’ and ‘‘Rates of Duty 2’’, respectively:

Heading/ subheading	Article description	Rates of duty		
		1		2
		General	Special	
“9903.88.70	Effective with respect to entries on or after January 1, 2024, and before June 1, 2025, articles the product of China, as provided in U.S. note 20(www) to this subchapter, each covered by an exclusion granted by the U.S. Trade Representative.	The duty provided in the applicable subheading”.		

(b) by inserting the following new U.S. note 20(www) to subchapter III of chapter 99 in numerical sequence:

‘‘(www) The U.S. Trade Representative determined to establish a process by which particular products classified in heading 9903.88.02 and provided for in U.S. notes 20(c) and (d) to this subchapter could be excluded from the additional duties imposed by heading 9903.88.02. See 83 FR 40823 (August 16, 2018) and 83 FR 47236 (September 18, 2018). Pursuant to the product exclusion process, the U.S. Trade Representative has determined that the additional duties imposed by heading 9903.88.02 and U.S. note 20(d) to this subchapter shall not apply to the products of China described herein and classified in the specified subheadings of heading 8486 of the tariff schedule, when such products of China are entered with a claim for the tariff treatment provided in heading 9903.88.70 of this subchapter:

(1) Silicon growth furnaces, including Czochralski crystal growth furnaces, designed for growing monocrystalline silicon ingots (boules) of a mass exceeding 700 kg, for use in solar wafer manufacturing (described in statistical reporting number 8486.10.0000)

(2) Band saws designed for cutting or slicing cylindrical monocrystalline silicon ingots (boules) of an initial mass exceeding 400 kg into square or rectangular ingots (boules), for use in solar wafer manufacturing (described in statistical reporting number 8486.10.0000)

(3) Machines designed to align and adhere square or rectangular monocrystalline silicon ingots (boules) of an initial mass exceeding 200 kg to plastic support boards on metal mounting plates to provide support during diamond wire sawing, for use in solar wafer manufacturing (described in statistical reporting number 8486.10.0000)

(4) Diamond wire saws designed for cutting or slicing square or rectangular monocrystalline silicon ingots (boules) of an initial mass exceeding 400 kg into solar wafers of a thickness not exceeding 200 micrometers (described in statistical reporting number 8486.10.0000)

(5) Wire guide roller machines, presented with diamond wire saws designed for slicing square or rectangular monocrystalline silicon ingots (boules) of an initial mass exceeding 400 kg into solar wafers of a thickness not exceeding 200 micrometers, all of the foregoing for use in solar wafer manufacturing (described in statistical reporting number 8486.10.0000)

(6) Coolant fluid recycling machines, presented with diamond wire saws designed for slicing square or rectangular monocrystalline silicon ingots (boules) of an initial mass exceeding 400 kg into solar wafers of a thickness not exceeding 200 micrometers, all of the foregoing for use in solar wafer manufacturing (described in statistical reporting number 8486.10.0000)

(7) Degumming machines designed to remove adhesives from solar wafers (described in statistical reporting number 8486.10.0000)

(8) Texturing, etching, polishing, and cleaning machines designed to prepare, repair, clean, etch, polish or texture the solar wafer substrate, whether or not integrated with automation equipment for transferring solar wafers from one process station to the next, all the foregoing for use in solar wafer manufacturing (described in statistical reporting number 8486.20.0000)

(9) Thermal diffusion quartz-tube furnaces, designed to diffuse dopant impurities into square or rectangular silicon wafers, whether or not integrated with automation equipment for transferring solar wafers from one process station to the next or boat loading or unloading machines, all the

foregoing for use in solar cell manufacturing (described in statistical reporting number 8486.20.0000)

(10) Plasma-enhanced or low-pressure chemical vapor deposition machines designed to deposit amorphous or nanocrystalline layers on one or both surfaces of a solar wafer, whether or not integrated with automation equipment for transferring solar wafers from one process station to the next, all the foregoing for use in solar cell manufacturing (described in statistical reporting number 8486.20.0000)

(11) Physical vapor deposition (PVD) machines, designed to deposit a thin film of transparent conducting oxide on one or both surfaces of a solar wafer, whether or not integrated with automation equipment for transferring solar wafers from one process station to the next, all the foregoing for use in solar cell manufacturing (described in statistical reporting number 8486.20.0000)

(12) Screen printing line machines, including sintering furnaces for printing conducting contacts on both surfaces of a solar wafer, whether or not integrated with automation equipment for transferring solar wafers from one process station to the next, and whether or not integrated with equipment for solar cell testing, all the foregoing for use in solar cell manufacturing (described in statistical reporting number 8486.20.0000)

(13) Machines designed for transporting polysilicon material to growth furnaces and machines designed for transporting monocrystalline ingots (boules) and wafers throughout the solar wafer manufacturing process, including machines for loading or unloading solar wafers during the diamond wire slicing process (described in statistical reporting number 8486.40.0030)

(14) Machines designed for lifting, handling, loading, or unloading of solar wafers of a thickness not exceeding 200 micrometers, for use in solar wafer manufacturing (described in statistical reporting number 8486.40.0030)

9. Effective on September 27, 2024, subdivision (s)(i) of note 20 to subchapter III of chapter 99 of the HTSUS is modified by deleting "6307.90.98" and subdivision (s)(ii) of note 20 to subchapter III of chapter 99 of the HTSUS is modified by inserting the following in numerical order: "5. Other made-up articles of textile materials, provided for in subheading 6307.90.98, except for respirators of textiles, described in statistical reporting numbers 6307.90.9842, 6307.90.9844 or 6307.90.9850, and except for face masks of textiles, other than disposable, described in statistical reporting number 6307.90.9875;".

10. Effective on September 27, 2024, subdivision (s)(i) of note 20 to subchapter III of chapter 99 of the HTSUS is modified by deleting "8507.60.00" and subdivision (s)(ii) of note 20 to subchapter III of chapter 99 of the HTSUS is modified by inserting the following in numerical order: "6. Lithium-ion batteries, provided for in subheading 8507.60.00, except for lithium-ion batteries of a kind used as the primary source of electrical power for electrically powered vehicles of subheadings 8703.40, 8703.50, 8703.60, 8703.70 or 8703.80, described in statistical reporting number 8507.60.0010".

11. Effective on September 27, 2024, note 20(b) to subchapter III of chapter 99 is modified by deleting the following 8-digit subheading numbers:

(1) 8702.40.31
(2) 8702.40.61
(3) 8702.90.31
(4) 8702.90.61
(5) 8703.60.00
(6) 8703.70.00
(7) 8703.80.00
(8) 8703.90.01

12. Effective on September 27, 2024, note 20(d) to subchapter III of chapter 99 is modified by deleting the following 8-digit subheading numbers:

(1) 8541.42.00
(2) 8541.43.00

13. Effective on September 27, 2024, note 20(s)(i) to subchapter III of chapter 99 is modified by deleting the following 8-digit subheading numbers:

(1) 7206.10.00
(2) 7206.90.00
(3) 7207.11.00
(4) 7207.12.00
(5) 7207.19.00
(6) 7207.20.00
(7) 7208.10.15
(8) 7208.10.30
(9) 7208.10.60
(10) 7208.25.30
(11) 7208.25.60
(12) 7208.26.00
(13) 7208.27.00
(14) 7208.36.00
(15) 7208.37.00
(16) 7208.38.00
(17) 7208.39.00
(18) 7208.40.30
(19) 7208.40.60
(20) 7208.51.00
(21) 7208.52.00
(22) 7208.53.00
(23) 7208.54.00
(24) 7208.90.00
(25) 7209.15.00
(26) 7209.16.00
(27) 7209.17.00
(28) 7209.18.15
(29) 7209.18.25
(30) 7209.18.60
(31) 7209.25.00
(32) 7209.26.00
(33) 7209.27.00
(34) 7209.28.00
(35) 7209.90.00
(36) 7210.11.00
(37) 7210.12.00
(38) 7210.30.00
(39) 7210.41.00
(40) 7210.49.00
(41) 7210.50.00
(42) 7210.61.00
(43) 7210.69.00
(44) 7210.70.30
(45) 7210.70.60
(46) 7210.90.10
(47) 7210.90.60
(48) 7210.90.90
(49) 7211.13.00
(50) 7211.14.00
(51) 7211.19.15
(52) 7211.19.20
(53) 7211.19.30
(54) 7211.19.45
(55) 7211.19.60
(56) 7211.19.75
(57) 7211.23.15
(58) 7211.23.20
(59) 7211.23.30
(60) 7211.23.45
(61) 7211.23.60
(62) 7211.29.20
(63) 7211.29.45
(64) 7211.29.60
(65) 7211.90.00
(66) 7212.10.00
(67) 7212.20.00
(68) 7212.30.10
(69) 7212.30.30
(70) 7212.30.50
(71) 7212.40.10
(72) 7212.40.50
(73) 7212.50.00
(74) 7212.60.00
(75) 7213.10.00
(76) 7213.20.00
(77) 7213.91.30
(78) 7213.91.45
(79) 7213.91.60
(80) 7213.99.00
(81) 7214.20.00
(82) 7214.30.00
(83) 7214.91.00
(84) 7214.99.00
(85) 7215.10.00
(86) 7215.50.00
(87) 7215.90.10
(88) 7215.90.50
(89) 7216.10.00

(90) 7216.21.00
(91) 7216.22.00
(92) 7216.31.00
(93) 7216.32.00
(94) 7216.33.00
(95) 7216.40.00
(96) 7216.50.00
(97) 7216.99.00
(98) 7217.10.10
(99) 7217.10.20
(100) 7217.10.30
(101) 7217.10.50
(102) 7217.10.60
(103) 7217.10.70
(104) 7217.10.80
(105) 7217.10.90
(106) 7217.20.15
(107) 7217.20.30
(108) 7217.20.45
(109) 7217.20.60
(110) 7217.20.75
(111) 7217.30.15
(112) 7217.30.30
(113) 7217.30.60
(114) 7217.30.75
(115) 7217.90.10
(116) 7217.90.50
(117) 7218.10.00
(118) 7218.91.00
(119) 7218.99.00
(120) 7219.11.00
(121) 7219.12.00
(122) 7219.13.00
(123) 7219.14.00
(124) 7219.21.00
(125) 7219.22.00
(126) 7219.23.00
(127) 7219.24.00
(128) 7219.31.00
(129) 7219.32.00
(130) 7219.33.00
(131) 7219.34.00
(132) 7219.35.00
(133) 7219.90.00
(134) 7220.12.10
(135) 7220.12.50
(136) 7220.20.10
(137) 7220.20.60
(138) 7220.20.70
(139) 7220.20.80
(140) 7220.90.00
(141) 7221.00.00
(142) 7222.11.00
(143) 7222.19.00
(144) 7222.20.00
(145) 7222.30.00
(146) 7222.40.30
(147) 7222.40.60
(148) 7223.00.10
(149) 7223.00.50
(150) 7223.00.90
(151) 7224.10.00
(152) 7224.90.00
(153) 7225.11.00
(154) 7225.19.00
(155) 7225.30.11
(156) 7225.30.30
(157) 7225.30.51
(158) 7225.30.70
(159) 7225.40.11
(160) 7225.40.30
(161) 7225.40.51
(162) 7225.40.70
(163) 7225.50.11
(164) 7225.50.60
(165) 7225.50.70
(166) 7225.50.80
(167) 7225.91.00
(168) 7225.92.00
(169) 7225.99.00
(170) 7226.11.10
(171) 7226.11.90
(172) 7226.19.10
(173) 7226.19.90
(174) 7226.20.00
(175) 7226.91.05
(176) 7226.91.15
(177) 7226.91.25
(178) 7226.91.50
(179) 7226.91.70
(180) 7226.91.80
(181) 7226.92.10
(182) 7226.92.30
(183) 7226.92.50
(184) 7226.92.70
(185) 7226.92.80
(186) 7226.99.01
(187) 7227.10.00
(188) 7227.20.00
(189) 7227.90.10
(190) 7227.90.20
(191) 7227.90.60
(192) 7228.20.10
(193) 7228.20.50
(194) 7228.30.40
(195) 7228.30.60
(196) 7228.30.80
(197) 7228.40.00
(198) 7228.50.10
(199) 7228.50.50
(200) 7228.60.10
(201) 7228.60.60
(202) 7228.60.80
(203) 7228.70.30
(204) 7228.70.60
(205) 7229.20.00
(206) 7229.90.10
(207) 7229.90.50
(208) 7229.90.90
(209) 7301.10.00
(210) 7302.10.10
(211) 7302.10.50
(212) 7302.90.10
(213) 7302.90.90
(214) 7304.11.00
(215) 7304.19.10
(216) 7304.19.50
(217) 7304.22.00
(218) 7304.23.60
(219) 7304.24.30
(220) 7304.24.40
(221) 7304.24.60
(222) 7304.29.10
(223) 7304.29.20
(224) 7304.29.31
(225) 7304.29.41
(226) 7304.29.50
(227) 7304.29.61
(228) 7304.31.30
(229) 7304.31.60
(230) 7304.39.00
(231) 7304.49.00
(232) 7304.51.10
(233) 7304.51.50
(234) 7304.59.10
(235) 7304.59.20
(236) 7304.59.60
(237) 7304.59.80
(238) 7304.90.10
(239) 7304.90.70
(240) 7305.11.10
(241) 7305.11.50
(242) 7305.12.10
(243) 7305.12.50
(244) 7305.19.10
(245) 7305.19.50
(246) 7305.20.20
(247) 7305.20.40
(248) 7305.20.60
(249) 7305.20.80
(250) 7305.31.20
(251) 7305.31.40
(252) 7305.31.60
(253) 7305.39.10
(254) 7305.39.50
(255) 7305.90.10
(256) 7305.90.50
(257) 7306.11.00
(258) 7306.19.10
(259) 7306.19.51
(260) 7306.21.30
(261) 7306.21.40
(262) 7306.21.80
(263) 7306.29.10
(264) 7306.29.20
(265) 7306.29.31
(266) 7306.29.41
(267) 7306.29.60
(268) 7306.29.81
(269) 7306.30.10
(270) 7306.30.30
(271) 7306.30.50
(272) 7306.40.10
(273) 7306.40.50
(274) 7306.50.10
(275) 7306.50.30
(276) 7306.50.50
(277) 7306.61.10
(278) 7306.61.30
(279) 7306.61.50
(280) 7306.61.70
(281) 7306.69.10
(282) 7306.69.30
(283) 7306.69.70
(284) 7306.90.10
(285) 7306.90.50
(286) 7601.10.30
(287) 7601.10.60
(288) 7601.20.30
(289) 7601.20.60
(290) 7601.20.90
(291) 7604.10.10
(292) 7604.10.30
(293) 7604.10.50
(294) 7604.21.00
(295) 7604.29.10
(296) 7604.29.30

(297) 7604.29.50
(298) 7605.11.00
(299) 7605.19.00
(300) 7605.21.00
(301) 7605.29.00
(302) 7606.11.30
(303) 7606.11.60
(304) 7606.12.30
(305) 7606.12.60
(306) 7606.91.30
(307) 7606.91.60
(308) 7606.92.30
(309) 7606.92.60
(310) 7607.11.30
(311) 7607.11.60
(312) 7607.11.90
(313) 7607.19.60
(314) 7607.20.10
(315) 7608.10.00
(316) 7608.20.00
(317) 7609.00.00
(318) 8507.90.40

14. Effective on September 27, 2024, note 20(s)(ii)(4) to subchapter III of chapter 99 is modified by deleting ''9401.71.00031'' and by inserting ''9401.71.0031'' in lieu thereof.

15. Effective on September 27, 2024, note 20(u)(i) to subchapter III of chapter 99 is modified by deleting the following 8-digit subheading numbers:

(1) 7210.20.00
(2) 7215.90.30
(3) 7302.40.00
(4) 7304.23.30

16. Effective on January 1, 2025, note 20(b) to subchapter III of chapter 99 is modified by deleting the following 8-digit subheading numbers:

(1) 8541.21.00
(2) 8541.29.00
(3) 8541.30.00
(4) 8541.49.70
(5) 8541.49.80
(6) 8541.49.95
(7) 8541.51.00
(8) 8541.59.00
(9) 8541.90.00

17. Effective on January 1, 2025, note 20(d) to subchapter III of chapter 99 is modified by deleting the following 8-digit subheading numbers:

(1) 8541.10.00
(2) 8541.49.10
(3) 8542.31.00
(4) 8542.32.00
(5) 8542.33.00
(6) 8542.39.00
(7) 8542.90.00

18. Effective on January 1, 2025, note 20(s)(i) to subchapter III of chapter 99 is modified by deleting ''4015.12.10''.

19. Effective on January 1, 2025, subparagraph 5 of subdivision (s)(ii) of note 20 to subchapter III of chapter 99 of the HTSUS is modified by deleting ''and except for face masks of textiles, other than disposable, described in statistical reporting number 6307.90.9875'' and by inserting ''and except for face masks of textiles, described in statistical reporting numbers 6307.90.9870 or 6307.90.9875'' in lieu thereof.

20. Effective on January 1, 2026, subdivision (s)(ii) of note 20 to subchapter III of chapter 99 of the HTSUS is modified by deleting subparagraph number 6 and its associated tariff language. Subparagraph number 5 of such subdivision is modified by deleting the semicolon at the end of the subparagraph and inserting a period in lieu thereof.

21. Effective on January 1, 2026, subdivision (b) of note 31 to subchapter III of chapter 99 of the HTSUS is modified by deleting subparagraph numbers 1, 2, 3, and 4, and their associated tariff language.

22. Effective on January 1, 2026, subdivision (f) of note 31 to subchapter III of chapter 99 of the HTSUS is modified by deleting ''(1) 4015.12.10''.

23. Effective on January 1, 2024:

(1) subdivisions (c) and (d) of note 20 to subchapter III of chapter 99 are each modified: (a) by deleting ''or (11)'' and by inserting ''(11)'' in lieu thereof; and (b) by inserting ''or (12) heading 9903.88.70 and U.S. note 20(www) to subchapter III of chapter 99'' after ''U.S. note 20(vvv)(ii) to subchapter III of chapter 99''; and

(2) the article description of heading 9903.88.02 is modified by deleting ''or 9903.88.69,'' and by inserting in lieu thereof ''9903.88.69, or 9903.88.70,'' in lieu thereof.

Annex D—Importer Certification

I hereby certify that:

(A) My name is [IMPORTER OF RECORD OFFICIAL'S NAME] and I am an official of [NAME OF IMPORTER OF RECORD], located at [ADDRESS OF IMPORTER OF RECORD].

(B) I hereby certify that the ship-to-shore crane(s) that was entered into the Customs territory of the United States under the entry summary number(s) identified below are fulfilling in whole or in part a contract for sale, purchase, or delivery in the United States of such ship-to-shore crane(s) that was in effect and dated as executed prior to May 14, 2024, that specifies that the ship-to-shore crane(s) is to be imported to or delivered within the United States before May 14, 2026, and that has not been modified on or later than May 14, 2024, with regard to delivery date.

(C) This certification applies to the following entries (repeat this block as many times as necessary):

Entry Number:

Applicable Line Item Number of the Entry (Declared Under 9903.91.09, HTSUS):

(D) I understand that [NAME OF IMPORTER OF RECORD] is required to provide U.S. Customs and Border Protection (CBP) with this certification at the time the entry summary is filed and that any additional supporting documentation must be provided upon request by CBP.

Signature

[NAME OF COMPANY OFFICIAL]

[TITLE OF COMPANY OFFICIAL]

Date

Annex E—Subheadings Eligible for Machinery Exclusion Process

HTSUS subheading	Product description
8417.10.00	Furnaces and ovens for the roasting, melting or other heat treatment of ores, pyrites or of metals.
8417.80.00	Industrial or laboratory furnaces and ovens nesoi (not elsewhere specified or included), including incinerators, nonelectric.
8418.69.01	Refrigerating or freezing equipment nesoi.
8419.33.10	Lyophilization apparatus; freeze drying units; spray dryers, for agricultural products.
8419.33.50	Lyophilization apparatus; freeze drying units; spray dryers, other than for agricultural products, nesoi.
8419.34.00	Other dryers for agricultural products (other than lyophilization apparatus; freeze drying units; spray dryers).
8419.35.10	Dryers for wood.
8419.35.50	Dryers for paper pulp, paper or paperboard.
8419.39.02	Other dryers other than of a kind used for domestic purposes, nesoi (other than lyophilization apparatus; freeze drying units; spray dryers).
8419.40.00	Distilling or rectifying plant, not used for domestic purposes.
8419.50.10	Brazed aluminum plate-fin heat exchangers.
8419.50.50	Heat exchange units, nesoi.
8419.60.10	Machinery for liquefying air or gas containing brazed aluminum plate-fin heat exchangers.
8419.60.50	Machinery for liquefying air or gas, nesoi.

HTSUS subheading	Product description
8419.89.10	Machinery and equipment for the treatment of materials (by a process which changes temperatures), for making paper pulp, paper or paperboard.
8419.89.60	Industrial machinery, plant or equip. for the treat. of mat., involving a change in temp., for molten-salt-cooled acrylic acid reactors.
8419.89.95	Industrial machinery, plant or equipment for the treatment of materials, by process involving a change in temperature, nesoi.
8420.10.10	Textile calendering or rolling machines.
8420.10.20	Calendering or similar rolling machines for making paper pulp, paper or paperboard.
8420.10.90	Calendering or other rolling machines, other than for metals or glass, nesoi.
8420.91.10	Cylinders for textile calendering or rolling machines.
8420.91.20	Cylinders for paper pulp, paper or paperboard calendering or rolling machines.
8420.91.90	Cylinders for calendering and similar rolling machines, nesoi.
8421.21.00	Machinery and apparatus for filtering or purifying water.
8421.29.00	Filtering or purifying machinery and apparatus for liquids, nesoi.
8421.39.01	Filtering or purifying machinery and apparatus for gases, other than intake air filters or catalytic conv. for internal combustion engines.
8422.19.00	Dishwashing machines other than of the household type.
8422.20.00	Machinery for cleaning or drying bottles or other containers.
8422.30.11	Can-sealing machines.
8422.30.91	Machinery for filling, closing, sealing, capsuling or labeling bottles, cans, boxes or other containers; machinery for aerating beverages; nesoi.
8422.40.11	Machinery for packing or wrapping pipe tobacco, candy and cigarette packages; combination candy cutting and wrapping machines.
8422.40.91	Packing or wrapping machinery, nesoi.
8428.70.00	Industrial robots.
8429.11.00	Self-propelled bulldozers and angledozers, for track laying.
8429.19.00	Self-propelled bulldozers and angledozers other than track laying.
8429.20.00	Self-propelled graders and levelers.
8429.30.00	Self-propelled scrapers.
8429.40.00	Self-propelled tamping machines and road rollers.
8429.51.10	Self-propelled front-end shovel loaders, wheel-type.
8429.51.50	Self-propelled front-end shovel loaders, other than wheel-type.
8429.52.10	Self-propelled backhoes, shovels, clamshells and draglines with a 360 degree revolving superstructure.
8429.52.50	Self-propelled machinery with a 360 degree revolving superstructure, other than backhoes, shovels, clamshells and draglines.
8429.59.10	Self-propelled backhoes, shovels, clamshells and draglines not with a 360 degree revolving superstructure.
8429.59.50	Self-propelled machinery not with a 360 degree revolving superstructure, other than backhoes, shovels, clamshells and draglines.
8430.10.00	Pile-drivers and pile-extractors.
8430.31.00	Self-propelled coal or rock cutters and tunneling machinery.
8430.39.00	Coal or rock cutters and tunneling machinery, not self-propelled.
8430.41.00	Self-propelled boring or sinking machinery.
8430.49.40	Offshore oil and natural gas drilling and production platforms.
8430.49.80	Boring or sinking machinery, not self-propelled, nesoi.
8430.50.10	Self-propelled peat excavators.
8430.50.50	Self-propelled machinery for working earth, minerals or ores, nesoi.
8430.61.00	Tamping or compacting machinery, not self-propelled.
8430.69.01	Machinery for working earth, minerals or ores, not self-propelled, nesoi.
8432.10.00	Plows for soil preparation or cultivation.
8432.21.00	Disc harrows for soil preparation or cultivation.
8432.29.00	Harrows (other than disc), scarifiers, cultivators, weeders and hoes for soil preparation or cultivation.
8432.31.00	No-till direct seeders, planters and transplanters.
8432.39.00	Seeders, planters and transplanters, nesoi.
8432.41.00	Manure spreaders.
8432.42.00	Fertilizer distributors.
8432.80.00	Agricultural, horticultural or forestry machinery for soil preparation or cultivation, nesoi; lawn or sports ground rollers.
8433.30.00	Haymaking machinery other than mowers.
8433.40.00	Straw or fodder balers, including pick-up balers.
8433.51.00	Combine harvester-threshers.
8433.52.00	Threshing machinery other than combine harvester-threshers.
8433.53.00	Root or tuber harvesting machines.
8433.59.00	Harvesting machinery or threshing machinery, nesoi.
8433.60.00	Machines for cleaning, sorting or grading eggs, fruit or other agricultural produce.
8435.10.00	Presses, crushers and similar machinery used in the manufacture of wine, cider, fruit juices or similar beverages.
8436.10.00	Machinery for preparing animal feeds.
8436.21.00	Poultry incubators and brooders.
8436.29.00	Poultry-keeping machinery.
8436.80.00	Agricultural, horticultural, forestry or bee-keeping machinery, nesoi.
8437.10.00	Machines for cleaning, sorting or grading seed, grain or dried leguminous vegetables.
8437.80.00	Machinery used in the milling industry or for the working of cereals or dried leguminous vegetables, other than farm type machinery.
8438.10.00	Bakery machinery and machinery for the manufacture of macaroni, spaghetti or similar products, nesoi.
8438.20.00	Machinery for the manufacture of confectionery, cocoa or chocolate, nesoi.
8438.30.00	Machinery for sugar manufacture, nesoi.

HTSUS subheading	Product description
8438.40.00	Brewery machinery, nesoi.
8438.50.00	Machinery for the preparation of meat or poultry, nesoi.
8438.60.00	Machinery for the preparation of fruits, nuts or vegetables, nesoi.
8438.80.00	Machinery for the industrial preparation or manufacture of food or drink, nesoi.
8439.10.00	Machinery for making pulp of fibrous cellulosic material.
8439.20.00	Machinery for making paper or paperboard.
8439.30.00	Machinery for finishing paper or paperboard.
8441.10.00	Cutting machines of all kinds used for making up paper pulp, paper or paperboard.
8441.20.00	Machines for making bags, sacks or envelopes of paper pulp, paper or paperboard.
8441.30.00	Machines for making cartons, boxes, cases, tubes, drums or similar containers, other than by molding, of paper pulp, paper or paperboard.
8441.40.00	Machines for molding articles in paper pulp, paper or paperboard.
8441.80.00	Machinery for making up paper pulp, paper or paperboard, nesoi.
8442.30.01	Machinery, apparatus and equipment of heading 8442.
8442.50.10	Printing plates.
8442.50.90	Printing type, blocks, cylinders and other printing components; blocks, cylinders and lithographic stones, prepared for printing purposes.
8443.19.30	Printing machinery, nesoi.
8444.00.00	Machines for extruding, drawing, texturing or cutting man-made textile materials.
8445.11.00	Carding machines for preparing textile fibers.
8445.12.00	Combing machines for preparing textile fibers.
8445.13.00	Drawing or roving machines for preparing textile fibers.
8445.19.00	Machines for preparing textile fibers, nesoi.
8445.20.00	Textile spinning machines.
8445.30.00	Textile doubling or twisting machines.
8445.40.00	Textile winding (including weft-winding) or reeling machines.
8445.90.00	Machinery for producing textile yarns nesoi; machines for preparing textile yarns for use on machines of heading 8446 or 8447.
8446.10.00	Weaving machines (looms) for weaving fabrics of a width not exceeding 30 cm.
8446.21.50	Shuttle type power looms for weaving fabrics of a width exceeding 30 cm, but not exceeding 4.9 m.
8446.29.00	Weaving machines for weaving fabrics of a width exceeding 30 cm, shuttle type, nesoi.
8446.30.10	Shuttleless type power looms, for weaving fabrics of a width exceeding 4.9 m, nesoi.
8446.30.50	Shuttleless type weaving machines (looms), for weaving fabrics of a width exceeding 30 cm, nesoi.
8447.11.10	Circular knitting machines with cylinder diameter not exceeding 165 mm, for knitting hosiery.
8447.11.90	Circular knitting machines with cylinder diameter not exceeding 165 mm, other than for knitting hosiery.
8447.12.10	Circular knitting machines with cylinder diameter exceeding 165 mm, for knitting hosiery.
8447.12.90	Circular knitting machines with cylinder diameter exceeding 165 mm, other than for knitting hosiery.
8447.20.20	V-bed flat knitting machines, power driven, over 50.8 mm in width.
8447.20.30	V-bed flat knitting machines, nesoi.
8447.20.40	Warp knitting machines.
8447.20.60	Flat knitting machines, other than V-bed or warp; stitch-bonding machines.
8447.90.10	Braiding and lace-braiding machines.
8447.90.50	Embroidery machines.
8447.90.90	Knitting machines other than circular or flat knitting; machines for making gimped yarn, tulle, trimmings or net; machines for tufting.
8448.11.00	Dobbies and Jacquards, card reducing, copying, punching or assembling machines for use with machines of heading 8444, 8445, 8446 or 8447.
8448.19.00	Auxiliary machinery for machines of heading 8444, 8445, 8446 or 8447, nesoi.
8448.31.00	Card clothing as parts and accessories of machines of heading 8445 or of their auxiliary machinery.
8448.33.00	Spindles, spindle flyers, spinning rings and ring travellers of machines of heading 8445 or of their auxiliary machines.
8448.42.00	Reeds for looms, healds and heald-frames of weaving machines (looms) or their auxiliary machinery.
8448.51.10	Latch needles for knitting machines.
8448.51.20	Spring-beard needles for knitting machines.
8448.51.30	Needles for knitting machines other than latch needles or spring-beard needles.
8448.51.50	Sinkers, needles and other articles used to form stitches, nesoi, for machines of heading 8447.
8449.00.10	Finishing machinery for felt or nonwovens and parts thereof.
8449.00.50	Machinery for making felt hats; blocks for making hats; parts thereof.
8451.29.00	Drying machines for yarns, fabrics or made up textile articles, each of a dry linen capacity exceeding 10 kg.
8451.30.00	Ironing machines and presses (including fusing presses) for textile fabrics or made up textile articles.
8451.40.00	Washing, bleaching or dyeing machines for textile yarns, fabrics or made up textile articles.
8451.50.00	Machines for reeling, unreeling, folding, cutting or pinking textile fabrics.
8451.80.00	Machinery for the handling of textile yarns, fabrics or made up textile articles, nesoi.
8452.21.10	Sewing machines specially designed to join footwear soles to uppers, automatic.
8452.21.90	Sewing machines, automatic, nesoi.
8452.29.10	Sewing machines, other than automatic, specially designed to join footwear soles to uppers.
8452.29.90	Sewing machines, other than automatic, nesoi.
8453.10.00	Machinery for preparing, tanning or working hides, skins or leather.
8453.20.00	Machinery for making or repairing footwear.
8453.80.00	Machinery, nesoi, for making or repairing articles of hides, skins or leather.
8454.10.00	Converters of a kind used in metallurgy or in metal foundries.
8454.20.00	Ingot molds and ladles, of a kind used in metallurgy or in metal foundries.
8454.30.00	Casting machines, of a kind used in metallurgy or in metal foundries.
8455.10.00	Metal-rolling tube mills.
8455.21.00	Metal-rolling mills, other than tube mills, hot or combination hot and cold.

HTSUS subheading	Product description
8455.22.00	Metal-rolling mills, other than tube mills, cold.
8455.30.00	Rolls for metal-rolling mills.
8456.11.10	Machine tools operated by laser, for working metal.
8456.11.70	Machine tools operated by laser, of a kind used solely or principally for manufacture of printed circuits.
8456.11.90	Machine tools operated by laser, nesoi.
8456.12.10	Machine tools operated by light or photon beam processes, for working metal.
8456.12.70	Machine tools operated by light or photon beam processes, of a kind used solely or principally for the manufacture of printed circuits.
8456.12.90	Machine tools operated by light or photon beam processes, nesoi.
8456.20.10	Machine tools operated by ultrasonic processes, for working metal.
8456.20.50	Machine tools operated by ultrasonic processes, other than for working metal.
8456.30.10	Machine tools operated by electro-discharge processes, for working metal.
8456.30.50	Machine tools operated by electro-discharge processes, other than for working metal.
8456.40.10	Machine tools operated by plasma arc process, for working metal.
8456.40.90	Machine tools operated by plasma arc process, other than for working metal.
8456.50.00	Water-jet cutting machines.
8456.90.31	Machine tools operated by electro-chemical or ionic-beam processes, for working metal.
8456.90.71	Machine tools operated by electro-chemical or ionic-beam processes, other than for working metal.
8457.10.00	Machining centers for working metal.
8457.20.00	Unit construction machines (single station), for working metal.
8457.30.00	Multistation transfer machines for working metal.
8458.11.00	Horizontal lathes (including turning centers) for removing metal, numerically controlled.
8458.19.00	Horizontal lathes (including turning centers) for removing metal, other than numerically controlled.
8458.91.10	Vertical turret lathes (including turning centers) for removing metal, numerically controlled.
8458.91.50	Lathes (including turning centers), other than horizontal or vertical turret lathes, for removing metal, numerically controlled.
8458.99.10	Vertical turret lathes (including turning centers) for removing metal, other than numerically controlled.
8458.99.50	Lathes (including turning centers), other than horizontal or vertical turret lathes, for removing metal, other than numerically controlled.
8459.10.00	Way-type unit head machines for drilling, boring, milling, threading or tapping by removing metal, other than lathes of heading 8458.
8459.21.00	Drilling machines, numerically controlled, nesoi.
8459.29.00	Drilling machines, other than numerically controlled, nesoi.
8459.31.00	Boring-milling machines, numerically controlled, nesoi.
8459.39.00	Boring-milling machines, other than numerically controlled, nesoi.
8459.41.00	Boring machines, numerically controlled, nesoi.
8459.49.00	Boring machines, not numerically controlled, nesoi.
8459.51.00	Milling machines, knee type, numerically controlled, nesoi.
8459.59.00	Milling machines, knee type, other than numerically controlled, nesoi.
8459.61.00	Milling machines, other than knee type, numerically controlled, nesoi.
8459.69.00	Milling machines, other than knee type, other than numerically controlled, nesoi.
8459.70.40	Other threading or tapping machines, numerically controlled.
8459.70.80	Other threading or tapping machines nesoi.
8460.12.00	Flat-surface grinding machines, numerically controlled.
8460.19.01	Flat-surface grinding machines, not numerically controlled.
8460.22.00	Centerless grinding machines, numerically controlled.
8460.23.00	Other cylindrical grinding machines, numerically controlled.
8460.24.00	Other grinding machines, numerically controlled.
8460.29.01	Other grinding machines, other than numerically controlled.
8460.31.00	Sharpening (tool or cutter grinding) machines for working metal or cermets, numerically controlled.
8460.39.00	Sharpening (tool or cutter grinding) machines for working metal or cermets, other than numerically controlled.
8460.40.40	Honing or lapping machines for working metal or cermets, numerically controlled.
8460.40.80	Honing or lapping machines for working metal or cermets, other than numerically controlled.
8460.90.40	Other machine tools for deburring, polishing or otherwise finishing metal or cermets, nesoi, numerically controlled.
8460.90.80	Other machine tools for deburring, polishing or otherwise finishing metal or cermets, nesoi, other than numerically controlled.
8461.20.40	Shaping or slotting machines for working by removing metal or cermets, numerically controlled.
8461.20.80	Shaping or slotting machines for working by removing metal or cermets, other than numerically controlled.
8461.30.40	Broaching machines for working by removing metal or cermets, numerically controlled.
8461.30.80	Broaching machines for working by removing metal or cermets, other than numerically controlled.
8461.40.10	Gear cutting machines for working by removing metal or cermets.
8461.40.50	Gear grinding or finishing machines for working by removing metal or cermets.
8461.50.40	Sawing or cutting-off machines for working by removing metal or cermets, numerically controlled.
8461.50.80	Sawing or cutting-off machines for working by removing metal or cermets, other than numerically controlled.
8461.90.30	Machine-tools for working by removing metal or cermets, nesoi, numerically controlled.
8461.90.60	Machine-tools for working by removing metal or cermets, nesoi, other than numerically controlled.
8462.11.00	Hot forming machines for forging, die forging (including presses) and hot hammers, closed die forging machines.
8462.19.00	Other hot forming machines for forging, die forging (including presses) and hot hammers (other than closed die forging machines), nesoi.
8462.22.00	Profile forming machines.
8462.23.00	Numerically controlled press brakes.
8462.24.00	Numerically controlled panel benders.
8462.25.00	Numerically controlled roll forming machines.
8462.26.00	Other numerically controlled bending, folding, straightening or flattening machines (o/t press brakes, panel benders, roll forming machines).

HTSUS subheading	Product description
8462.29.00	Other bending folding straightening or flattening machines (other than numerically controlled or profile forming machines), nesoi.
8462.32.10	Numerically controlled sitting lines and cut-to-length lines.
8462.32.50	Sitting lines and cut-to-length lines (other than numerically controlled), nesoi.
8462.33.00	Numerically controlled shearing machines.
8462.39.00	Shearing machines (other than numerically controlled), nesoi.
8462.42.00	Numerically controlled punching, notching or nibbling machines (excluding presses) for flat products.
8462.49.00	Other punching, notching or nibbling machines (excluding presses) for flat products, other than numerically controlled.
8462.51.00	Numerically controlled machines for working tube, pipe, hollow section and bar (excluding presses).
8462.59.00	Other machines for working tube, pipe, hollow section and bar (excluding presses), other than numerically controlled.
8462.61.40	Hydraulic presses, numerically controlled.
8462.61.80	Hydraulic presses, not numerically controlled.
8462.62.40	Numerically controlled mechanical cold metal working presses.
8462.62.50	Other mechanical cold metal working presses, other than numerically controlled.
8462.63.40	Numerically controlled cold metal working servo-presses.
8462.63.80	Other cold metal working servo-presses, other than numerically controlled.
8462.69.40	Numerically controlled other cold metal working presses, nesoi.
8462.69.80	Other cold metal working presses, other than numerically controlled, nesoi.
8462.90.40	Other numerically controlled machines tools for working metal, nesoi.
8462.90.80	Other machines tools for working metal, other than numerically controlled, nesoi.
8463.10.00	Draw-benches for bars, tubes, profiles, wire or the like, for working metal or cermets, without removing material.
8463.20.00	Thread rolling machines for working metal or cermets, without removing material.
8463.30.00	Machines for working wire of metal or cermets, without removing material.
8463.90.00	Machine tools for working metal or cermets, without removing material, nesoi.
8464.10.01	Sawing machines for working stone, ceramics, concrete, asbestos-cement or like mineral materials or for cold working glass.
8464.20.01	Grinding or polishing machines for working stone, ceramics, concrete, asbestos-cement or like mineral materials, or glass, nesoi.
8464.90.01	Machine tools for working stone, ceramics, concrete, asbestos-cement or like mineral materials or for cold working glass, nesoi.
8465.10.00	Machines for working certain hard materials which can carry out different types of machining operations w/o tool change between operations.
8465.20.10	Machine centers for sawing, planing, milling, molding, grinding, sanding, polishing, drilling or mortising.
8465.20.50	Machine centers for bending or assembling.
8465.20.80	Machine centers, nesoi.
8465.91.00	Sawing machines for working wood, cork, bone, hard rubber, hard plastics or similar hard materials.
8465.92.00	Planing, milling or molding (by cutting) machines for working wood, cork, bone, hard rubber, hard plastics or similar hard materials.
8465.93.00	Grinding, sanding or polishing machines for working wood, cork, bone, hard rubber, hard plastics or similar hard materials.
8465.94.00	Bending or assembling machines for working wood, cork, bone hard rubber, hard plastics or similar hard materials.
8465.95.00	Drilling or mortising machines for working wood, cork, bone, hard rubber, hard plastics or similar hard materials.
8465.96.00	Splitting, slicing or paring machines for working wood, cork, bone, hard rubber, hard plastics or similar hard materials.
8465.99.02	Machine tools for working wood, cork, bone, hard rubber, hard plastics and similar hard materials, nesoi.
8468.20.10	Gas-operated machinery, apparatus and appliances, hand-directed or -controlled, used for soldering, brazing, welding or tempering, nesoi.
8468.20.50	Gas-operated machinery, apparatus and appliances, not hand-directed or -controlled, used for soldering, brazing, welding or tempering, nesoi.
8468.80.10	Machinery and apparatus, hand-directed or -controlled, used for soldering, brazing or welding, not gas-operated.
8468.80.50	Machinery and apparatus other than hand-directed or -controlled, used for soldering, brazing or welding, not gas- operated.
8474.10.00	Sorting, screening, separating or washing machines for earth, stones, ores or other mineral substances in solid form.
8474.20.00	Crushing or grinding machines for earth, stones, ores or other mineral substances.
8474.31.00	Concrete or mortar mixers.
8474.32.00	Machines for mixing mineral substances with bitumen.
8474.39.00	Mixing or kneading machines for earth, stones, ores or other mineral substances, nesoi.
8474.80.00	Machinery for agglomerating, shaping or molding solid mineral fuels, or other mineral products; machines for forming sand foundry molds.
8475.10.00	Machines for assembling electric or electronic lamps, tubes or flashbulbs, in glass envelopes.
8475.21.00	Machines for making glass optical fibers and preforms thereof.
8475.29.00	Machines for manufacturing or hot working glass or glassware, nesoi.
8477.10.30	Injection-molding machines for manufacturing shoes of rubber or plastics.
8477.10.40	Injection-molding machines for use in the manufacture of video laser discs.
8477.10.90	Injection-molding machines of a type used for working or manufacturing products from rubber or plastics, nesoi.
8477.20.00	Extruders for working rubber or plastics or for the manufacture of products from these materials, nesoi.
8477.30.00	Blow-molding machines for working rubber or plastics or for the manufacture of products from these materials.
8477.40.01	Vacuum-molding and other thermoforming machines for working rubber or plastics or for manufacture of products from these materials, nesoi.
8477.51.00	Machinery for molding or retreading pneumatic tires or for molding or otherwise forming inner tubes.
8477.59.01	Machinery for molding or otherwise forming rubber or plastics other than for molding or retreading pneumatic tires, nesoi.
8477.80.01	Machinery for working rubber or plastics or for the manufacture of products from these materials, nesoi.
8478.10.00	Machinery for preparing or making up tobacco, nesoi.
8479.10.00	Machinery for public works, building or the like, nesoi.
8479.20.00	Machinery for the extraction or preparation of animal or fixed vegetable fats or oils, nesoi.

HTSUS subheading	Product description
8479.30.00	Presses for making particle board or fiber building board of wood or other ligneous materials, and mach. for treat. wood or cork, nesoi.
8479.40.00	Rope- or cable-making machines nesoi.
8479.50.00	Industrial robots, nesoi.
8479.81.00	Machines and mechanical appliances for treating metal, including electric wire coil-winders, nesoi.
8479.82.00	Machines for mixing, kneading, crushing, grinding, screening, sifting, homogenizing, emulsifying or stirring, nesoi.
8479.83.00	Cold isostatic presses, nesoi.
8479.89.83	Machines for the manufacture of optical media.
8479.89.92	Automated electronic component placement machines for making printed circuit assemblies.
8479.89.95	Other machines and mechanical appliances having individual functions, not specified or included elsewhere in chapter 84, nesoi.
8486.10.00	Machines and apparatus for the manufacture of boules or wafers.
8486.20.00	Machines and apparatus for the manufacture of semiconductor devices or electronic integrated circuits.
8486.30.00	Machines and apparatus for the manufacture of flat panel displays.
8486.40.00	Machines and apparatus for the manufacture of masks and reticles and for the assembly of electronic integrated circuits.
8514.11.00	Hot isostatic presses.
8514.19.00	Other resistance heated industrial or laboratory furnaces and ovens, other than hot isostatic presses.
8514.20.40	Industrial or laboratory microwave ovens for making hot drinks or for cooking or heating food.
8514.20.60	Industrial or laboratory microwave ovens, nesoi.
8514.20.80	Industrial or laboratory furnaces and ovens (other than microwave) functioning by induction or dielectric loss.
8514.31.10	Electron beam furnaces for making printed circuits or printed circuit assemblies.
8514.31.90	Electron beam furnaces, other than for making printed circuits or printed circuit assemblies.
8514.32.10	Plasma and vacuum arc furnaces for making printed circuits or printed circuit assemblies.
8514.32.90	Plasma and vacuum arc furnaces, other than for making printed circuits or printed circuit assemblies.
8514.39.10	Other industrial furnaces and ovens for making printed circuits or printed circuit assemblies.
8514.39.90	Other industrial or laboratory electric industrial or laboratory furnaces and ovens nesoi.
8514.40.00	Industrial or laboratory induction or dielectric heating equipment nesoi.
8515.11.00	Electric soldering irons and guns.
8515.19.00	Electric brazing or soldering machines and apparatus, other than soldering irons and guns.
8515.21.00	Electric machines and apparatus for resistance welding of metal, fully or partly automatic.
8515.29.00	Electric machines and apparatus for resistance welding of metal, other than fully or partly automatic.
8515.31.00	Electric machines and apparatus for arc (including plasma arc) welding of metals, fully or partly automatic.
8515.39.00	Electric machines and apparatus for arc (including plasma arc) welding of metals, other than fully or partly automatic.
8515.80.00	Electric welding apparatus nesoi,and electric machines and apparatus for hot spraying metals or sintered metal carbides.
8543.30.20	Electrical machines and apparatus for electroplating, electrolysis, or electrophoresis for making printed circuits.
8543.30.90	Other electrical machines and apparatus for electroplating, electrolysis, or electrophoresis.
8543.70.20	Physical vapor deposition apparatus, nesoi.
8543.70.60	Electrical machines and apparatus nesoi, designed for connection to telegraphic or telephonic apparatus, instruments or networks.
8543.70.71	Electric luminescent lamps.
8543.70.97	Plasma cleaner machines that remove organic contaminants from electron microscopy specimens and holders.
8543.70.98	Other electrical machines and apparatus, having individual functions, nesoi.

[FR Doc. 2024–21217 Filed 9–17–24; 8:45 am]
BILLING CODE 3390–F4–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

[Docket No. FAA–2024–2158]

Agency Information Collection Activities: Requests for Comments; Clearance of a Renewed Approval of Information Collection: Unmanned Aircraft Systems (UAS) BEYOND and Partnership for Safety Plan (PSP) Programs

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice and request for comments.

SUMMARY: In accordance with the Paperwork Reduction Act of 1995, FAA invites public comments about our intention to request the Office of Management and Budget (OMB) approval to renew an information collection. The collection involves operational data submissions by proponents who have been granted exemptions and operational and report submissions by State, local, Tribal, and territorial (SLTT) participants in the UAS BEYOND program. The information to be collected will be used to inform FAA policy and decision-making regarding integrating UAS into the National Airspace System (NAS).

DATES: Written comments should be submitted by November 18, 2024.

ADDRESSES: Please send written comments:

By Electronic Docket: www.regulations.gov (Enter docket number into search field).

By mail: Kim Merchant, c/o Tammie Meadows, Federal Aviation Administration, 800 Independence Avenue SW, Rm. 127, Washington, DC 20591–0001.

By fax: 202–267–4193.

FOR FURTHER INFORMATION CONTACT: Kim Merchant by email at: *kim.merchant@faa.gov;* phone: 202–267–6148.

SUPPLEMENTARY INFORMATION:

Public Comments Invited: You are asked to comment on any aspect of this information collection, including (a) Whether the proposed collection of information is necessary for FAA's performance; (b) the accuracy of the estimated burden; (c) ways for FAA to enhance the quality, utility and clarity of the information collection; and (d) ways that the burden could be minimized without reducing the quality of the collected information. The agency will summarize and/or include your comments in the request for OMB's clearance of this information collection.

OMB Control Number: 2120–0800.

Title: Unmanned Aircraft Systems (UAS) BEYOND and Partnership for Safety Plan (PSP) Programs.

Form Numbers:

• UAS Monthly Flight Report (Pending)

EXHIBIT 202

United States
International Trade Commission

Economic Impact of Section 232 and 301 Tariffs on U.S. Industries

Corrected May 2023
March 2023
Publication Number: 5405
Investigation Number: 332-591

Commissioners

David S. Johanson, Chairman

Rhonda K. Schmidtlein

Jason E. Kearns

Amy A. Karpel

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Director, Office of Economics

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United States International Trade Commission
Washington, DC 20436

Economic Impact of Section 232 and 301 Tariffs on U.S. Industries

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Errata

For the United States International Trade Commission, *Economic Impact of Section 232 and 301 Tariffs on U.S. Industries*, Investigation No. 332-591, USITC Publication 5405, March 2023.

- In table ES.2 (page 24) and table 6.4 (page 148), the column header for import values from China has been corrected to say "Tariff-inclusive value of imports from China" rather than "Nontariff-inclusive value of imports from China." For these tables, the last sentence of the table note was corrected to reflect that the column displays tariff-inclusive values instead of nontariff-inclusive values.
- In footnote 122 (page 60), a misnumbered reference to a *Federal Register* notice was corrected from "Proclamation No. 9711, 83 Fed. Reg. 13361" to "Proclamation No. 9710, 83 Fed. Reg. 13355".
- In table 6.4 (page 148), an unintended "+" was removed from the NAICS industry group column, replacing "+3343" with "3343".
- In tables 6.7, 6.11, 6.15, 6.19, 6.23, 6.27, 6.31, 6.35, 6.39, and 6.43 (pages 151–69), the table notes have been corrected to say, "Imports from China are tariff-inclusive estimates" instead of "Imports from China are nontariff-inclusive estimates."
- In appendix D, names and summaries of written submissions of several interested parties have been added.

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Figures

Tables

Abbreviations and Acronyms

Item	Definition
AD	antidumping
AUV	average unit value
BEA	U.S. Bureau of Economic Analysis
BF	blast furnace
BIS	U.S. Bureau of Industry and Security
BLS	U.S. Bureau of Labor Statistics
BOF	basic oxygen furnace
Census	U.S. Census Bureau
Commission	U.S. International Trade Commission
Committees	U.S. House of Representatives and Senate Committees on Appropriations
COVID-19	Coronavirus disease 2019, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)
CRS	Congressional Research Service
CVD	countervailing duty
EAF	electric arc furnace
EC	European Commission
EU	European Union
Fed. Reg.	*Federal Register*
GAE	General Approved Exclusion
GATT	General Agreement on Tariffs and Trade
HS	Harmonized Commodity Description and Coding System
HTS	Harmonized Tariff Schedule of the United States
LME	London Metal Exchange
mt	metric ton(s)
mmt	million metric ton(s)
NAICS	North American Industry Classification System
OECD	Organisation for Economic Co-operation and Development
PPI	producer price index
ROO	rule(s) of origin
Secretary	U.S. Secretary of Commerce
Trade Representative	The U.S. Trade Representative
TRQ	tariff-rate quota
USDOC	U.S. Department of Commerce
USGS	U.S. Geological Survey
USITC	U.S. International Trade Commission
USMCA	U.S.-Mexico-Canada Agreement
USTR	The Office of the U.S. Trade Representative
WTO	World Trade Organization

Executive Summary

This report provides a retrospective analysis of U.S. trade, production, and prices in the industries directly and most affected by any section 232 or section 301 tariffs that were active as of the date of enactment (March 15, 2022) of the Consolidated Appropriations Act, 2022. Section 232 and section 301 tariffs active as of March 15, 2022 comprise tariffs implemented pursuant to two sets of investigations: (1) national security investigations pursuant to section 232 on steel and aluminum and (2) a section 301 investigation concerning China's acts, policies, and practices related to technology transfer, intellectual property, and innovation. The U.S. International Trade Commission (Commission or USITC) prepared the report in response to an explanatory statement accompanying the Act that directed the Commission to conduct an investigation and provide its report no later than March 15, 2023.

Consistent with the explanatory statement's direction, the report estimates the effects of section 232 tariffs on the U.S. steel and aluminum industries and downstream industries that intensively consume steel and aluminum and the effects of section 301 tariffs on industries in the United States that produce the products subject to section 301 tariffs. Because of the breadth of section 301 duties and the one-year timeframe for its completion, the report does not include estimated effects of section 301 tariffs on downstream industries that consume products subject to section 301 tariffs. It also does not examine upstream industries or service industries that support the steel and aluminum industries. The estimates concern effects on trade, production, and prices. The report does not estimate the tariffs' effects on other factors, including investment, their contribution to the national security, or intellectual property protection concerns that led to the tariffs' imposition, for example. Because this analysis is not forward looking, it focuses on short-term effects during 2018–21 and does not address long-term effects. The report is not an assessment of the complete, economy-wide impacts of the tariffs under sections 232 and 301 and cannot be used to draw broad conclusions about whether the tariffs under sections 232 and 301 produced a net benefit for the U.S. economy overall. The analysis in this report is, by design, not intended to address those questions.

Tariffs under Sections 232 and 301[1] [2] [3]

Section 232

President Trump imposed section 232 tariffs on imports of steel and aluminum products on March 23, 2018. This followed investigations and receipt of reports containing findings and recommendations from Secretary of Commerce Wilbur Ross (Secretary). The Secretary initiated the respective investigations, which examined the effects that imported steel and aluminum have had on national security, in April 2017 under section 232 of the Trade Expansion Act of 1962 (19 U.S.C. § 1862). In the steel investigation, the Secretary found that the present quantities of imports (at the time of the investigation) were weakening the domestic market and threatened to impair national security.

Following receipt of the Secretary's report, President Trump imposed an additional 25 percent ad valorem tariff on steel articles imported from all but a select number of countries. These tariffs went into effect on March 23, 2018. The investigation of aluminum imports reported similar findings and recommendations. The President subsequently imposed a 10 percent additional tariff on aluminum imports, which also went into effect on March 23, 2018.[4] Since the imposition of the steel and aluminum tariffs, several countries have been fully or partially exempted from the tariffs, with many top U.S. suppliers—including Canada and Mexico—fully or partially exempt from the tariffs for much of the life of the tariffs. In most cases, the specifics of these alterations differed across countries and the two tariff actions. Numerous steel and aluminum products were also granted exclusions on a case-by-case basis.

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[1] Commissioner Kearns believes that additional context for the implementation of the section 232 and 301 tariffs is critical to understanding and assessing the costs and benefits of these actions. In his additional views, he endeavors to provide a more complete picture of the U.S. trade relationship with China vis-à-vis global steel overcapacity and highlights some of the benefits of the actions as described by parties appearing before the Commission. See Additional Views of Commissioner Jason E. Kearns.

[2] Chairman Johanson, Commissioner Karpel, and Commissioner Schmidtlein do not share Commissioner Kearns' concerns regarding the report. As Commissioner Kearns acknowledges in his Additional Views, the Commission conducted an economic analysis of the section 232 and 301 tariffs consistent with the direction in the explanatory statement provided by the House and Senate Committees on Appropriations, in particular by focusing on the effect of the tariffs on trade, production, and prices in the directly and most affected industries. Commissioner Kearns joins the Commission's report, and thus does not appear to take issue with the Commission's reporting of the effects it did analyze. Commissioner Kearns, however, contends that the report is incomplete because it does not analyze other effects of the tariffs (or the effects of "inaction"), but such an analysis would go well beyond the request of Congress and would therefore be inappropriate in the context of this investigation. It is also not clear that the analysis advocated in the Additional Views is appropriate or even possible (depending on the issue) given the ITC's mission, expertise, and access to data. Commissioner Kearns additionally finds the report incomplete because it does not in his view include a fulsome enough discussion of events preceding imposition of the tariffs. The Commission's report, however, does detail the facts leading up to imposition of the tariffs as reflected in the respective official reports of the 232 and 301 investigations.

[3] Commissioner Stayin is recused from this investigation.

[4] Although an estimate for the total value of affected trade was not provided in the presidential proclamations announcing section 232 tariffs on steel and aluminum, the Commission estimates that the total value of affected annual trade was between $22.3 billion and $25.9 billion for steel and between $3.1 billion and $3.9 billion for aluminum. Estimates are based on 2016 and 2017 imports from all countries, excluding Canada and Mexico.

Section 301

Beginning in July 2018, U.S. Trade Representative Robert Lighthizer imposed a series of additional tariffs on a large range of products imported from China. These actions followed an investigation initiated by the Trade Representative at the direction of the President in August 2017. The investigation was initiated under section 301 of the Trade Act of 1974 (19 U.S.C. §§ 2411–20). It sought to determine whether acts, policies, and practices of the government of China related to technology transfer, intellectual property, and innovation were unreasonable or discriminatory and burdened or restricted U.S. commerce. Following the investigation, the Trade Representative reported a series of findings regarding foreign ownership restrictions, technology regulations, investment practices, intellectual property, and sensitive commercial information. The Trade Representative also determined that appropriate action in response included the imposition of additional tariffs.

Beginning on July 6, 2018, additional tariffs were imposed on products imported from China under 874 tariff subheadings with an approximate annual trade value of $34 billion (tranche 1). The coverage of these tariffs expanded with the imposition of tariffs on products imported under 292 additional subheadings in August 2018, with an approximate annual value of $16 billion (tranche 2); 5,918 additional subheadings and 11 partial subheadings in September 2018, with an approximate annual value of $200 billion (tranche 3); and 3,821 additional subheadings and 12 partial subheadings in September 2019, with an approximate annual value of $300 billion (tranche 4, lists 1 and 2).[5] However, of the subheadings covered by tranche 4, only the 3,279 subheadings and 4 partial subheadings of list 1 went into effect. The 542 subheadings and 8 partial subheadings of list 2 were suspended indefinitely.

Trade, Production, and Prices in the U.S. Steel and Aluminum Industries

The U.S. steel market has exhibited changes in trade, production, and prices since the imposition of tariffs under sections 232 and 301, affecting both U.S. producers of these products and downstream businesses that rely on them. Imports of steel decreased in the years following the imposition of the tariffs, declining 17.2 percent from 2017 to 2021. U.S. production of steel fluctuated in recent years, but it remained about 5 percent higher in 2021 than in 2017. The steel industry's capacity utilization increased as well from 2017 to 2021, with capacity utilization at a 14-year high in 2021. Many domestic steel producers announced plans to invest in and greatly expand domestic steel production in the coming years. The prices of U.S. steel products have increased in recent years as well. Between December 2017 and December 2021, average monthly prices for hot-rolled steel (a common steel product frequently used to track steel prices) increased from $697 per metric ton to $1,855 per metric ton, an increase of 166.1 percent. Although prices have increased globally since 2018, the increase has been much higher in the United States than elsewhere, despite fluctuations during that period. These changes in imports, production, and prices have had impacts on downstream industries such as construction and automotive manufacturing that rely extensively on steel inputs.

[5] Approximate trade values were estimated by USTR and provided in the *Federal Register* notices accompanying the announcements of each tranche.

The aluminum market has similarly experienced changes in trade, production, and price trends. Imports of aluminum have generally been lower since the imposition of the tariffs, declining by 19.0 percent from 2017 to 2021. However, import volumes have exhibited large variations over the period. U.S. production of aluminum has fluctuated since the imposition of the tariffs. Some plants have expanded production, but others have temporarily or permanently shut down. Despite these fluctuations, aluminum production was higher across all industry segments from 2017 to 2021, with increases ranging from 11.5 to 22.5 percent. Smelter capacity utilization also fluctuated but was about 15 percentage points higher in 2021 than 2017. Aluminum prices increased significantly following the imposition of the tariffs in 2018 but fell steadily in the following years. Prices spiked again beginning in June 2020, representing an overall increase of 45.0 percent between December 2017 and December 2021, and reaching their highest levels in 13 years in October 2021. The gap between U.S. prices and those throughout the rest of the world remains larger than it was in the period preceding the imposition of the tariffs. These changes in imports, production, and prices have had effects on the many downstream industries, including transportation, construction, and packaging, that use aluminum as major inputs to their own products.

In recent years, several factors other than the tariffs under sections 232 and 301 have also affected trade, production, and prices in the U.S. steel and aluminum industries. These factors include the COVID-19 pandemic, supply chain disruptions, antidumping and countervailing duty (AD/CVD) orders, a surge in energy prices, global responses to the tariffs, and Russia's invasion of Ukraine. Although both steel and aluminum markets have exhibited changes in import, production, and price trends since the imposition of the tariffs, other factors have also contributed to those changes. To help disentangle the effects of the tariffs from these other factors, the Commission developed specialized economic models that estimate the effects of the tariffs distinct from other factors. This results in a clearer picture of the stand-alone effects of the tariffs under sections 232 and 301.

Estimated Economic Effects of Tariffs under Sections 232 and 301 on Trade, Production, and Prices

To estimate the effects on trade, production, and prices of section 232 tariffs, the Commission developed a specialized partial equilibrium model of the U.S. steel, aluminum, and downstream industries. The model estimates the economic effects of section 232 tariffs in place in each year modeled from 2018 to 2021. The model estimates the direct effect of the tariffs on these industries but does not capture the indirect effects or long-term factors (such as investment). The model estimates that section 232 tariffs reduced imports of steel and aluminum products covered by section 232 tariffs by an estimated 24.0 percent and 31.1 percent on average, respectively, during this period (table ES.1). Also, as a result of the tariffs, U.S. production of steel and aluminum increased by 1.9 percent and 3.6 percent on average, respectively, during this period. In dollar terms, U.S production of steel and aluminum was $1.5 billion and $1.3 billion higher each year, respectively, than it would have been absent the tariffs, on average. The tariffs are estimated to have increased the average price of steel and aluminum in the United States by 2.4 percent and 1.6 percent, respectively. They are estimated to have increased prices of domestically produced steel and aluminum by about 0.7 percent and 0.9 percent on average and the prices of imported steel and aluminum products subject to the duties by about 22.7 percent and 8.0 percent, respectively. With regard to trends in trade, production, and prices, tariffs appear to explain a relatively large portion of the declines in steel and aluminum imports during 2018–21. Meanwhile, the tariffs explain relatively small portions of the observed increases in prices and domestic production.

For downstream industries, the effects are largely negative but differ in magnitude across industries. The average annual decrease in production values for these industries was $3.4 billion during 2018–21. The most negatively impacted industries, as classified by the North American Industry Classification System (NAICS), include Industrial Machinery Manufacturing; Cutlery and Handtool Manufacturing; Motor Vehicle Steering, Suspension Components and Brake Systems; Other General Purpose Machinery; Agriculture, Mining, and Construction Manufacturing; and Other Fabricated Metal Products. U.S. production quantities in these industries decreased by up to nearly 3 percent and U.S. production values in some industries decreased by up to $469 million in 2021. Given the rise in prices for imported steel and aluminum products, many downstream industries shifted some of their sourcing away from foreign sources to domestic producers. The largest shifts were seen in Architectural and Structural Metal Manufacturing and Boiler, Tank, and Shipping Container Manufacturing, which both increased their domestic sourcing by more than $200 million each in 2021.

Table ES.1 Estimated effects of section 232 steel and aluminum tariffs on U.S. steel and aluminum production, prices, and imports
In percentage changes.

Variable	Impact in 2018	Impact in 2019	Impact in 2020	Impact in 2021	Average effect
Quantity of covered steel imports	−23.8	−23.6	−24.7	−24.0	−24.0
Quantity of covered aluminum imports	−30.3	−29.8	−32.2	−32.0	−31.1
Delivered price of covered steel imports	22.8	22.8	22.7	22.7	22.7
Delivered price of covered aluminum imports	8.0	8.1	7.9	7.9	8.0
Price of domestically produced steel	0.81	0.87	0.52	0.75	0.74
Price of domestically produced aluminum	1.02	1.10	0.67	0.71	0.87
Average steel price in U.S.	2.7	2.8	1.6	2.5	2.4
Average aluminum price in U.S.	1.8	1.9	1.2	1.3	1.6
Quantity of domestic steel production	2.0	2.2	1.3	1.9	1.9
Quantity of domestic aluminum production	4.2	4.5	2.7	2.9	3.6

Source: USITC estimates.
Note: Economic effects reported in this table are calculated as the percent change between actual economic outcomes in each year and a counterfactual scenario in which no section 232 tariffs were in place. Steel products are aggregated in the model. The delivered price of covered imports is the average price paid for U.S. imports of steel products. The average steel price in the United States is a weighted average of the price of domestically produced steel and covered steel imports. The same is true for aluminum products. Covered imports are imports of steel and aluminum subject to section 232 tariffs.

Section 301 tariffs were imposed on a wide range of imports from China. Following the imposition of these tariffs beginning in 2018, imports of affected products from China declined from about $311 billion in 2017 to $265 billion in 2021. However, as with steel and aluminum product imports, other major factors also contributed to these changes. To disentangle the effects of section 301 tariffs, the Commission developed an econometric model that examined U.S. trade patterns with China and the rest of the world. The model estimates the extent to which the tariffs affected trade and import prices while controlling for—and therefore separating—other influential factors. The Commission's econometric model estimates that tariffs under sections 232 and 301 resulted in a nearly one-to-one increase in prices of U.S. imports following the tariffs. This implies that a 10 percent ad valorem tariff raised the price of U.S. imports from China by about 10 percent. This nearly complete pass-through (meaning that prices received by exporters were largely unaffected and prices paid by U.S. importers increased by the same amount as the tariffs) is unusual but has been similarly found by other recent studies, which conclude that U.S. importers have borne almost the full burden of section 301 tariffs. The model also estimates that for every 1 percent increase in these tariffs, imports from China of products covered by the tariffs have decreased by about 2 percent in value and quantity. Notably, the magnitude of this response has slowly increased over time, likely because U.S. importers have adjusted and found new sources.

The model estimates the economic effects on trade, production, and prices of section 301 tariffs in place in each year modeled from 2018 to 2021. Across all sectors that include products covered by section 301 tariffs, the Commission's model estimates that tariffs decreased imports from China by 13 percent on average during 2018 to 2021. Meanwhile, the tariffs increased the price of domestically produced products and the value of domestic production by 0.2 percent and 0.4 percent on average, respectively, during the period. Compared to observed trends, the estimated impacts of the tariffs appear to explain a relatively large portion of the recent changes in import values of these products.

To identify the specific effects on trade, production, and prices of section 301 tariffs on the directly affected industries, the Commission's analysis estimates the impacts of the tariffs on the 10 industries in the United States that had the largest volumes of trade in affected products immediately before the imposition of the tariffs. These industries include apparel, various types of electronics equipment, automotive parts, and a variety of other manufactured products. These tariffs are estimated to have significantly reduced imports from China in 2021 compared to a scenario in which the tariffs were not in place. Within this group of industries, the estimated reduction in imports ranges from 5 percent for Computer Equipment to 72 percent for Semiconductors and Other Electronic Components. Prices of imports from China in 2021 are estimated to be higher with the tariffs in place—up to 22–25 percent for Semiconductors and Other Electronic Components, Household and Institutional Furniture and Kitchen Cabinets, and Audio and Video Equipment. Prices of domestically produced goods are estimated to have increased by up to 3–4 percent in some industries. On average, across both imports and domestically produced products, prices in these sectors increased by up to 7.1 percent for Household and Institutional Furniture and Kitchen Cabinets in 2021. The value of U.S. production is also estimated to have increased, by up to nearly 8 percent for Semiconductors and Electronic Components in 2021. The individual estimated effects for the five largest affected industries are presented in table ES.2.

Table ES.2 Effect of section 301 tariffs by industry group on domestic prices and value in 2021
In percentage changes.

NAICS industry group	Description	Price of imports from China	Price of domestically produced products	Average price in the United States	Tariff-inclusive value of imports from China	Value of U.S. production
3152	Cut and Sew Apparel Manufacturing	14.5	3.1	4.3	−39.1	6.3
3344	Semiconductors and Other Electronic Components	25.0	3.1	4.1	−72.3	6.4
3341	Computer Equipment	1.5	0.6	0.8	−5.3	1.2
3371	Household and Institutional Furniture and Kitchen Cabinets	22.4	3.7	7.1	−25.4	7.5
3363	Motor Vehicle Parts	24.5	1.5	2.3	−50.1	3.0

Source: USITC estimates.
Note: Economic effects reported in this table are calculated as the percent change between actual economic outcomes in 2021 and a counterfactual scenario where no section 301 tariffs were in place. The change in average price in the United States is a weighted average that considers the estimated substitutability between products from different sources. The percentage change in "tariff-inclusive value" refers to the change in the value of imports from China including the value of the section 301 duties themselves.

Finally, the Commission's investigation prompted extensive interest from external stakeholders, resulting in a three-day public hearing with witnesses representing 89 organizations, and 362 written submissions from 195 organizations. The comments received from producers that compete with affected imports generally wrote or spoke in support of the tariffs. Those that relied on affected imports as inputs typically wrote or spoke in opposition to them.

 This page has been changed to reflect corrections to the original publication.

Chapter 1
Introduction

The U.S. International Trade Commission (Commission or USITC) has prepared this report in response to a direction in an explanatory statement accompanying the Consolidated Appropriations Act, 2022, enacted on March 15, 2022. The explanatory statement directed the Commission to conduct an investigation and provide a report containing a retrospective analysis of any section 232 or section 301 tariff active as of the date of enactment of the Act. The explanatory statement directed the Commission to provide its report to the House and Senate Committees on Appropriations (Committees) within a year of enactment of the legislation. The term “section 232 tariff” refers to tariffs proclaimed by the President under section 232 of the Trade Expansion Act of 1962 (19 U.S.C. § 1862) (safeguarding national security), and “section 301 tariff” refers to tariffs proclaimed under sections 301–10 of the Trade Act of 1974 (19 U.S.C. § 2411–20) (enforcement of U.S. rights under trade agreements and response to certain foreign trade practices). Tariffs were active as of March 15, 2022, pursuant to two sets of investigations: (1) national security investigations pursuant to section 232 on steel and aluminum and (2) a section 301 investigation concerning China’s acts, policies, and practices related to technology transfer, intellectual property, and innovation.

More specifically, the explanatory statement provided as follows:

> Trade Enforcement Analysis.—ITC is directed to conduct an investigation and retrospective economic analysis of any section 232 or 301 tariff that is active as of the date of enactment of this Act. Within a year of enactment of this Act, ITC shall provide a report to the Committees with detailed information, to the extent practicable, on U.S. trade, production, and prices in the industries directly and most affected by active tariffs under section 232 of the Trade Expansion Act of 1962 (19 U.S.C. 1862) and section 301 of the Trade Act of 1974.[6]

This report responds to the direction and provides to the Committees detailed information on U.S. trade, production, and prices in the industries directly and most affected by the tariffs under sections 232 and 301.

Section 232 of the Trade Expansion Act of 1962 provides for investigations by the Secretary of Commerce to determine the effects on national security of imports of articles and for the President’s determination regarding the appropriate action with respect to such imports.[7]

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[6] Explanatory Statement submitted by Rosa DeLauro on March 9, 2022, 117th Cong., 2d sess., *Congressional Record* 168, H1801. See also Explanatory Statement for Commerce, Justice, and Science and Related Agencies Appropriations Bill 2023, Staff of the Senate Committee on Appropriations, 117th Congress, 2022: “The Committee continues to be concerned about the impact of active tariffs under section 232 of the Trade Expansion Act of 1962 (19 U.S.C. 1862) and section 301 of the Trade Act of 1974 (19 U.S.C. 2232). The Committee looks forward to receiving the report on the effects of these tariffs, as directed by the joint explanatory statement accompanying Public Law 117–103 under the heading ‘Trade Enforcement Analysis.’”

[7] 19 U.S.C. § 1862.

Section 301 of the Trade Act of 1974 is designed to address unfair foreign practices affecting U.S. commerce. Section 301 may be used to enforce U.S. rights under bilateral and multilateral trade agreements or to respond to unreasonable, unjustifiable, or discriminatory foreign government practices that burden or restrict U.S. commerce.[8]

Scope

The Committees directed that the report provide an economic analysis with detailed information on U.S. trade, production, and prices in the industries directly and most affected by the tariffs under sections 232 and 301 that were active on March 15, 2022. The Commission interpreted this request as applying to the tariffs that were imposed under: (1) section 232, on steel and aluminum articles resulting from the investigations titled *The Effects of Imports of Steel on the National Security* and *The Effects of Imports of Aluminum on the National Security* and (2) section 301, on a wide range of products from China resulting from the investigation titled *Findings of the Investigation into China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation under Section 301 of the Trade Act of 1974*.[9] The tariffs in effect are defined as temporary tariffs set out in subchapter III of chapter 99 of the 2022 *Harmonized Tariff Schedule of the United States (Basic Edition), Revision 2* (HTS). Specifically, section 232 tariffs apply to articles described under HTS subheadings 9903.80.01 through 9903.81.80 and 9903.85.01 through 9903.85.44. Section 301 tariffs apply to articles described under HTS subheadings 9903.88.01, 9903.88.02, 9903.88.03, 9903.88.04, and 9903.88.15.

Several other recent actions under section 301, such as those relating to the European Union (EU) large civil aircraft dispute and digital services taxes in 11 jurisdictions, were suspended or terminated as of March 15, 2022, and were not considered "active" as of that date for the purposes of this report.

As a result of bilateral negotiations with certain affected countries, quotas or tariff-rate quotas (TRQs) have replaced some tariffs imposed under section 232. Although these alternative restrictions still function under the scope of section 232 actions, the Commission has interpreted the direction in the explanatory statement to conduct an economic analysis of section 232 tariffs to not include the impacts of these quotas and TRQs and therefore largely did not include them as part of the scope of its assessment in its economic modeling.[10] This report does consider the implementation of section 232 quotas and TRQs in its data collection and assessment of imports that have paid section 232 tariffs, but it does not directly assess the effect of import volumes being constrained by the quotas and TRQs.

In addition, some individual products and countries within the scope of the initial actions were excluded, exempted, or otherwise relieved from the tariffs, either temporarily or permanently. Tariff rates on

[8] Section 301 refers to sections 301–10 of the Trade Act, which are codified at 19 U.S.C. §§ 2411–20.
[9] USDOC, BIS, *The Effect of Imports of Steel on the National Security*, January 11, 2018; USDOC, BIS, *The Effect of Imports of Aluminum on the National Security*, January 17, 2018; USTR, *Findings of the Investigation into China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation under Section 301 of the Trade Act of 1974*, March 22, 2018.
[10] Trying to include imports subject to quotas or TRQs also presented data challenges. Filtering imports by U.S. Census Bureau's rate provision codes as described in the "Data Availability and Limitations" section below allows for the separation of imports subject to section 232 tariffs from nonsubject imports, but it does not allow for the separation of imports subject to quotas and TRQs from other nonsubject imports, such as imports that were subject to a product exclusion.

certain groups of products subject to these tariffs also changed over time. When possible, the report considers these modifications in its retrospective analysis. The report assesses the effect of tariffs under sections 232 and 301 in place in each year from 2018 to 2021, pursuant to the specific section 232 and 301 investigations cited above for which tariffs were active as of March 15, 2022.

Approach

The Commission used a variety of analytical approaches in its economic analysis of the tariffs under sections 232 and 301 that were active as of March 15, 2022. The approaches include the presentation of relevant data, economic modeling, and qualitative analysis of impacts. Together, these approaches provide a detailed depiction of the impacts of these tariffs on the U.S. industries directly and most affected.

Chapters 3, 4, and part of chapter 6 present multiple data series that show how U.S. trade, production, and prices have changed since tariffs under sections 232 and 301 were imposed, beginning in 2018. These data series provide a detailed view of how economic conditions have changed in the months and years following each of the tariff changes. It is important to note, however, that these trends were affected by many factors other than tariffs. Perhaps most notable was the COVID-19 pandemic, which began in March 2020, and the supply chain disruptions and inflation that followed. These additional factors also have had a considerable impact on U.S. trade, production, and prices in recent years, and should not be overlooked when interpreting these data.

This report also uses economic modeling (in chapters 5 and 6) to help disentangle the effects of the tariffs under sections 232 and 301 from the effects of other influential factors occurring simultaneously. The economic models also provide information about trade, production, and prices where data are unavailable, by estimating impacts that otherwise may be poorly recorded or difficult to observe.

Finally, the data analysis and economic modeling are complemented with qualitative analysis. This additional analysis draws on historical information, industry interviews, public statements, economic literature, and other sources and provides valuable context. Combined, these three approaches provide an economic analysis of the tariffs under sections 232 and 301 on the U.S. industries directly and most affected.

As requested, the Commission's analysis is retrospective, looking at changes that occurred after the tariffs under sections 232 and 301 were imposed. In most cases, the analysis considers the period between 2016 and 2021 to provide information about trends prior to the imposition of these tariffs and after. The analysis ends with 2021 because that was the latest year with available data at the time of writing. This report does not consider the likely future effects of the tariffs or the likely effects of removing them. For this reason, the findings in the report should be viewed as an assessment of the impacts that occurred, which may or may not be indicative of their effects in the future.

When interpreting the findings of this report, the scope of the analyses that it presents is important. As directed, the Commission focused on the impacts of the tariffs on the industries that were directly and most affected. The Commission's analysis should not be considered an assessment of the complete, economy-wide impacts of the tariffs under sections 232 and 301. Many costs and benefits are not fully captured in the Commission's analysis. For example, because the Commission did not assess the economy-wide impact of the tariffs, the analysis may not fully capture all the possible connections between affected industries. Similarly, with the exception of the analysis of the economic effect of 232 tariffs on downstream industries, the estimates do not capture the impacts on indirectly connected parties, such as consumers of final goods, or producers of products or services that were not affected by tariffs but were indirectly impacted by changes in purchasing patterns, prices, or other factors. It also did not consider the uses of the additional tariff revenues, nor does it fully address the effects of the tariffs on long-term factors such as investment, capacity changes, inventory storage, or supply chain adjustments. For this reason, readers should be cautious about drawing broad conclusions about whether the tariffs under sections 232 and 301 produced a net benefit for the U.S. economy overall. The analysis in this report is, by design, not intended to address those questions.

Data Availability and Limitations

Trade

U.S. import and export data are derived from the U.S. Census Bureau, via USITC DataWeb. To estimate the value and volume of goods subject to tariffs under sections 232 or 301, the Commission used data on imports covered under HTS statistical reporting numbers and from countries that were subject to these tariffs. For goods subject to section 301 tariffs, these data allowed the Commission to capture changing product coverage, including imports which had been granted a product exclusion.[11] When estimating goods subject to tariffs, the data were often further refined by including only goods where the U.S. Census Bureau rate provision codes were equal to 69 or 79.[12] These data capture only imports of products that paid a tariff under a trade provision provided for in HTS chapter 99 and therefore do not capture goods entering under a quota, the duty-free portion of a TRQ, or a product exclusion. No

[11] Some Section 301 product exclusions that were granted on products more specific than the full HTS statistical reporting number in which they are imported under could not be excluded. The Commission does not expect this to have a significant impact on the overall analysis because the exclusions are generally very narrowly defined as only parts of select statistical reporting numbers. As a result, the value of products subject to an exclusion is expected to be very small compared to the value of covered products.

[12] U.S. Census rate provision codes 69 and 79 are applied to imports that were "dutiable at rates prescribed in Rates of Duty columns of HTS chapter 99." Chapter 99 of the HTS provides for products for which temporary tariff modifications apply pursuant to trade legislation such as sections 232 and 301, among other provisions. Thus, rate provision codes 69 and 79 can be used to examine imports that paid an additional duty pursuant to sections 232 and/or 301. Goods entering under an exclusion, quota, or the duty-free portion of a TRQ would generally not be dutiable at rates prescribed in HTS chapter 99 and therefore are not recorded under rate provision codes 69 and 79. However, between 2018 and 2021, rate provision codes 69 and 79 do apply to a small share of imports of aluminum from Argentina that are subject to a quota under section 232. Imports of aluminum from Argentina comprise less than 1 percent of total imports subject to section 232 tariffs, depending on the year. Additionally, a small subset of goods may enter under dutiable rates that are prescribed in chapter 99 related to measures other than the 232 and 301 tariffs, and therefore may be recorded as imports under rate provision codes 69 and 79. For example, these rate provision codes could also be applied to imports subject to a reduced tariff (rather than zero rate) under the Miscellaneous Tariff Bill or to imports subject to an additional tariff resulting from a safeguard action. The Miscellaneous Tariff Bill, which expired as of December 31, 2020, provided temporary duty suspension or reductions for certain products selected according to public petitions from importers. Safeguards may include duties imposed by the President to provide import relief. In both cases, these instances are minimal and have been excluded from the data presented in this report where possible.

publicly available data specifically reflect the value of products subject to exclusion under section 232 or 301. However, this report endeavors to separate products subject to an exclusion from those subject to the tariffs as described above, capturing in many respects the exclusions' influence on the effects of the tariffs.

In addition, both modeling chapters in this report have concorded U.S. import data with North American Industry Classification System (NAICS) 4- or 6-digit industry sectors using concordances provided by the U.S. Census Bureau.

Production

Steel production data by volume, presented in chapter 4, were obtained from the World Steel Association and the American Iron and Steel Institute. Aluminum production data by volume, presented in chapter 4, were obtained from the Aluminum Association and Refinitiv World Bureau of Metal Statistics. For both the steel and aluminum industries, disaggregated production data by product are not publicly available. For the economic modeling presented in chapter 5, steel and aluminum production data by value were derived from the U.S. Census Annual Survey of Manufactures. Because these production data by value were available through only 2020, the Commission used the production data for 2020 in both the 2020 and 2021 estimates and adjusted them, as required. The economic modeling also uses the U.S. Bureau of Economic Analysis (BEA) 2012 Use Tables and Import Matrices to estimate the share of steel and aluminum inputs used in production for downstream consuming industries. The modeling in chapter 6 also uses gross output by sector from the BEA for industries affected by section 301 duties, which includes 94 of 98 NAICS industry sectors.

Prices

Hot-rolled steel coil prices presented in chapter 4 were obtained from CRU Group data published by the U.S. Department of Commerce.[13] These prices are believed to be representative of price trends in other steel products and in the industry in general. Domestic aluminum prices presented in chapter 4 are from the Platts Midwest Premium price series, sourced from Fastmarkets.[14] Global aluminum prices presented in chapter 4 are from the London Metal Exchange global price series, sourced from the World Bank's Commodity Markets webpage. All aluminum prices presented in chapter 4 are for primary unwrought aluminum; prices for secondary aluminum (aluminum recycled from aluminum scrap) and conversion prices for wrought aluminum products are not publicly available. In chapter 6, U.S. producer price indexes for NAICS 4-digit industry groups are from the U.S. Bureau of Labor Statistics. Prices paid by U.S. importers, which are inferred from import values inclusive of tariffs, are used to evaluate import prices.

[13] CRU Group is a private, subscription-based business intelligence company focused on the mining, metals, and fertilizer industries.
[14] Fastmarkets is a private, subscription-based commodity price reporting agency.

Views of Interested Parties

In its notice of investigation and hearing published in the *Federal Register*, the Commission invited interested parties to furnish information relevant to the investigation, including in the form of written submissions, prehearing and posthearing briefs, and testimony at the Commission's public hearing. This request generated significant engagement and extensive information from a wide variety of parties, including representatives of firms, labor unions, industry associations, and public interest groups. The hearing took place over three days on July 20–22, 2022, and included testimony from U.S. Representative Frank Mrvan, Burak Güreşci of Turkey's Ministry of Trade, and witnesses representing 89 organizations. A schedule of the hearing with a list of witnesses is provided in appendix C. The Commission also received 362 written submissions from 195 persons and organizations, including some that appeared at the hearing.

Persons and organizations appearing at the hearing and filing written submissions presented a broad range of views on how tariffs under sections 232 and 301 had affected U.S. industries. Many producers and importers of the steel and aluminum products covered by section 232 tariffs—in addition to organizations representing workers in those industries—as well as numerous businesses affected by section 301 tariffs provided their views. As evidence of the breadth of section 301 tariffs coverage, the Commission received comments from producers and retailers on an extensive range of products including automotive parts, tooling, electronics, apparel, home and building supplies, and food products.

In general, domestic producers of products subject to the tariffs and labor unions expressed support for the tariffs. These producers and unions stated that the tariffs provided important relief for their businesses and have helped with the recovery and preservation of these industries. Many reported that the tariffs have improved market conditions and allowed them to invest in and expand their operations. Firms that rely on imports, on the other hand, generally expressed opposition to the specific tariffs on the products they import. Firms expressing opposition frequently stated that the tariffs had increased their costs, lowered their margins, introduced supply shortages, and required them to raise their prices. Notably, many of the firms whose imports were covered by section 301 tariffs expressed support for the tariff actions overall but requested relief from the tariffs for the specific products they import. The Commission also received comments from public advocacy groups and think tanks that expressed similarly diverse views on the tariffs.

The information that the Commission received from these interested parties is reflected in this report in several ways. The Commission's analysis throughout the following chapters drew on and referenced information shared in the hearing and written submissions. A full list of parties that provided public comments is included in appendix D. Written summaries of each party's views are included in this appendix when the party provided them. All these party views, including hearing transcripts and written submissions, are available on the Commission's website.[15]

[15] Views of interested parties can be accessed via the Commission's Electronic Document Information System (EDIS) at https://edis.usitc.gov.

Report Organization

The remainder of the report is organized into five chapters. Chapter 2 provides background information on sections 232 and 301 and the initial actions taken under those provisions that are covered by this report. It includes a summary of the findings and recommendations of the Secretary of Commerce and the President relating to actions taken under section 232, and by the U.S. Trade Representative (Trade Representative) for actions taken under section 301 at the direction of the President. This chapter also includes a brief summary of the international responses to the U.S. implementation of tariffs under sections 232 and 301, such as the introduction of a large number of retaliatory tariffs on U.S. exports.

Chapter 3 describes the scope of the tariff actions under sections 232 and 301, including the product coverage and countries impacted. It presents information on the change in tariff coverage in terms of the number and value of products, as well as the change in overall tariff rates and the imposition of quotas or tariff rate quotas (TRQs) with respect to certain countries subject to section 232 tariffs. It also describes the various country exemptions and product exclusions that have altered the original coverage of the tariffs.

Chapter 4 examines the U.S. steel and aluminum industries. Imports of steel and aluminum are the only imports subject to the tariffs under both sections 232 and 301. The analysis presents detailed information about trade, production, and price trends in these industries leading up to and following the imposition of the tariffs under sections 232 and 301. The chapter also highlights trends in selected upstream and downstream industries that may also have been affected by the tariffs and may also have impacted supply and demand for steel and aluminum.

Chapter 5 examines the effects of section 232 tariffs on steel, aluminum, and downstream industries. It presents the findings produced by a custom-built economic model of these industries, which is used to estimate the effects of these tariffs on trade, production, and prices. The economic model is able to control for and separate other factors that have influenced these economic outcomes, thereby providing a clearer picture of the effects of these tariffs absent these other influences.

Chapter 6 examines the effects of section 301 tariffs on U.S. imports on directly affected industries. The chapter presents detailed data and discussion of recent trends in trade, production, and prices for the more than 10,000 products affected by these tariffs. It also presents the findings from an econometric model and a series of partial equilibrium models that estimate the effects of these tariffs and seek to disentangle them from all other factors that have impacted trade, production, and prices.

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Chapter 2
History of Statutory Provisions and Recent Investigations under Sections 232 and 301

Section 232 of the Trade Expansion Act of 1962 provides for investigations by the Secretary of Commerce (Secretary) to determine the effects of imports on national security, reports to the President by the Secretary, and determinations and actions by the President to adjust imports so that such imports will not threaten to impair national security.

Section 301 of the Trade Act of 1974 provides for investigations by the U.S. Trade Representative (Trade Representative) and is designed to address unfair foreign practices affecting U.S. commerce. It may be used to enforce U.S. rights under bilateral and multilateral trade agreements or to respond to unreasonable, unjustifiable, or discriminatory foreign government practices that burden or restrict U.S. commerce.

Both sections 232 and 301 had seen relatively limited use in recent decades. Since 2017, however, the level of activity under both authorities has increased, including the actions that are the subject of this report. Investigations under section 232 on steel and aluminum focused on global overcapacity, import levels in the United States, and the impact of those imports on domestic industries deemed important to national security. An investigation under section 301 into technology transfer, intellectual property, and innovation issues focused on the acts, policies, and practices of the government of China. Each of these proceedings resulted in import restraints intended to address longstanding concerns.

This chapter begins with an overview of section 232 of the Trade Expansion Act of 1962 and section 301 of the Trade Act of 1974. It then describes the investigations that led to the actions taken under those provisions that are the subject of this report, providing context for their implementation. Finally, this chapter summarizes responses to the U.S. actions taken by U.S. trading partners.

Section 232 of the Trade Expansion Act of 1962

The Trade Expansion Act of 1962 included provisions for temporary tariff reduction as well as trade adjustment assistance and tariff-based import relief. Section 232 of the Trade Expansion Act of 1962, as amended, provides for investigations by the Secretary of Commerce to determine the effects on national security of imports of articles and for the President's determination regarding the appropriate action with respect to such imports.[16]

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[16] Section 232 of the Trade Expansion Act of 1962, 19 U.S.C. § 1862. Between 1962 and 1973, the administering authority for section 232 was the Director of the Office of Emergency Planning/Preparedness. Between 1973 and

Description

Section 232(b) of the Act requires the Secretary of Commerce, upon request of the head of any department or agency, upon application of an interested party, or upon the Secretary's own motion, to initiate an appropriate investigation to determine the effects on the national security of imports of the article that is the subject of the request, application, or motion.[17] In the course of any investigation, the Secretary of Commerce must consult with the Secretary of Defense and other officers of the United States and, if appropriate, hold public hearings or otherwise afford opportunities for interested parties to present information and advice relevant to such investigation.[18]

The Secretary of Commerce must submit a report to the President within 270 days of initiating an investigation. The report must include the Secretary's findings "with respect to the effect of the importation of such article in such quantities or under such circumstances upon the national security" and recommendations for action or inaction. The statute also requires that if the Secretary finds that the imported article "is being imported into the United States in such quantities or under such circumstances as to threaten to impair the national security," the Secretary must so advise the President in the report.[19] Within 90 days of receiving such a report from the Secretary, the President must determine whether they concur with the finding of the Secretary, and if the President concurs, must determine the nature and duration of the action that must be taken to adjust imports of the article and its derivatives so that such imports will not threaten to impair the national security.[20]

Past Investigations by the Secretary of Commerce

As presented in table 2.1, since January 2, 1980, when the Secretary of Commerce (Secretary) became the administering authority for section 232 investigations, the Secretary has initiated 22 investigations.[21] Fourteen were initiated between 1981 and 2001, including four relating to imports of oil and one

1980, the administering authority for section 232 was the Secretary of the Treasury. Since 1980, the Secretary of Commerce has been the administering authority for section 232, pursuant to Executive Order 12188, January 2, 1980. BIS, *Section 232 Investigations Program Guide*, June 2007, 16–20 (referencing Executive Order 12188, 45 Fed. Reg. 989, January 2, 1980).

[17] 19 U.S.C. § 1862(b)(1)(A).

[18] 19 U.S.C. § 1862(b)(2)(A).

[19] 19 U.S.C. § 1862(b)(3)(A).

[20] 19 U.S.C. § 1862(c)(1)(A). See also USITC, *The Year in Trade 2021*, August 2022, 81–82.

[21] 44 Fed. Reg. 69274 (December 3, 1979).

relating to imports of iron ore and semifinished steel—specifically ingots, slabs, blooms, and billets of all grades (carbon, stainless, and alloy).[22]

Following more than a decade of inactivity, since 2017 the Secretary has initiated eight section 232 investigations, including the two that are part of the subject of this report. Of these eight investigations, two (automobiles and automobile parts; and vanadium) resulted in no action; four (uranium; titanium sponge; transformers and transformer components—focusing on grain-oriented electrical steel, or GOES; and neodymium-iron-boron [NdFeB] permanent magnets) resulted in other types of actions, such as consultation, negotiation, monitoring, creation of a working group, or those related to the broader supply chain; and two (aluminum and steel) resulted in actions to adjust imports, specifically through increases in tariffs and other measures.[23]

[22] The U.S. Department of Commerce (USDOC) was unable to conclude that imports of iron ore and semifinished steel threaten to impair the national security of the United States or to recommend to the President that he take action under section 232 to adjust the level of imports. USDOC found no weapons system to be dependent upon foreign steel; noted that demand of critical industries can be “readily satisfied” by domestic production; stated that the U.S. industry currently has, and anticipates continuing to have in the future, “sufficient human resources, products, raw materials, and other supplies and services” needed for production; observed that imports are from diverse and “safe” foreign suppliers such as Canada, Mexico, and Brazil; and reasoned that although domestic manufacturers “clearly are enduring substantial economic hardship, there is no evidence that imports of these items (20 percent of U.S. iron ore and 7 percent of semifinished steel consumption) fundamentally threaten to impair the capability of U.S. industry to produce the quantities of iron ore and semifinished steel needed to satisfy national security requirements, a modest proportion of total U.S. consumption.” USDOC, BIS, *The Effect of Imports of Iron Ore and Semi-Finished Steel on The National Security*, October 2001, 1–2.

[23] Proclamation No. 9704, 83 Fed. Reg. 11619 (March 15, 2018) and Proclamation No. 9705, 83 Fed. Reg. 11625 (March 15, 2018). USITC, *The Year in Trade 2021,* August 2022, 82–87. See also USTR, *USTR Statement on Successful Conclusion of Steel Negotiations with Mexico*, November 5, 2020 (noting that “Mexico will establish a strict monitoring regime for exports of electrical transformer laminations and cores made of non-North American GOES.”); USDOC, *FACT SHEET: Biden-Harris Administration Announces Further Actions to Secure Rare Earth Element Supply Chain*, September 21, 2022, accompanying USDOC, BIS, *The Effect of Imports of Neodymium-Iron-Boron (NdFeB) Permanent Magnets on the National Security*, September 21, 2022.

Table 2.1 Investigations initiated by the Secretary of Commerce under section 232 of the Trade Expansion Act of 1962, 1981–present

Proceedings	Report publication years
Neodymium-Iron-Boron (NdFeB) Permanent Magnets	2022
Vanadium	2021
Transformers and Transformer Components	2020
Titanium Sponge	2019
Uranium	2019
Automobiles and Automobile Parts	2019
Steel	2018
Aluminum	2018
Iron Ore and Semifinished Steel	2001
Crude Oil	1999
Crude Oil and Petroleum Products	1994
Ceramic Semiconductor Packaging	1993
Gears and Gearing Products	1992
Crude Oil and Petroleum Products	1989
Plastic Injection Molding	1989
Uranium	1989
Antifriction Bearings	1988
Crude Oil from Libya	1982
Nuts, Bolts, and Large Screws	1983
Metal-Cutting and Metal-Forming Machine Tools	1983
Chromium, Manganese and Silicon Ferroalloys and Related Materials	1981
Glass-Lined Chemical Processing Equipment	1981

Source: USDOC, BIS, "Section 232 Investigations: The Effect of Imports on the National Security," accessed October 3, 2022.
Note: The year in which these investigations were initiated is in some cases different than the year the corresponding reports were published.

Findings by the Secretary of Commerce Regarding Imports of Steel

On April 19, 2017, Secretary of Commerce Wilbur Ross initiated an investigation under section 232 to determine the effects on the national security of imports of steel and provided notice to the Secretary of Defense.[24] Following a public hearing, submission of comments, and interagency consultations, the Secretary submitted a report to President Trump setting out his findings and supporting information in the investigation, *The Effect of Imports of Steel on the National Security,* on January 11, 2018.[25] Table 2.2 summarizes the major findings and the support for those findings as set out in the Secretary's report.

[24] Notice Request for Public Comments and Public Hearing on Section 232 National Security Investigation of Imports of Steel, 82 Fed. Reg. 19205 (April 26, 2017).
[25] USDOC, BIS, *The Effect of Imports of Steel on the National Security*, January 11, 2018, 5 and 18–20.

Table 2.2 Findings and items that support findings regarding imports of steel as provided in the Secretary's report

Finding	Support
Steel is important to U.S. national security	1. National security includes projected national defense requirements for the U.S. Department of Defense. 2. National security also encompasses U.S. critical infrastructure sectors including transportation systems, the electric power grid, water systems, and energy generation systems. 3. Domestic steel production is essential for national security applications. Statutory provisions illustrate that Congress believes domestic production capability is essential for defense requirements and critical infrastructure needs, and ultimately to the national security of the United States. U.S. Government actions on steel across earlier Administrations further demonstrate domestic steel production is vital to national security. 4. Domestic steel production depends on a healthy and competitive U.S. industry. The principal types of mills that produce steel are integrated mills with basic oxygen furnaces (BOFs); mini-mills using electric arc furnaces (EAFs); re-roller/converter; and metal coater facilities. Basic oxygen furnaces convert raw materials into steel, and remain critical for continued innovation in steel technology. Covered in this report are five categories of steel products that are used for national security applications: flat, long, semi-finished, pipe and tube, and stainless. 5. The Department found that demand for steel in critical industries has increased since the Department's last investigation in 2001. The 2001 Report determined that there was 33.68 million tons of finished steel consumed in critical industries per year in the United States based on 1997 data. The Department updated that analysis for this report using 2007 data (the latest available) and determined that domestic consumption in critical industries has increased significantly, with 54 million metric tons of steel now being consumed annually in critical industries.
Imports in such quantities as are presently found adversely impact the economic welfare of the U.S. steel industry	1. The United States is the world's largest steel importer. In the first ten months of 2017 steel imports have increased at a double-digit rate over 2016, accounting for more than 30 percent of U.S. consumption. Notwithstanding numerous anti-dumping and countervailing duty orders, which are limited in scope, imports of most types of steel continue to increase. 2. Import penetration levels for flat, semi-finished, stainless, long, and pipe and tube products continue on an upward trend above 30 percent of domestic consumption. 3. Imports are nearly four times U.S. exports. 4. Imports are priced substantially lower than U.S. produced steel. 5. Excessive steel imports have adversely impacted the steel industry. Numerous U.S. steel mill closures, a substantial decline in employment, lost domestic sales and market share, and marginal annual net income for U.S.-based steel companies illustrate the decline of the U.S. steel industry.

Finding	Support
Displacement of domestic steel by excessive quantities of imports has the serious effect of weakening our internal economy	1. As steel imports have increased, U.S. steel production capacity has been stagnant and production has decreased. 2. Since 2000, foreign competition and the displacement of domestic steel by excessive imports have resulted in the closure of six basic oxygen furnace facilities and the idling of four more (which is more than a 50 percent reduction in the number of such facilities), a 35 percent decrease in employment in the steel industry, and caused the domestic steel industry as a whole to operate on average with negative net income since 2009. 3. The declining steel capacity utilization rate is not economically sustainable. Utilization rates of 80 percent or greater are necessary to sustain adequate profitability and continued capital investment, research and development, and workforce enhancement in the steel sector.
Global excess steel capacity is a circumstance that contributes to the weakening of the domestic economy	1. In the steel sector, free markets globally are adversely affected by substantial chronic global excess steel production led by China. The world's nominal crude steelmaking capacity reached about 2.4 billion metric tons in 2016, an increase of 127 percent compared to the capacity level in 2000, while steel demand grew at a much smaller rate. In 2016 there was a 737 million metric ton global gap between steelmaking capacity and steel crude demand, which means there is unlikely to be any market-driven reduction in steel exports to the United States in the near future. 2. While U.S. steel production capacity has remained flat since 2001. Other steel producing nations have increased their production capacity, with China alone able to produce as much steel as the rest of the world combined. Such excess capacity means that U.S. steel producers, for the foreseeable future, will face increasing competition from imported steel as other countries export more steel to the United States to bolster their own economic objectives and offset loss of markets to Chinese steel exports.

Source: USDOC, BIS, *The Effect of Imports of Steel on the National Security*, January 11, 2018, 2–5.
Note: The table above presents the specific language as provided in the BIS report. Items in the Findings column reflect the primary findings as presented in the executive summary of the BIS report. Items in the Support column reflect the sub-findings as presented in the executive summary of the BIS report.

Although data appearing in *The Effect of Imports of Steel on the National Security* focused on a period since 2011, the Secretary's 2018 report also highlighted events and trends stretching back to the end of the 20th century. For example, citing an earlier OECD report, the Secretary's report noted that U.S. steel capacity had remained stagnant from 2006–2016. The report also noted that between 1975 and 2016, the number of BOF facilities in the United States decreased from 38 to 13. Of the remaining BOFs, 33 percent were idled at the time of the investigation.[26]

The Secretary's report recommended that the President adjust import levels through quotas or tariffs with the goal of reducing import penetration to 21 percent of the U.S. market, which would enable U.S. steel producers to operate at 80 percent or better of available capacity.[27] In explaining this recommendation, the Secretary noted that "[p]rior significant actions to address steel imports using quotas and/or tariffs were taken under various statutory authorities by President George W. Bush,

[26] USDOC, BIS, *The Effect of Imports of Steel on the National Security*, January 11, 2018, 41–44.
[27] Given that capacity utilization in 2016 was estimated to be 69.4 percent, in order to have achieved 80 percent capacity utilization of the projected 2017 import levels, a reduction of imports would have been required, from 36 million metric tons to 23 million metric tons. USDOC, BIS, *The Effect of Imports of Steel on the National Security*, January 11, 2018, 58–59.

President William J. Clinton (three times), President George H. W. Bush, President Ronald W. Reagan (three times), President James E. Carter (twice), and President Richard M. Nixon, all at lower levels of import penetration than the present level, which is greater than 30 percent."[28]

On March 8, 2018, President Trump issued Proclamation 9705, *Adjusting Imports of Steel into the United States*, imposing a 25 percent ad valorem tariff on steel articles,[29] effective March 23, 2018.[30] The proclamation provided for the removal, modification, or adjustment of the tariff on the basis of national security considerations and the continuation of ongoing discussions with Canada and Mexico while exempting steel articles imports from those countries from the tariff, "at least at this time."[31] By one estimate, U.S. imports of steel articles covered by these tariffs accounted for $29.0 billion in trade in 2017.[32]

Findings by the Secretary of Commerce Regarding Imports of Aluminum

On April 26, 2017, Secretary of Commerce Wilbur Ross initiated an investigation under section 232 to determine the effects on the national security of imports of aluminum.[33] Following a public hearing, submission of comments, and interagency consultations, the Secretary submitted a report to President Trump, setting out his findings and supporting information in the investigation *The Effect of Imports of Aluminum on the National Security*.[34] Table 2.3 summarizes the major findings and the support for those findings as set out in the Secretary's report.

Table 2.3 Findings and items that support findings regarding imports of aluminum as provided in the Secretary's report

Finding	Support
Aluminum is essential to U.S. national security	1. Aluminum is needed to satisfy requirements for the U.S. Department of Defense (USDOD) for maintaining effective military capabilities including armor plate for armored vehicles, aircraft structural parts and components, naval vessels, space and missile structural components, and propellants. 2. Aluminum is needed to satisfy requirements for critical infrastructure sectors that are central to the essential operations of the U.S. economy and government, including power transmissions, transportation systems, manufacturing industries, construction, and others.

[28] USDOC, BIS, *The Effect of Imports of Steel on the National Security*, January 11, 2018, 58–61.
[29] An ad valorem tariff represents additional duties applied to the appraised customs value of the imported good.
[30] Proclamation No. 9705, 83 Fed. Reg. 11625 (March 15, 2018).
[31] Proclamation No. 9705, 83 Fed. Reg. 11625 (March 15, 2018). Exemptions from section 232 tariffs on imports from Canada and Mexico were not continued beginning June 1, 2018. These exemptions were reinstated on May 20, 2019. Tariff coverage has been adjusted for various other countries since the tariffs' initial imposition, and some countries have later become subject to quotas or TRQs in lieu of the tariffs. For more information on country exemptions and tariff chronology, see chapter 3.
[32] CRS, Section 232 Steel and Aluminum Tariffs: Potential Economic Implications, May 3, 2018, 1–3.
[33] Notice of Request for Public Comments and Public Hearing on Section 232 National Security Investigation of Imports of Aluminum, 82 Fed. Reg. 21509 (May 9, 2017).
[34] USDOC, BIS, *The Effect of Imports of Aluminum on the National Security*, January 17, 2018, 5 and 18–19.

Finding	Support
The U.S. government does not maintain any strategic stockpile	1. The USDOD does not keep any type of aluminum product, including armor plate, in the U.S. government's national stockpile. 2. Limited commercial stockpiles (of high performance aluminum) located in the United States are not likely to be sufficient to support USDOD aluminum requirements in a time of a major war.
The present quantity of imports adversely impacts the economic welfare of the U.S. aluminum industry	1. Imports and global aluminum production overcapacity, caused in part by foreign government subsidies—particularly in China, have had a substantial negative impact on the economic welfare and production capacity of the U.S. primary aluminum industry. The decline in U.S. production has occurred despite growing demand for aluminum both in the United States and abroad. 2. In 2016, the United States imported five times as much primary aluminum on a tonnage basis as it produced; the import penetration level was about 90 percent, up from 66 percent in 2012. 3. U.S. primary aluminum production in 2016 was about half of what it was in 2015, and output further declined in 2017. U.S. smelters are now producing at 43 percent of capacity and at annual rate of 785,000 metric tons. As recently as 2013, U.S. production was approximately 2 million metric tons per year. 4. Since 2012, six smelters with a combined 3,500 workers have been permanently shut down, totaling 1.13 million metric tons in lost production capacity per year. 5. The loss of jobs in the primary aluminum sector has been precipitous between 2013 and 2016, falling 58 percent from about 13,000 to 5,000 employees. 6. The United States currently has five smelters remaining, only two of which are operating at full capacity. Only one of these five smelters produces high-purity aluminum required for critical infrastructure and defense aerospace applications, including types of high performance armor plate and aircraft-grade aluminum products used in upgrading F-18, F-35, and C-17 aircraft. Should this one U.S. smelter close, the United States would be left without an adequate domestic supplier for key national security needs. The only other high-volume producers of high-purity aluminum are located in the UAE and China (internal use only). 7. The impact so far has been greatest on the primary (unwrought) aluminum sector. Now, however, the downstream aluminum sector also is threatened by overcapacity and surging imports. 8. Imports accounted for 64 percent of U.S. consumption of aluminum (primary and downstream mill products combined) in 2016. 9. U.S. imports in the aluminum categories subject to this investigation totaled 5.9 million metric tons in 2016, up 34 percent from 4.4 million metric tons in 2013. In the first 10 months of 2017, aluminum imports rose 18 percent above 2016 levels on a tonnage basis. 10. In the downstream aluminum sectors of bars, rods, plates, sheets, foil, wire, tubes, and pipes, imports rose 33 percent from 1.2 million metric tons in 2013 to 1.6 million metric tons in 2016. 11. Overall in 2016, for the aluminum product categories covered by this investigation, the United States ran a trade deficit of $7.2 billion.

Finding	Support
Global excess aluminum capacity is a circumstance that contributes to the weakening of the U.S. aluminum industry and the U.S. economy	1. A major cause of the recent decline in the U.S. aluminum industry is the rapid increase in production in China. Chinese overproduction suppressed global aluminum prices and flooded into world markets. 2. China's aluminum production is largely unresponsive to market forces. China produced approximately one million metric tons of excess supply in 2016. This excess alone exceeds the total U.S. 2016 production of primary aluminum of 840,000 metric tons. 3. China's industrial policies encourage development and domination of the entire aluminum production chain. These policies are further intended to stimulate the export of aluminum processed into sheets, plates, rods, bars, foils and other semimanufactures and to target development of increasingly sophisticated and high-value product sectors such as automotive and aerospace. 4. China imposes an excise tax that creates a disincentive for the export of primary aluminum ingots and billets. It provides tax rebates on exports of semifinished or finished aluminum products. Thus, U.S. imports of aluminum from China are not in the form of unwrought aluminum but primarily semifinished downstream aluminum products. 5. As imports make further inroads into the higher value-added, more sophisticated downstream sectors, U.S. downstream companies supporting the defense sector will be increasingly impacted.

Source: BIS, *The Effect of Imports of Aluminum on the National Security*, January 17, 2018, 2–5.
Note: The table above presents the specific language as provided in the BIS report. Items in the Findings column reflect the primary findings as presented in the executive summary of the BIS report. Items in the Support column reflect the sub-findings as presented in the executive summary of the BIS report, with the exception of the Support provided for the Finding in the second row regarding the strategic stockpile, for which there were no support sub-findings in the executive summary and the points provided in the table therefore were taken from the main text of the BIS report.

Although data appearing in *The Effect of Imports of Aluminum on the National Security* focused on a period since 2013, the report also highlighted events and trends stretching back to the end of the 20th century. For example, the report notes that "in 1981, the U.S. produced 30 percent of the world's primary aluminum and it remained the world's largest producer until 2000, when there were 23 smelters in operation. In 2016, the U.S. accounted for just 1.5 percent of global production. In the same timeframe, production of primary aluminum in China grew from less than 15 percent of global production in 2000 to about 55 percent in 2016."[35]

The Secretary recommended that the President use quotas or tariffs to adjust import levels so as to help enable U.S. producers to utilize 80 percent of their production capacity.[36] Moreover, in recommending import adjustments through tariffs and quotas, the report also provided information regarding prior actions to investigate and address aluminum import levels, including a general factfinding investigation requested of the U.S. International Trade Commission by the U.S. House of Representatives Committee on Ways and Means; a World Trade Organization (WTO) trade enforcement complaint concerning

[35] USDOC, BIS, *The Effect of Imports of Aluminum on the National Security,* 44, January 17, 2018.
[36] USDOC, BIS, *The Effect of Aluminum on the National Security*, January 17, 2018, 107–09. Various options, each designed to restrict aluminum imports sufficiently to allow U.S. primary aluminum producers to increase production by about 669,000 metric tons, included a worldwide quota limiting imports to 86.7 percent of 2017 import levels, a global tariff rate of 7.7 percent on imports of unwrought aluminum and the other aluminum product categories, or a tariff rate of 23.6 percent on imports of aluminum products from China, Hong Kong, Russia, Venezuela, and Vietnam.

China's subsidies to certain producers of primary aluminum and USTR's subsequent requests for consultations; and antidumping and countervailing duty investigations conducted by the USDOC and the USITC.[37]

On March 8, 2018, President Trump issued Proclamation 9704, *Adjusting Imports of Aluminum into the United States*, imposing a 10 percent ad valorem tariff on aluminum articles, effective March 23, 2018.[38] The proclamation provided for the removal, modification, or adjustment of the tariff, using national security considerations and ongoing discussions with Canada and Mexico as grounds while exempting aluminum imports from these countries from the tariff, "at least at this time."[39] By one estimate, U.S. imports of aluminum products covered by these tariffs accounted for $17.4 billion in trade in 2017.[40]

Section 301 of the Trade Act of 1974

In early 1975, President Ford signed the Trade Act of 1974.[41] The Act authorized certain multilateral trade negotiations, extended authority to address adverse or discriminatory foreign trade actions, and enhanced trade adjustment assistance. Section 301 of the Trade Act of 1974 (19 U.S.C. §§ 2411–20)[42] specifically addresses unfair foreign practices affecting U.S. commerce. Section 301 authority may be used to enforce U.S. rights under both bilateral and multilateral trade agreements.[43] It can also be used for responding to unjustifiable, unreasonable, or discriminatory foreign government practices that burden or restrict U.S. commerce.[44] Interested parties may petition the Trade Representative to investigate foreign government policies or practices, or the Trade Representative may initiate an investigation.[45]

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[37] USDOC, BIS, *The Effect of Imports of Aluminum on the National Security*, January 17, 2018, 6 and appendix D. See also USITC, *Aluminum: Competitive Conditions Affecting the U.S. Industry*, June 2017, 44–46.
[38] Proclamation No. 9704, 83 Fed. Reg. 11619 (March 15, 2018).
[39] Proclamation No. 9704, 83 Fed. Reg. 11619 (March 15, 2018). Exemptions from section 232 tariffs on imports from Canada and Mexico were not continued beginning June 1, 2018. These exemptions were reinstated on May 20, 2019, though once more Canada's exemptions were not continued between August 16 and September 1, 2020. Tariff coverage has been adjusted for various other countries since the tariffs' initial imposition, and some countries have later become subject to quotas or TRQs in lieu of the tariffs. For more information on country exemptions and tariff chronology, see chapter 3.
[40] CRS, *Section 232 Steel and Aluminum Tariffs: Potential Economic Implications*, May 3, 2018, 1–3.
[41] Pub. L. No. 93-618, 88 Stat. 1978.
[42] Section 301 refers to sections 301–10 of the Trade Act, which are codified at 19 U.S.C. §§ 2411–20.
[43] 19 U.S.C. § 2411(a).
[44] 19 U.S.C. § 2411(b).
[45] 19 U.S.C. § 2412(a) and (b). USITC, *The Year in Trade 2021*, August 2022, 64 (citing USTR, 2022 *Trade Policy Agenda and 2021 Annual Report*, March 2022, 62–63). The Section 301 Committee, which consists of a USTR-designated Chair and members from agencies with an interest in the issues, conducts section 301 investigations. The Committee operates under the auspices of the USTR-led interagency Trade Policy Staff Committee. See 15 C.F.R. § 2002.3; see also CRS, *Section 301 of the Trade Act of 1974: Origin, Evolution, and Use*, updated December 14, 2020, 6–8.

Description

In each investigation under section 301, the Trade Representative is required to seek consultations with the foreign government involved.[46] If the matter is not resolved, the Trade Representative must determine whether the practices in question fulfill any of three conditions: (1) they deny U.S. rights under a trade agreement; (2) they are unjustifiable and burden or restrict U.S. commerce; or (3) they are unreasonable or discriminatory and burden or restrict U.S. commerce.[47] If the practices fulfill either of the first two conditions, the Trade Representative generally must take action.[48] If the practices are unreasonable or discriminatory and burden or restrict U.S. commerce, the Trade Representative determines whether action is appropriate and, if so, what action to take.[49] Section 301 authorizes a wide range of actions, including the suspension of trade agreement concessions, the imposition of duties or other restrictions on the imports of goods or services, and any agreement to eliminate the offending practice or provide the United States with compensatory benefits.[50] Moreover, if a country fails to comply with such an agreement, or to implement a World Trade Organization (WTO) recommendation, the Trade Representative must determine what further action should be taken under section 301.[51]

Past Investigations by the Trade Representative

Since 1999, the Trade Representative has initiated six section 301 investigations (table 2.4). After initiating an investigation on European Union (EU) beef in 1999, no new investigations were initiated until 2017. Since 2017, the Trade Representative has initiated five investigations, including the one at issue in this report.

Table 2.4 Investigations conducted pursuant to section 301 of the Trade Act of 1974, 1999–present

Investigations	Years
Vietnam Currency	2020
Vietnam Timber	2020
Digital Services Taxes in 11 jurisdictions	2019–20
EU Large Civil Aircraft Dispute	2019
China's Technology Transfer Policies and Practices	2017
EU Beef	1999

Source: USTR, Section 301 Investigations, accessed October 3, 2022.
Note: Before 1999, section 301 proceedings were more common, including two prior investigations regarding China's treatment of intellectual property that resulted in bilateral agreements between the United States and China in 1992 and 1995. See, e.g., USTR, "Special 301 Report Section 306," May 1, 2003. Between 1975 and 1997, a total of 116 section 301 proceedings were undertaken. USTR, "Archive: Trade Agreements, Monitoring, and Enforcement," accessed October 3, 2022.

[46] 19 U.S.C. § 2413.
[47] 19 U.S.C. § 2414(a)(1).
[48] 19 U.S.C. § 2411(a)(1) but see 19 U.S.C. § 2411(a)(2)(describing circumstances where action is not required).
[49] 19 U.S.C. § 2411(b).
[50] 19 U.S.C. § 2411(c).
[51] 19 U.S.C. § 2416(b); see also USITC, *The Year in Trade 2021*, August 2022, 64–65.

USTR Findings Regarding China's Technology Transfer Policies and Practices

At the direction of President Trump,[52] effective August 18, 2017, the Trade Representative initiated a section 301 investigation to determine whether acts, policies, and practices of the government of China related to technology transfer, intellectual property, and innovation are actionable.[53] Following a public hearing and submission of comments, USTR issued *Findings of the Investigation into China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation under Section 301 of the Trade Act of 1974* on March 22, 2018,[54] subsequently updated on November 20, 2018.[55] The Office of the USTR released the following statement regarding these findings:

> "Using the information obtained and the advice of the Section 301 Committee, the Trade Representative determined that the acts, policies, and practices covered in the investigation were unreasonable or discriminatory and burden or restrict U.S. commerce and, in particular, that:
>
> - China uses foreign ownership restrictions, such as joint venture requirements and foreign equity limitations, and various administrative review and licensing processes, to require or pressure technology transfer from U.S. companies;
> - China's regime of technology regulations forces U.S. companies seeking to license technologies to Chinese entities to do so on nonmarket-based terms that favor Chinese recipients;
> - China directs and unfairly facilitates the systematic investment in, and acquisition of, U.S. companies and assets by Chinese companies to obtain cutting-edge technologies and intellectual property and generate the transfer of technology to Chinese companies; and
> - China conducts and supports unauthorized intrusions into, and theft from, the computer networks of U.S. companies to access their sensitive commercial information and trade secrets."[56]

The Trade Representative characterized these concerns as "longstanding" in the description of steps taken to address those concerns. Specifically, the Trade Representative stated that "[c]oncerns about a wide range of unfair practices of the Chinese government (and the Chinese Communist Party (CCP)) related to technology transfer, intellectual property, and innovation are longstanding. USTR has pursued these issues multilaterally, for example, through the WTO dispute settlement process and in WTO committees, and bilaterally through the annual Special 301 review. These issues also have been raised in

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[52] See Addressing China's Laws, Policies, Practices, and Actions Related to Intellectual Property, Innovation, and Technology/Memorandum for the U.S Trade Representative, 82 Fed. Reg. 39007 (August 17, 2017).
[53] Initiation of Section 301 Investigation; Hearing; and Request for Public Comments: China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation, 82 Fed. Reg. 40213, August 24, 2017.
[54] USTR, *Findings of the Investigation into China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation under Section 301 of the Trade Act of 1974*, March 22, 2018.
[55] USTR, *Update Concerning China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation under Section 301 of the Trade Act of 1974*, November 20, 2018.
[56] Notice of Determination and Request for Public Comment Concerning Proposed Determination of Action Pursuant to Section 301: China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation, 83 Fed. Reg. 14906, 14907 (April 6, 2018).

bilateral dialogues with China, including the U.S.-China Joint Commission on Commerce and Trade (JCCT) and U.S.-China Strategic & Economic Dialogue, to attempt to address some of the U.S. concerns."[57]

As discussed in greater detail in chapter 3, USTR proposed a list of products to be subject to increased tariffs.[58] It estimated the value of the list to be approximately $50 billion in 2018 trade value and concluded that "[t]his level is appropriate both in light of the estimated harm to the U.S. economy, and to obtain elimination of China's harmful acts, policies, and practices."[59] The initial actions resulted in the imposition of an additional ad valorem duty of 25 percent on imports under approximately 1,000 tariff subheadings.[60] Subsequent rounds of actions led to the imposition of additional ad valorem duties of varying rates on imports under approximately 10,121 tariff subheadings, as described in chapter 3. To address the second bulleted finding on China's discriminatory licensing policies, the United States initiated a WTO dispute by requesting consultations with the government of China.[61]

In a November 2018 report providing an update on the section 301 investigation and subsequent actions, USTR stated that "[d]espite repeated U.S. engagement efforts and international admonishments of its trade technology transfer policies, China did not respond constructively and failed to take any substantive actions to address U.S. concerns," and that "China fundamentally has not altered its acts, policies, and practices related to technology transfer, intellectual property, and innovation, and indeed appears to have taken further unreasonable actions in recent months," and stated the intent to continue efforts to monitor any new developments and actions in this area.[62]

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[57] USTR, *Findings of the Investigation into China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation under Section 301 of the Trade Act of 1974*, March 22, 2018, 4. See also USTR Releases 2022 Special 301 Report on Intellectual Property Protection and Enforcement, April 27, 2022 (characterizing the report as "an annual review of the global state of IP protection and enforcement" and noting that it is conducted pursuant to Section 182 of the Trade Act of 1974, as amended by the Omnibus Trade and Competitiveness Act of 1988 and the Uruguay Round Agreements Act). The report places China among other countries on the Priority Watch List. Countries on the Priority Watch List present the most significant concerns regarding insufficient intellectual property protection or enforcement or actions that otherwise limit market access for persons relying on intellectual property protections. USTR, 2022 Special 301 Report, April 27, 2022. China's IPR policies have been highlighted as an area of concern in Special 301 reports for decades. See e.g., USTR, 2003, Special 301 Report, May 1, 2003.
[58] Notice of Determination and Request for Public Comment Concerning Proposed Determination of Action Pursuant to Section 301: China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation, 83 Fed. Reg. 14906, 14910–14954 (April 6, 2018).
[59] Notice of Determination and Request for Public Comment Concerning Proposed Determination of Action Pursuant to Section 301: China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation, 83 Fed. Reg. 14906, 14907 (April 6, 2018).
[60] Notice of Action and Request for Public Comment Concerning Proposed Determination of Action Pursuant to Section 301: China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation, 83 Fed. Reg. 28710 (June 20, 2018) (announcing the imposition of duties on 818 tariff subheadings), and Notice of Action Pursuant to Section 301: China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation, 83 Fed. Reg. 40823 (August 16, 2018) (announcing the imposition of duties on further 279 tariff subheadings).
[61] 83 Fed. Reg. 14906, 14907 (April 6, 2018). WTO, DS542: China—Certain Measures Concerning the Protection of Intellectual Property Rights, accessed January 30, 2023.
[62] USTR, *Update Concerning China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation under Section 301 of the Trade Act of 1974*, November 20, 2018, 5, 49.

Global Responses and Retaliatory Tariffs

This section gives a brief overview of the retaliatory tariffs imposed by foreign trade partners in response to section 232 tariffs on steel and aluminum articles and section 301 tariffs on imports from China.[63] It also notes WTO disputes that have been initiated in response to tariffs under sections 232 and 301. Although the impacts of these retaliatory actions are not explicitly examined in this report, their description here offers background information about global trading conditions in recent years.

Trade Partner Responses to Section 232 Actions

Several trade partners imposed retaliatory tariffs and filed WTO disputes in response to the U.S. section 232 tariffs on imports of steel and aluminum articles.[64] Claiming that these tariffs were inconsistent with U.S. obligations under several articles of GATT 1994, including Article XIX and the WTO Safeguards Agreement (WTO Agreement), Canada, China, the EU, India, Mexico, Russia, Turkey, and the United Kingdom (UK) filed WTO disputes and imposed retaliatory tariffs on imports of certain products originating in the United States.[65] Canada, the EU, Mexico, and the UK subsequently withdrew their retaliatory tariffs and, along with the United States, withdrew their respective WTO disputes after reaching mutually agreed solutions.[66] Norway and Switzerland did not impose retaliatory tariffs but filed WTO disputes.[67]

China's Responses to Section 301 Actions

Claiming that section 301 tariffs violate not only various WTO rules and obligations but also the consensus attained from bilateral consultations, China's Customs Tariff Commission responded to each section 301 action with successive additional ad valorem tariffs of its own upon imports of products originating in the United States among the HTS subheadings enumerated in each of the four section 301 product tranches. China also filed a WTO dispute (DS543) on April 4, 2018, alleging that section 301 tariffs violated U.S. WTO obligations.[68] On September 15, 2020, the WTO panel found the imposition of

[63] For further details about the chronology of U.S. trade partner responses to section 232 steel and aluminum tariffs and section 301 China tariffs, see USDOC, ITA, "Foreign Retaliations Timeline," March 29, 2022.
[64] For further information about specific ongoing WTO panel dispute actions, see: USTR, "Dispute Settlement Proceedings," accessed November 3, 2022; WTO, "Dispute Settlement: The Disputes, Follow Disputes and Create Alerts," accessed November 3, 2022.
[65] Compiled from individual "Immediate Notice Under Article 12.5 of the Agreement on Safeguards" documents provided to the WTO Council for Trade in Goods, Committee on Safeguards. USDOC, ITA, "Current Foreign Retaliatory Actions," January 6, 2020; USDOC, ITA, "Foreign Retaliation Timeline," accessed October 3–12, 2022.
[66] For information on the WTO disputes filed by the United States in response to these retaliatory tariffs, see WTO, "DS557: Canada—Additional Duties on Certain Products from the United States," accessed November 3, 2022; WTO, "DS559: European Union - Additional Duties on Certain Products from the United States," accessed November 3, 2022; and WTO, "DS560: Mexico—Additional Duties on Certain Products from the United States," accessed November 3, 2022.
[67] WTO, "DS552: United States—Certain Measures on Steel and Aluminium Products," accessed November 3, 2022; WTO, "DS556: United States—Certain Measures on Steel and Aluminium Products," accessed November 3, 2022.
[68] WTO, "DS543: United States—Tariff Measures on Certain Goods from China," accessed November 3, 2022.

section 301 tariffs to be inconsistent with rules under the GATT.[69] As of December 29, 2022, the panel report is currently under appeal by the United States.

[69] The WTO published the following summary of the panel findings on its website:

> "The Panel concluded that the United States had not provided an explanation demonstrating how the imposition of additional duties on the selected imported products in List 1 and List 2 was apt to contribute to the public morals objective invoked, and, following on from that, how they were necessary to protect public morals . . . [T]he Panel recalled that the Government of the United States had not, up to the present time, initiated action under the WTO DSU with respect to measures that China had imposed in response to the United States measures at issue in this dispute."

WTO, "DS543: United States—Tariff Measures on Certain Goods from China," Panel report circulated 15 September 2022, accessed December 20, 2022.

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Chapter 3 Tariffs under Sections 232 and 301

This chapter details the products and countries covered by section 232 tariffs imposed on U.S. imports of steel and aluminum articles and section 301 tariffs imposed on U.S. imports of certain products originating in China as well as the applicable duty rates. This chapter identifies the products and countries for which tariffs under sections 232 and 301 were in effect as of March 15, 2022, which remain the same as of the writing of this report, except as noted.[70]

Steel articles imported under 306 HTS subheadings from all U.S. trade partners other than Australia, Canada, and Mexico (with duty exemptions), and Argentina, Brazil, and South Korea (with duty-free quotas) were subject to section 232 tariffs since March 23, 2018. Steel articles under these subheadings from EU member countries became subject to tariff-rate quotas (TRQs) on January 1, 2022, and therefore in-quota amounts became exempt from section 232 tariffs. Aluminum articles imported under 42 HTS subheadings from all U.S. trade partners other than Australia, Canada, and Mexico (with duty exemptions) and Argentina (with duty-free quotas) were also subject to section 232 tariffs since March 23, 2018. Aluminum articles under these subheadings from EU member countries became subject to TRQs on January 1, 2022, and therefore in-quota amounts became exempt from section 232 tariffs. Likewise, section 232 tariffs were applied to derivative steel articles imported under nine HTS subheadings and derivative aluminum articles imported under six HTS subheadings from all U.S. trade partners not otherwise provided with duty exemptions, duty-free quotas, or duty-free in-quota amounts under TRQs. Products originating in China and subject to section 301 tariffs were imported under 10,121 HTS subheadings.

Between 2018 and 2021, the monthly value of imports subject to tariffs under sections 232 or 301 ranged between $9.9 billion, at their lowest, and $25 billion, at their highest.[71] Since their imposition, imports subject to section 301 tariffs in tranches 3 and 4 consistently accounted for the largest share of imports subject to section 232 or 301 tariffs. U.S. imports subject to section 232 tariffs, which accounted for the smallest share of imports subject to section 232 or 301 tariffs, decreased in value in recent years as more countries have become exempt and more articles have become subject to exclusions (see figure 3.1). Between March 2018 and December 2021, the total value of imports subject to section 232 tariffs was $37.4 billion for steel and $27.2 billion for aluminum. The total value of imports subject to section 301 tariffs was $62.8 billion for tranche 1, $24.8 billion for tranche 2, $369.4 billion for tranche 3, and $213.5 billion for tranche 4.

[70] Beginning April 1, 2022, tariffs on steel imports from Japan were not continued and instead imports from Japan became subject to a TRQ. Beginning June 1, 2022, the United Kingdom, which had previously been exempt from the tariffs, also became subject to a TRQ for both steel and aluminum imports. Also beginning June 1, 2022, tariffs on steel imports from Ukraine were temporarily suspended for a period of one year. Beginning March 10, 2023, the section 232 tariff rate on imports of aluminum and derivative aluminum articles from Russia was raised to 200 percent. See 87 Fed. Reg. 19351, (April 1, 2022); 87 Fed. Reg. 33407, (June 2, 2022); 87 Fed. Reg. 33583, (June 3, 2022); 87 Fed. Reg. 33591, (June 3, 2022); 88 Fed. Reg. 13267 (March 2, 2023).
[71] See figure 3.1.

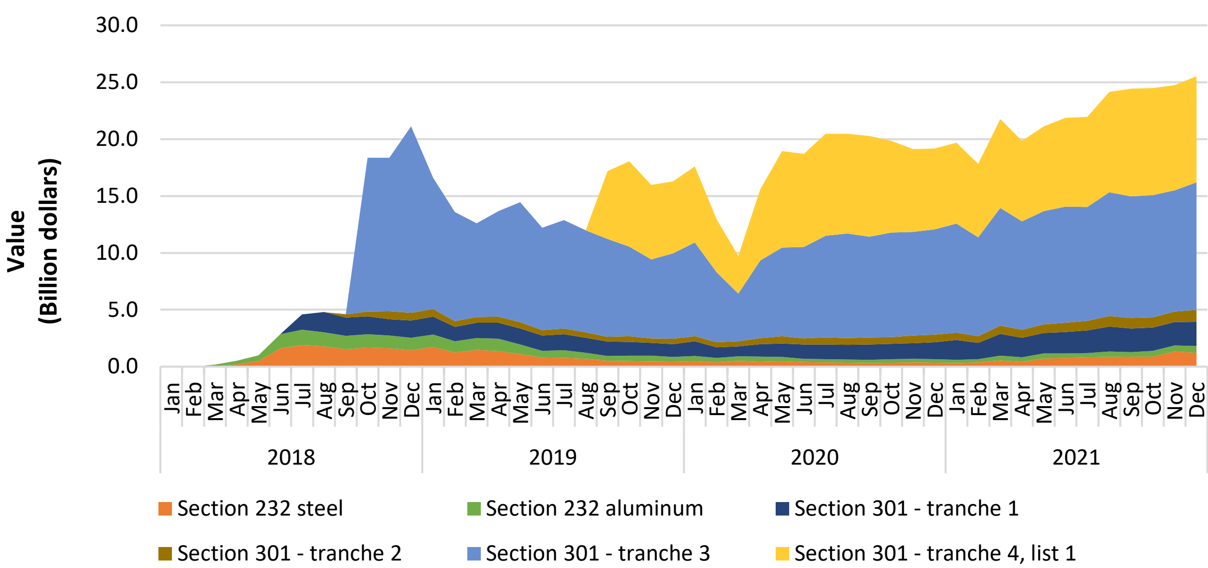
Section 232 tariffs cover steel and aluminum articles, and section 301 tariffs cover a much broader group of products. For section 301, agricultural products account for the largest share of covered subheadings, with 22.4 percent. Chemicals and related products account for the second-largest share of covered subheadings at 16.7 percent, followed by textiles and apparel at 15.9 percent. Other major industry-commodity groups covered by section 301 tariffs include electronic products, machinery, and forest products.

U.S. Imports

Section 232 steel and aluminum tariffs were imposed in March 2018.[72] Section 301 tariffs were imposed in four successive tranches of subject products: tranche 1 in July 2018; tranche 2 in August 2018; tranche 3 in September 2018; and tranche 4, list 1 in September 2019.[73] Figure 3.1 depicts the trade value of imports subject to section 232 and 301 tariffs, delineated by tariff actions, which reached a high of more than $25 billion by the end of 2021.

Figure 3.1 Monthly value of imports subject to tariffs under sections 232 and 301, January 2018–December 2021

By value in billions of dollars. Underlying data for this figure can be found in appendix E, tables E.1 and E.2.



Source: Compiled from USITC DataWeb/Census, accessed September 27, 2022.
Note: This figure uses rate provision codes to determine the share of imports that were subject to tariffs under sections 232 and 301. For more information on this methodology, see "Data Availability and Limitations" in chapter 1. To avoid duplicative coverage, certain steel and aluminum articles also subject to section 232 tariffs are not included among the products in the section 301 tranches.

[72] Section 232 steel and aluminum tariffs were extended to derivative articles of these metals, effective February 2020. The HTS subheadings for the derivative articles are included with those for the steel and aluminum articles in figure 3.1. Proclamation No. 9980, 85 Fed. Reg. 5281 (January 29, 2020).
[73] The tranche 4, list 2 of subject products is not shown in figures 3.1 and 3.2, being announced, amended, and suspended before ever entering into effect.

Section 232 Tariffs on Steel and Aluminum

As discussed in chapter 2, the President cited the Secretary of Commerce's (Secretary's) respective steel and aluminum import investigation reports in his determinations that such imports threaten national security.[74] The President subsequently issued proclamations imposing additional ad valorem tariffs upon both steel and aluminum imports, effective March 23, 2018, under section 232 of the Trade Expansion Act of 1962, as amended (19 U.S.C. § 1862).[75]

Steel

Steel Articles

Product Coverage and Tariff Rates

The President's initial proclamation imposed an additional tariff of 25 percent ad valorem on U.S. imports of covered steel articles, except those originating in Canada and Mexico, effective March 23, 2018. The steel articles subject to these higher tariffs included: iron and nonalloy steel mill products (provided for in HTS subheadings 7206.10 through 7216.50, 7216.99, and 7217.10 through 7217.90); stainless steel mill products (provided for in HTS subheadings 7218.10 through 7223.00); alloy steel mill products (provided for in HTS subheadings 7224.10 through 7229.90); sheet piling (provided for in HTS subheading 7301.10), railway rails (provided for in HTS subheading 7302.10), and certain railway track accessories (provided for in HTS subheadings 7302.40 through 7302.90); and tubes, pipes, and hollow profiles (provided for in HTS subheadings 7304.10 through 7306.90). The proclamation provided that any subsequent revisions to these HTS classifications would be included.[76]

Country Exemption and Tariff Chronology—by Country and Region

Before the effective date of the tariffs under section 232 (March 23, 2018), the President issued another proclamation that also exempted steel imports originating in Argentina, Australia, Brazil, EU member countries, and South Korea because of important security relationships with such countries and pending the results of ongoing discussions to find alternative ways to address national security concerns related to imports from them.[77] In subsequent presidential proclamations, some of these exemptions were either not continued or replaced by quotas or tariff-rate quotas (TRQs). Steel articles originating in countries subject to quotas are exempted from section 232 tariffs, but the cumulative amount allowed to enter is limited by the quota. Steel articles originating in countries subject to TRQs are also exempted from section 232 tariffs for the cumulative amount entering within the quota, but any additional

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[74] See USDOC, BIS, *The Effect of Imports of Steel on the National Security*, January 11, 2018; USDOC, BIS, *The Effect of Imports of Aluminum on the National Security*, January 17, 2018.
[75] Proclamation No. 9705, 83 Fed. Reg. 11625 (March 15, 2018); Proclamation No. 9704, 83 Fed. Reg. 11619 (March 15, 2018).
[76] Proclamation No. 9705, 83 Fed. Reg. 11625 (March 15, 2018).
[77] Proclamation No. 9711, 83 Fed. Reg. 13361 (March 28, 2018). The President's initial proclamation exempted imports of steel from Canada and Mexico and invited countries with which the United States had security relationships to discuss "alternative ways" to address the impairment of national security posed by imports originating in such countries. Proclamation No. 9705, 83 Fed. Reg. 11625 (March 15, 2018).

amounts above these quotas are subject to these tariffs. The United States continued the initial exemptions, either with or without quotas or TRQs, of trade partners for which it reached agreement on various measures, for example, to reduce the trade partner's excess steel production and capacity, raise U.S. capacity utilization, counter transshipments, or avoid import surges to mitigate threatened impairment of national security caused by imports.[78] Section 232 measures applicable to imports of steel from specific U.S. trade partners can be summarized as follows:

- Argentina and Brazil are subject to quotas, effective June 1, 2018, after previously being initially exempted from tariffs, effective March 23, 2018.[79]
- Australia is the only U.S. trade partner for which imports have been continuously exempted from tariffs since its initial exemption, effective March 23, 2018, and not otherwise subject to quotas or TRQs.[80]
- Canada's and Mexico's initial exemptions from tariffs were not continued, effective June 1, 2018, but they were reinstated, effective May 20, 2019.[81]
- The initial exemptions from tariffs for EU member countries were not continued, effective June 1, 2018.[82] Effective January 1, 2022, each EU member country became subject to individual TRQs for two years. EU member countries are also subject to a "melt and pour" requirement that the raw molten steel must be produced entirely within an EU member country for the resulting products to qualify for duty-free in-quota treatment.[83]
- South Korea is subject to quotas, effective June 1, 2018, after initially being exempted from tariffs, effective March 23, 2018.[84]
- The tariff rate for Turkey was temporarily doubled to 50 percent ad valorem, effective August 13, 2018, but was reduced to 25 percent, effective May 21, 2019.[85]
- The United Kingdom (UK) became subject to tariffs as an EU member country when the EU's exemptions were not continued, effective June 1, 2018.[86] After its withdrawal from EU

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[78] Presidential proclamations announcing continued exemptions, either with or without quotas, for individual trade partners, cited below.
[79] Proclamation No. 9759, 83 Fed. Reg. 25857 (June 5, 2018); Proclamation No. 9711, 83 Fed. Reg. 13361 (March 28, 2018); Proclamation No. 9740, 83 Fed. Reg. 20683 (May 7, 2018).
[80] Proclamation No. 9711, 83 Fed. Reg. 13361 (March 28, 2018); Proclamation No. 9740, 83 Fed. Reg. 20683 (May 7, 2018); Proclamation No. 9772, 83 Fed. Reg. 40429 (August 15, 2018).
[81] Proclamation No. 9740, 83 Fed. Reg. 20683 (May 7, 2018); Proclamation No. 9759, 83 Fed. Reg. 25857 (June 5, 2018) (ending exemptions for Canada and Mexico); Proclamation No. 9894, 84 Fed. Reg. 23987 (May 23, 2019) (reinstating exemptions).
[82] Proclamation No. 9711, 83 Fed. Reg. 13361 (March 28, 2018) (initial exemptions); Proclamation No. 9740, 83 Fed. Reg. 20683 (May 7, 2018); Proclamation No. 9759, 83 Fed. Reg. 25857 (June 5, 2018) (ending exemptions).
[83] The President's proclamation also notes that ". . . the United States and the EU will seek to conclude, by October 31, 2023, negotiations on global steel and aluminum arrangements to restore market-oriented conditions and support the reduction of carbon intensity of steel and aluminum across modes of production." Proclamation No. 10328, 87 Fed. Reg. 11 (January 3, 2022). For further information, see the "Steel and Aluminum U.S.-EU Joint Statement," issued October 31, 2022.
[84] Proclamation No. 9705, 83 Fed. Reg. 11625 (March 15, 2018); Proclamation No. 9711, 83 Fed. Reg. 13361 (March 28, 2018); Proclamation No. 9740, 83 Fed. Reg. 20683 (May 7, 2018) (announcing establishment of quotas with South Korea).
[85] Proclamation No. 9772, 83 Fed. Reg. 40429 (August 15, 2018); Proclamation No. 9886, 84 Fed. Reg. 23421 (May 21, 2019).
[86] Proclamation No. 9740, 83 Fed. Reg. 20683 (May 7, 2018).

membership, effective January 31, 2020, the UK remained subject to these tariffs while negotiating with the United States to mutually remove their respective retaliatory and national security tariffs.[87]

Quota and Tariff-Rate Quota Provisions

The President provided Argentina, Brazil, and South Korea with annual quotas on U.S. imports of steel articles originating in those countries, effective June 1, 2018.[88] However, the President also required that the imported amount in any single quarter from those three countries cannot exceed 30 percent of the respective total annual quota amounts (the "30 percent rule"), effective July 1, 2018.[89] The U.S. Customs and Border Protection (CBP) monitors quarterly imports of steel articles within 54 quota categories (HTS subheadings 9903.80.05–9903.80.58), which are concorded across those three countries.[90] For the first quarter of 2022, CBP issued the following quotas (aggregated across all quota categories) of 54,258 metric tons for steel articles originating in Argentina, 1,260,352 metric tons for Brazil, and 791,316 metric tons for South Korea.[91] According to CBP data, at the end of 2022, South Korea filled 96.5 percent of its total annual aggregated quota volume for all product categories. Brazil and Argentina filled 56.7 percent and 47.0 percent, respectively.[92]

The President provided EU member countries with separate annual TRQs on U.S. imports of steel articles originating in the individual EU member countries, totaling 3,300,170 metric tons, effective January 1, 2022. Quarterly quotas are initially set at 25 percent of the annual quotas, with the unfilled portion carried over to subsequent quarters of the year.[93] CBP monitors quarterly imports of steel articles within 54 quota categories (HTS subheadings 9903.80.65–9903.80.99 and 9903.81.01–9903.81.19), which are divided among all EU member countries, with each assigned a specific TRQ amount in each quota category.[94] In 2022, EU countries filled approximately 59.1 percent of their total annual aggregated TRQ volume for all product categories.[95]

[87] EU, "Agreement on the Withdrawal of the United Kingdom," January 31, 2020.
[88] Proclamation No. 9759, 83 Fed. Reg. 25857 (June 5, 2018); Proclamation No. 9740, 83 Fed. Reg. 20683 (May 7, 2018).
[89] Proclamation No. 9759, 83 Fed. Reg. 25857 (June 5, 2018).
[90] Once a quota category reaches the limit within any quarter, it is closed until reopening again in the following quarter. Fourth-quarter quotas are managed according to the 30 percent rule but will be either (1) the remaining annual balance if less than 30 percent or (2) 500,000 kilograms if the remaining annual balance is less than that amount.
[91] CBP, "QB 22-601 2022 First Quarter Absolute Quota for Steel Mill Articles of Argentina, Brazil and South Korea," May 22, 2022.
[92] CBP, 2022 Year-End Quota Status Report, February 10, 2023.
[93] Any unfilled portion of the first quarter can be carried over to the third quarter of the year and any unfilled portion of the second quarter can be carried over to the fourth quarter of the year. Proclamation No. 10328, 87 Fed. Reg. 11 (January 3, 2022).
[94] CBP, "QB 22-613 2022 First Quarter Tariff Rate Quota (TRQ) for Steel Mill Articles of European Union (EU) Member Countries," August 9, 2022.
[95] CBP, 2022 Year-End Quota Status Report, February 10, 2023.

Derivative Steel Articles

In the initial proclamation on steel imports, the President also directed the Secretary to monitor imports of steel articles and report any circumstances that might indicate need for further action.[96] Subsequently, in 2020, the President stated that he found that domestic steel producers' capacity utilization did not stabilize over the time period and did not attain the threshold level that the Secretary identified in his report as necessary to remove the threatened impairment to national security. Likewise, the President also noted the Secretary's assessment that foreign producers increased their shipments of derivative steel articles to the United States to circumvent the national security tariffs on steel articles.[97] For these reasons, the President extended the scope of the existing section 232 tariffs to include certain derivative steel articles, effective February 8, 2020. Derivative steel articles (enumerated in annex II to the Proclamation) subject to the 25 percent ad valorem tariffs include the following: nonthreaded fasteners (HTS subheading 7317.00.30 and HTS statistical reporting numbers 7317.00.5503, 7317.00.5505, 7317.00.5507, 7317.00.5560, 7317.00.5580, and 7317.00.6560); bumper stampings for certain motor vehicles (HTS subheading 8708.10.30); and body stampings for agricultural tractors (HTS subheading 8708.29.21). Derivative steel articles (HTS subheading 9903.80.03) originating in Argentina, Australia, Brazil, Canada, Mexico, and South Korea were specifically exempt from these additional tariffs, effective February 8, 2020, and EU member countries were subsequently exempt from these duties, effective January 1, 2022.[98]

Product Exclusions

The President's initial proclamation granted to the Secretary the authority to exclude specific steel articles from section 232 tariffs either because of a lack of domestic production or for specific national security considerations.[99] The President also authorized the Secretary to grant exclusions for specific steel articles from quantitative limitations using the same standards applicable to exclusions from the tariffs.[100] The U.S. Department of Commerce's Bureau of Industry and Security (BIS) issued four interim final rules on:

- March 19, 2018, to establish the section 232 exclusions process ("March 19 rule")[101]
- September 11, 2018, to amend the March 19 rule in response to comments received as well as experience in administering the exclusion process ("September 11 rule")[102]

[96] Proclamation No. 9705, 83 Fed. Reg. 11625, 11628 (March 15, 2018).
[97] For further information about the conditions necessary to determined that an article is a "derivative" of a steel article, see Proclamation No. 9980, 85 Fed. Reg. 5281 (January 29, 2020).
[98] Proclamation No. 9980, 85 Fed. Reg. 5281 (January 29, 2020); Proclamation No. 10328, 87 Fed. Reg. 11 (January 3, 2022).
[99] Proclamation No. 9705, 83 Fed. Reg. 11625, 11627 (March 15, 2018).
[100] Proclamation No. 9777, 83 Fed. Reg. 45025 (September 4, 2018).
[101] USDOC, BIS, "Requirements for Submissions Requesting Exclusions From the Remedies Instituted in Presidential Proclamations," 83 Fed. Reg. 12106 (March 19, 2018).
[102] USDOC, BIS, "Submissions of Exclusion Requests and Objections to Submitted Requests for Steel and Aluminum," 83 Fed. Reg. 46026 (September 11, 2018).

- June 10, 2019, to allow the public to submit new exclusion requests and comments through the BIS Section 232 Exclusions Portal (“June 10 rule”)[103]
- December 14, 2020, to announce further revisions to the section 232 exclusion process and initiate General Approved Exclusions (GAEs) (“December 14 rule”)[104]

Effective December 14, 2020, Supplement No. 2 was added to Part 705 of the BIS’s regulations—the “General Approved Exclusions (GAEs) for Steel Articles under the Section 232 Exclusions Process.” The December 14 rule identified 108 steel articles approved for import under a GAE, which may be used by any importer.[105] Previous rules only approved exclusions for the requesting importer and could not be used by any other importer. An update to Supplement No. 2 lists 82 HTS statistical reporting numbers as GAE entries; 26 others were removed from inclusion as GAEs for no longer meeting the December 14 rule criteria, effective December 27, 2021.[106]

Quota exclusion entries are not counted toward the annual quota for the TRQs assigned to EU member countries.[107] Conversely, they are counted toward the quarterly and annual quotas for the quotas assigned to Argentina, Brazil, and South Korea.[108] The BIS offers its “Section 232 Steel and Aluminum, Published Exclusion Requests” portal for importers to submit exclusion requests, which if granted, are valid for one year for the specific importer and steel article.[109]

Aluminum

Aluminum Articles

Product Coverage and Tariff Rates

The President imposed an additional tariff of 10 percent ad valorem in his initial proclamation on U.S. imports of aluminum articles, except those originating in Canada and Mexico, effective March 23, 2018. The HTS tariff classifications for the aluminum articles subject to these national security tariffs included

[103] USDOC, BIS, “Implementation of New Commerce Section 232 Exclusions Portal,” 84 Fed. Reg. 26751 (June 10, 2019). The BIS offers its “Section 232 Steel and Aluminum, Published Exclusion Requests” portal for importers to submit exclusion requests, which if granted, are valid for one year for the specific importer and steel article. The requested exclusion is often for a steel article more specific than described under the HTS statistical reporting number. USDOC, BIS, “Section 232 Steel and Aluminum, Published Exclusion Requests,” accessed September 30, 2022.

[104] USDOC, BIS, “Section 232 Steel and Aluminum Tariff Exclusions Process,” 85 Fed. Reg. 81060 (December 20, 2020).

[105] USDOC, BIS, “Section 232 Steel and Aluminum Tariff Exclusions Process,” 85 Fed. Reg. 81060, 81075–81083 (December 20, 2020) (codified at 15 C.F.R. Part 705 Supplement No. 2).

[106] USDOC, BIS, “Removal of Certain General Approved Exclusions (GAEs) Under the Section 232 Steel and Aluminum Tariff Exclusions Process,” 85 Fed. Reg. 70003 (December 9, 2021).

[107] Proclamation No. PP 10328, 87 Fed. Reg. 11 (January 3, 2022); CBP, “QB 22-613 2022 First Quarter Tariff Rate Quota (TRQ) for Steel Mill Articles of European Union (EU) Member Countries,” August 9, 2022.

[108] Proclamation No. 9777, 83 Fed. Reg. 45025 (September 4, 2018); CBP, “QB 22-601 2022 First Quarter Absolute Quota for Steel Mill Articles of Argentina, Brazil and South Korea,” May 22, 2022.

[109] The requested exclusion is often for a steel article more specific than the description under the HTS statistical reporting number. USDOC, BIS, “Section 232 Steel and Aluminum, Published Exclusion Requests,” accessed September 30, 2022.

unwrought aluminum (HTS heading 7601), semifinished wrought aluminum (HTS headings 7604 through 7608), aluminum fittings (HTS heading 7609), and aluminum castings (HTS statistical reporting number 7616.99.5160) and aluminum forgings (HTS statistical reporting number 7616.99.5170), including any subsequent revisions to these HTS classifications.[110]

Country Exemption and Tariff Chronology—By Exempted Country and Region

Before the effective date of the tariffs under section 232 (March 23, 2018), the President issued another proclamation that also exempted aluminum imports from Argentina, Australia, Brazil, EU member countries, and South Korea because of important security relationships with these countries and pending the results of ongoing discussions with them.[111] In subsequent proclamations, the President either discontinued these initial exemptions or replaced them with quotas or TRQs. Imports of aluminum articles originating in countries subject to quotas are exempted from section 232 tariffs, but the amount allowed to enter is limited by the quota. Imports of aluminum articles originating in countries subject to TRQs are exempted from section 232 tariffs for the cumulative amount entering within the quota, but any additional amounts are subject to these tariffs. The United States continued the initial exemptions, either with or without quotas or TRQs, of trade partners for which it reached agreement on various measures, for example, to reduce the trade partner's excess aluminum production and capacity, raise U.S. capacity utilization, counter transshipments, or avoid import surges to mitigate threatened impairment of national security caused by imports.[112] Section 232 measures applicable to imports of aluminum from specific U.S. trade partners are summarized as follows:

- Argentina is subject to quotas, effective June 1, 2018,[113] after previously being exempted from tariffs, effective March 23, 2018.[114]
- Australia is the only U.S. trade partner for which imports have been continuously exempted from tariffs and quotas since its initial exemption, effective March 23, 2018, and not otherwise subject to quotas or TRQs.[115]
- After their initial exemptions, Brazil and South Korea became subject to tariffs, effective June 1, 2018, for Brazil[116] and May 1, 2018, for South Korea.[117]
- Canada's and Mexico's initial exemptions from tariffs were not continued, effective June 1, 2018.[118] Following an agreement reached with these countries, their exemptions were

[110] Proclamation No. 9704, 86 Fed. Reg. 11619 (March 15, 2018). The initial proclamation exempted imports of aluminum from Canada and Mexico and invited countries with which the United States had a security relationship to discuss alternative means of addressing concerns over imports. Proclamation No. 9704, 86 Fed. Reg. 11619, 11620 (March 15, 2018).
[111] Proclamation No. 9710, 83 Fed. Reg. 13355 (March 28, 2018).
[112] Presidential proclamations announcing continued exemptions, either with or without quotas, for individual trade partners, cited below.
[113] Proclamation No. 9758, 83 Fed. Reg. 25849 (June 5, 2018).
[114] Proclamation No. 9710, 83 Fed. Reg. 13355 (March 28, 2018).
[115] Proclamation No. 9710, 83 Fed. Reg. 13355 (March 28, 2018); Proclamation No. 9739, 83 Fed. Reg. 20677 (May 7, 2018); Proclamation No. 9758, 83 Fed. Reg. 25849 (June 5, 2018).
[116] Proclamation No. 9758, 83 Fed. Reg. 25849 (June 5, 2018).
[117] Proclamation No. 9739, 83 Fed. Reg. 20677 (May 7, 2018).
[118] Proclamation No. 9704, 86 Fed. Reg. 11619 (March 15, 2018); Proclamation No. 9739, 83 Fed. Reg. 20677 (May 7, 2018); Proclamation No. 9758, 83 Fed. Reg. 25849 (June 5, 2018).

reinstated, effective May 20, 2019,[119] but Canada's exemption was again revoked with respect to imports of nonalloyed unwrought aluminum, effective August 16, 2020.[120] An agreement to decrease such imports of nonalloyed unwrought aluminum was subsequently reached, and these imports from Canada were again exempted from tariffs, effective September 1, 2020.[121]

- After their initial exemptions, each EU member country became subject to tariffs, effective June 1, 2018.[122] Effective January 1, 2022, each EU member country became subject to individual TRQs for two years. EU member countries are also required to provide certificates of analysis to qualify for duty-free in-quota treatment.[123]
- President Trump proclaimed an exemption from tariffs for the United Arab Emirates after an agreement on quotas was reached, effective February 3, 2021.[124] By revoking President Trump's proclamation, President Biden maintained this tariff after finding that doing so would be more effective for national security than an untested quota.[125]
- The UK became subject to tariffs as an EU member country when the EU's exemptions were not continued, effective June 1, 2018.[126] After completing its withdrawal from EU membership, effective January 31, 2020, the UK remained subject to these tariffs while negotiating with the United States to mutually remove their respective national security and retaliatory tariffs.[127]

Quota and Tariff-Rate Quota Provisions

The President provided Argentina with annual quotas on U.S. imports of aluminum articles originating in that country, effective June 1, 2018. The imported amount in any single quarter also follows the "30 percent rule" of not exceeding that share of the total annual quota.[128] CBP monitors quarterly imports of aluminum articles within separate quota categories for unwrought aluminum (HTS subheading 9903.85.05) and for semifinished wrought aluminum (HTS subheading 9903.85.06). For the first quarter of 2022, CBP issued quotas (aggregated across all quota categories) for 50,898 metric tons of unwrought

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[119] Proclamation No. 9893, 84 Fed. Reg. 23983 (May 23, 2019).
[120] Proclamation No. 10060, 85 Fed. Reg. 49921 (August 14, 2020).
[121] Proclamation No. 10106, 85 Fed. Reg. 68709 (October 30, 2020).
[122] Proclamation No. 9710, 83 Fed. Reg. 13355 (March 28, 2018) (initial exemption); Proclamation No. 9739, 83 Fed. Reg. 20677 (May 7, 2018); Proclamation No. 9758, 83 Fed. Reg. 25849 (June 5, 2018) (ending exemption).
[123] A certificate of analysis provides information about the source(s) of raw material inputs, compositional analysis, and technical specifications for the aluminum article. Although not specifying the purpose or contents of a certificate of analysis, the President authorized the Secretary of Commerce, in consultation with the Secretary of Homeland Security and the U.S. Trade Representative, to undertake the actions necessary to assure compliance with this requirement. The President's proclamation also notes that ". . . the United States and the EU will seek to conclude, by October 31, 2023, negotiations on global steel and aluminum arrangements to restore market-oriented conditions and support the reduction of carbon intensity of steel and aluminum across modes of production." Proclamation No. 10327, 87 Fed. Reg. 1 (January 3, 2022).
[124] Proclamation No. 10139, 86 Fed. Reg. 6825 (January 25, 2021).
[125] Proclamation No. 10144, 86 Fed. Reg. 8265 (February 4, 2021).
[126] Proclamation No. 9739, 83 Fed. Reg. 20677 (May 7, 2018); Proclamation No. 9758, 83 Fed. Reg. 25849 (June 5, 2018).
[127] EU, "Agreement on the Withdrawal of the United Kingdom," January 31, 2020.
[128] Proclamation No. 9758, 83 Fed. Reg. 25849 (June 5, 2018).

 This page has been changed to reflect corrections to the original publication.

and 3,384 metric tons of wrought aluminum articles originating in Argentina.[129] According to CBP data, at the end of 2022, Argentina had used 77.3 percent of its annual quota for unwrought aluminum and 75.3 percent of its annual quota for semifinished wrought aluminum.[130]

The President also provided EU member countries with separate annual TRQs on U.S. imports of aluminum articles originating in individual EU member countries totaling 18,000 metric tons of unwrought aluminum and 366,040 metric tons of semifinished wrought aluminum, effective January 1, 2022. Semiannual quotas are set relative to the annual quotas.[131] CBP monitors imports of aluminum articles within 2 quota categories for unwrought aluminum (HTS subheadings 9903.85.27 and 9903.85.29) and 14 quota categories for semifinished wrought aluminum (HTS subheadings 9903.85.31–9903.85.44). Each EU member country is assigned specific TRQ amounts in each quota category.[132] In 2022, EU countries filled approximately 65.1 percent of their total annual aggregated TRQ volume for all product categories.[133]

Derivative Aluminum Articles

In the initial proclamation on aluminum imports, the President also directed the Secretary to monitor imports of aluminum articles and report any circumstances that might indicate need for further action.[134] Subsequently, in 2020, the Secretary reported that domestic aluminum producers' capacity utilization remained below the minimum threshold level necessary to remove the threatened impairment of the national security. Likewise, the Secretary reported that foreign producers increased their shipments of derivative aluminum articles to the United States to circumvent the national security tariffs on aluminum articles.[135] For these reasons, the President stated that he found it necessary and appropriate to extend the scope of the existing section 232 tariffs to include certain derivative aluminum articles, effective February 8, 2020.[136] Derivative aluminum articles (enumerated in annex I to the Proclamation) subject to the 10 percent ad valorem tariffs include: stranded wires, cables, and plaited bands (HTS subheadings 7614.10.50, 7614.90.20, 7614.90.40, and 7614.90.50); bumper stampings for certain motor vehicles (HTS subheading 8708.10.30); and body stampings for agricultural tractors (HTS subheading 8708.29.21). Derivative aluminum articles originating in Argentina, Australia, Canada, and Mexico were exempt from these duties, and EU member countries were also subsequently exempted from these additional tariffs (HTS subheading 9903.85.03).[137]

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[129] CBP, "QB 22-701 2022 Aluminum Absolute Quota First Quarter Argentina," May 22, 2022.
[130] CBP, "2022 Absolute Steel and Aluminum Quarter Usage," January 30, 2023; CBP, 2022 Year-End Quota Status Report, February 10, 2023.
[131] An EU member country cannot fill more than 60 percent of the TRQ for a quota category during the first half of the year. Proclamation No. 10327, 87 Fed. Reg. 1 (January 3, 2022).
[132] CBP, "QB 22-711 2022 First and Second Period Tariff Rate Quota (TRQ) for Aluminum Articles of European Union," September 16, 2022.
[133] CBP, 2022 Year-End Quota Status Report, February 10, 2023.
[134] Proclamation No. 9704, 83 Fed. Reg. 11619, 11621 (March 15, 2018).
[135] For further information about the conditions necessary to determined that an article is a "derivative" of an aluminum article, see Proclamation No. 9980, 85 Fed. Reg. 5281 (January 29, 2020).
[136] Proclamation No. 9980, 85 Fed. Reg. 5281 (January 29, 2020).
[137] Proclamation No. 9980, 85 Fed. Reg. 5281 (January 29, 2020); Proclamation No. 10327, 87 Fed. Reg. 1 (January 3, 2022).

Product Exclusions

The President's initial proclamation granted to the Secretary the authority to exclude specific aluminum articles from section 232 tariffs due to either a lack of domestic production in sufficient and reasonably available quantities or of satisfactory quality, following specific national security considerations.[138] The President subsequently authorized the Secretary to grant exclusions for specific aluminum articles from quantitative limitations, following the same standards applicable to exclusions from the tariffs.[139]

Effective December 14, 2020, Supplement No. 3 was added to Part 705 of the BIS's regulations—the "General Approved Exclusions (GAEs) for Aluminum Articles under the Section 232 Exclusions Process." The December 14 rule identified 15 aluminum articles approved for import under a GAE, which may be used by any importer.[140] Previous rules only approved exclusions for the requesting importer and could not be used by any other importer. The supplement was subsequently reduced to 11 HTS statistical reporting numbers as GAE entries after the BIS issued an amendment removing 4 GAEs, effective December 27, 2021.[141]

For the quotas assigned to Argentina, quota exclusion entries are counted against the quarterly limit at the time of entry and count towards the annual limit.[142] For the TRQs assigned to EU member countries, quota exclusion entries are counted against the annual aggregate limit.[143] The BIS offers its "Section 232 Steel and Aluminum, Published Exclusion Requests" portal for importers to submit exclusion requests, which if granted, are valid for one year for the specific importer and aluminum article.[144]

Section 301 Tariffs

Following the initiation of its investigation on August 18, 2017,[145] the Trade Representative announced his determination, on April 6, 2018, ". . . that the acts, policies, and practices of the Government of China related to technology transfer, intellectual property, and innovation covered in the investigation

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[138] Proclamation No. 9704, 83 Fed. Reg. 11619 (March 15, 2018).
[139] Proclamation No. 9776, 83 Fed. Reg. 45019 (September 4, 2018).
[140] USDOC, BIS, "Section 232 Steel and Aluminum Tariff Exclusions Process," 85 Fed. Reg. 81060 (December 20, 2020) (codified at 15 C.F.R. Part 705 Supplement No. 3).
[141] USDOC, BIS, "Removal of Certain General Approved Exclusions (GAEs) Under the Section 232 Steel and Aluminum Tariff Exclusions Process," 85 Fed. Reg. 70003 (December 9, 2021); CBP, "QB 22-601 2022 First Quarter Absolute Quota for Steel Mill Articles of Argentina, Brazil and South Korea," May 22, 2022; CBP, "QB 22-613 2022 First Quarter Tariff Rate Quota (TRQ) for Steel Mill Articles of European Union (EU) Member Countries," August 9, 2022.
[142] Proclamation No. 9776, 83 Fed. Reg. 45019, (September 6, 2018); CBP, "QB 22-701 2022 Aluminum Absolute Quota First Quarter Argentina," May 22, 2022.
[143] Proclamation No. 10327, 87 Fed. Reg. 1 (January 3, 2022);CBP, "QB 22-711 2022 First and Second Period Tariff Rate Quota (TRQ) for Aluminum Articles of European Union," September 16, 2022.
[144] The requested exclusion is often for an aluminum article more specific than the HTS statistical reporting number. USDOC, BIS, "Section 232 Steel and Aluminum, Published Exclusion Requests," accessed September 30, 2022.
[145] USTR, "Initiation of Section 301 Investigation; Hearing; Request for Public Comments," 82 Fed. Reg. 40213 (August 24, 2017).

are unreasonable or discriminatory and burden or restrict U.S. commerce."[146] The Trade Representative imposed additional ad valorem tariffs upon an initial group (tranche) and three subsequent tranches of imported products originating in China, under section 301 of the Trade Act of 1974, as amended (19 U.S.C. § 2411 et seq.).

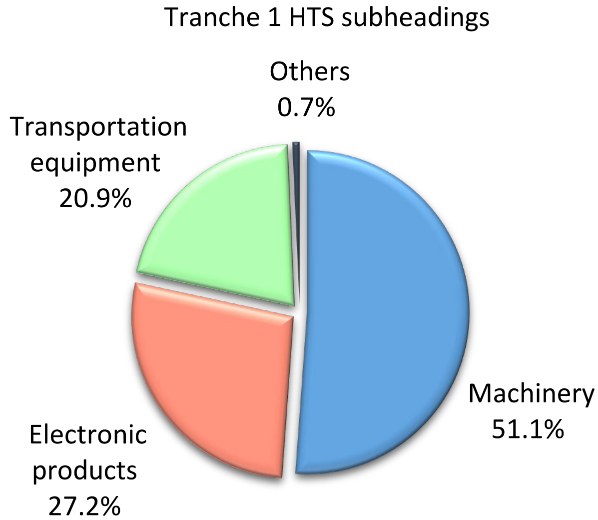
Product Coverage

The Trade Representative initially imposed additional ad valorem duties of 25 percent on approximately $34 billion of imports classifiable under 818 HTS subheadings (tranche 1), effective July 6, 2018.[147] As of March 15, 2022, the number of subheadings in tranche 1 had increased to 874 because of changes to the HTS.[148] For U.S. imports in March 2022, the HTS subheadings included in tranche 1 (figure 3.2) were predominantly for machinery (especially for metal cutting machine tools; electric motors, generators, and related equipment; and miscellaneous machinery); electronic products (especially for measuring, testing, and controlling instruments; medical goods; and navigational instruments and remote control apparatus); and transportation equipment (especially for motor vehicles and construction and mining equipment).[149] These HTS subheadings did not include any steel or aluminum articles subject to section 232 tariffs.

[146] USTR, "Notice of Determination and Request for Public Comment Concerning Proposed Determination of Action Pursuant to Section 301," 83 Fed. Reg. 14906 (April 6, 2018).
[147] USTR, "Notice of Action and Request for Public Comment Concerning Proposed Determination of Action Pursuant to Section 301," 83 Fed. Reg. 28710 (June 20, 2018).
[148] USITC, *Harmonized Tariff Schedule of the United States (2022) Revision 2*, February 2022, 99-III-18–22.
[149] For a list of HTS subheadings classified in these industry-commodity sectors (and their corresponding groups), see the supplementary, interactive data table accompanying USITC, *Shifts in U.S. Merchandise Trade, 2021*, June 2021, available at https://www.usitc.gov/system/files/research_and_analysis/tradeshifts/2021/files/sectors_digest_table.html.

Figure 3.2 Share of HTS subheadings subject to section 301 tariffs, tranche 1: by industry-commodity category, March 2022

Underlying data for this figure can be found in appendix E, table E.3.



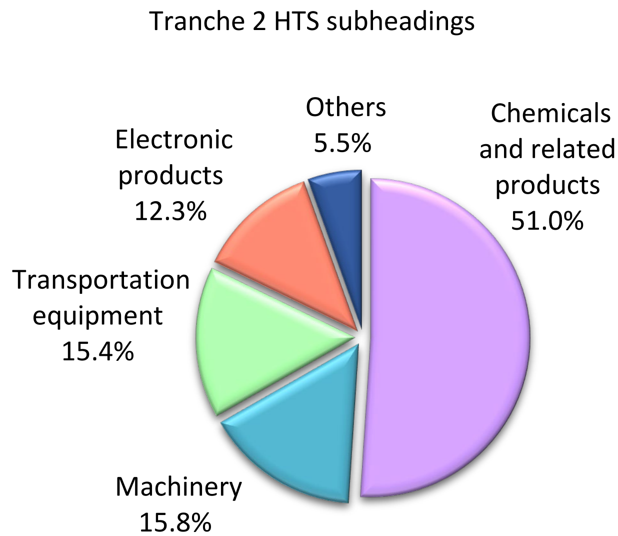
Source: Compiled from the *Harmonized Tariff Schedule of the United States (2022) Revision 2*, February 2022.

The Trade Representative imposed a second tranche of tariffs on imports valued at approximately $16 billion annually that were classifiable under 279 HTS subheadings (tranche 2), effective August 23, 2018.[150] As of March 15, 2022, the number of subheadings in tranche 2 had increased to 292 because of changes to the HTS.[151] The HTS subheadings included in tranche 2 in March 2022 (figure 3.3) were predominantly for chemicals and related products (especially for miscellaneous plastic products and for other plastics in primary forms); machinery (especially for electric motors, generators, and related equipment and for farm and garden machinery and equipment); transportation equipment (especially for railway locomotives and rolling stock); and electronic products (especially for measuring, testing, and controlling instruments and for semiconductors and integrated circuits). Only one of these HTS subheadings, for a derivative aluminum article, is subject to section 232 tariffs.[152]

[150] USTR, “Notice of Action and Request for Public Comment Concerning Proposed Determination of Action Pursuant to Section 301,” 83 Fed. Reg. 28710 (June 20, 2018) (proposing additional tranche encompassing 284 HTS subheadings); USTR, “Notice of Action Pursuant to Section 301,” 83 Fed. Reg. 40823 (August 16, 2018) (modifying the second tranche to 279 HTS subheadings following review of public comments).
[151] USITC, *Harmonized Tariff Schedule of the United States (2022) Revision 2*, February 2022, 99-III-23–25.
[152] Aluminum stranded wires, cables, and plaited bands (HTS subheading 7614.90.20).

Figure 3.3 Share of HTS subheadings subject to section 301 tariffs, tranche 2: by industry-commodity category, March 2022

Underlying data for this figure can be found in appendix E, table E.4.



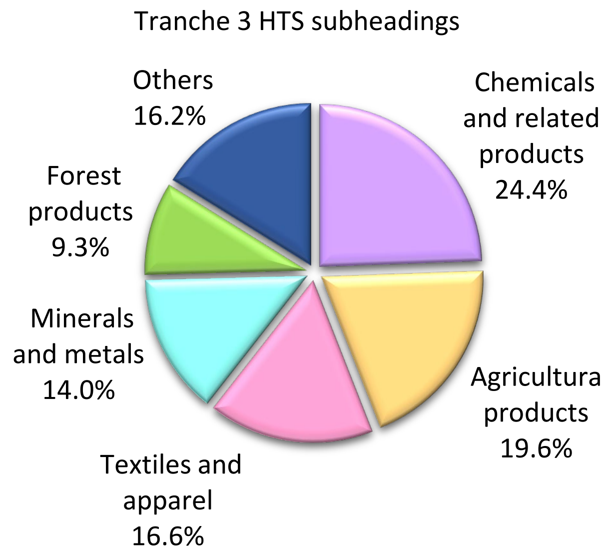
Source: Compiled from the *Harmonized Tariff Schedule of the United States (2022) Revision 2*, February 2022.

Citing China's failure to remove the discriminatory acts, policies, and practices, the Trade Representative subsequently imposed additional tariffs on imports classified under additional HTS subheadings in two successive tranches. The next tranche included imports valued at approximately $200 billion annually that were classifiable under 5,745 full or partial HTS subheadings (tranche 3), effective September 24, 2018.[153] As of March 15, 2022, the number of subheadings in tranche 3 had increased to 5,918 subheadings and parts of 11 additional subheadings because of changes to the HTS.[154] The HTS subheadings included in tranche 3 in March 2022 (figure 3.4) were predominantly for chemicals and related products (especially for organic specialty chemicals, miscellaneous inorganic chemicals, and certain organic chemicals); agricultural products (especially for fresh or frozen fish; prepared or preserved vegetables, mushrooms, and olives; and shellfish); textiles and apparel (especially for fabrics and fibers and yarns, except raw cotton and raw wool); minerals and metals (especially for cement, stone, and related products; nonpowered hand tools; miscellaneous products of base metal; and copper and related articles); and forest products (especially for wood veneer and wood panels, industrial papers, and paperboards). Several of these HTS subheadings for derivative steel and aluminum articles are subject to section 232 tariffs.[155]

[153] "Full" HTS subheadings do not exclude any corresponding HTS statistical reporting numbers. By contrast, partial HTS subheadings specifically excluded certain HTS statistical reporting numbers.
[154] USITC, *Harmonized Tariff Schedule of the United States (2022) Revision 2*, February 2022, 99-III-26–50.
[155] Steel nonthreaded fasteners (HTS subheadings 7317.00.30, 7317.00.55, and 7317.00.65), steel or aluminum bumper stampings for certain motor vehicles (HTS subheading 8708.10.30), and steel or aluminum body stampings for agricultural tractors (HTS subheading 8708.29.21).

Figure 3.4 Share of HTS subheadings subject to section 301 tariffs, tranche 3 by industry-commodity category, March 2022

Underlying data for this figure can be found in appendix E, table E.5.



Source: Compiled from the *Harmonized Tariff Schedule of the United States (2022) Revision 2*, February 2022.

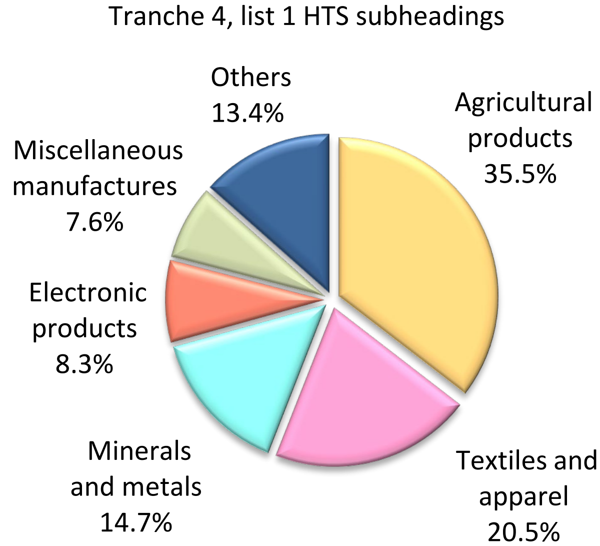
The Trade Representative announced additional tariffs on a fourth tranche of imports in two separate lists totaling approximately $300 billion annually. As of March 15, 2022, the number of subheadings covered by tranche 4, list 1 included 3,279 subheadings and parts of 4 additional subheadings because of changes to the HTS.[156] Products classifiable under the HTS subheadings in tranche 4, list 1 (effective September 1, 2019) in March 2022 (figure 3.5) were predominantly for agricultural products (especially for dairy products); textiles and apparel (especially for apparel); minerals and metals (especially for steel mill products); electronic products (especially for watches and clocks and consumer electronics); and miscellaneous manufactures (especially for works of art and miscellaneous manufactured goods, sporting goods, and musical instruments and accessories). These HTS subheadings include 298 subheadings for certain steel articles and 35 subheadings for certain aluminum articles that were subject to section 232 tariffs.[157] As discussed below, tariffs on subheadings in tranche 4, list 2 were announced but subsequently suspended before their effective date.

[156] USITC, *Harmonized Tariff Schedule of the United States (2022) Revision 2*, February 2022, 99-III-86–99.

[157] Nonalloy steel articles (HTS subheadings 7206.10.00–7216.50.00, 7216.99.00, and 7217.10.10–7217.90.50); stainless steel articles (HTS subheadings 7218.10.00–7223.00.90); alloy steel articles (HTS subheadings 7224.10.00–7229.0.90); sheet piling (HTS subheading 7301.10.00); railway rails and track accessories (HTS subheadings 7203.10.10–7302.10.50 and 7302.90.10–7302.90.90); and tubes, pipes, and hollow profiles (HTS subheadings 7304.11.00–7306.90.50). Unwrought aluminum (HTS subheadings 7601.10.30–7601.20.0) and semifinished wrought aluminum (HTS subheadings 7604.10–7608.20.00 and 7609.00.00).

Figure 3.5 Share of HTS subheadings subject to section 301 tariffs, tranche 4, list 1 by industry-commodity category, March 2022

Underlying data for this figure can be found in appendix E, table E.6.

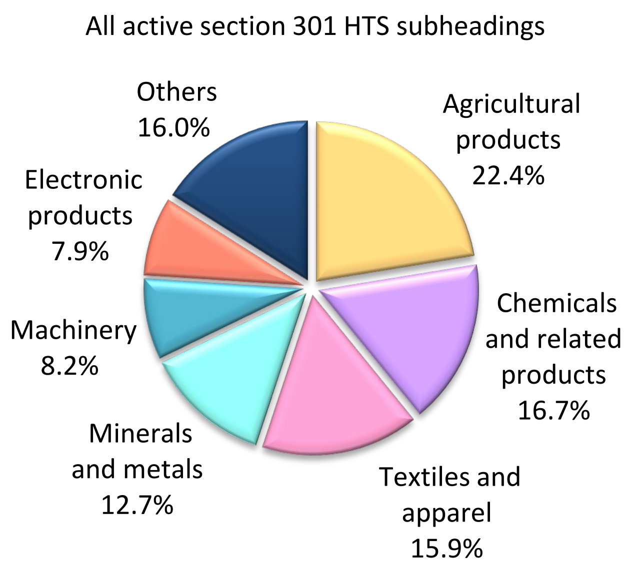


Source: Compiled from the *Harmonized Tariff Schedule of the United States (2022) Revision 2*, February 2022.

Across all four tranches, the HTS subheadings for U.S. imports subject to section 301 tariffs in March 2022 (figure 3.6) were predominantly for agricultural products, chemicals and related products, textiles and apparel, and minerals and metals. More than two-thirds (67.8 percent) of those HTS subheadings were among these four leading industry-commodity categories.

Figure 3.6 Share of HTS subheadings subject to all tranches of section 301 tariffs, by industry-commodity category, March 2022

Underlying data for this figure can be found in appendix E, table E.7.



Source: Compiled from the *Harmonized Tariff Schedule of the United States (2022) Revision 2*, February 2022.

Tariff Rates

Section 301 tariff rates applicable to imports originating in China in each tranche are summarized as follows:[158]

- Products covered by the HTS subheadings in tranche 1 and tranche 2 are subject to an additional 25 percent ad valorem duty, effective July 6, 2018, and August 23, 2018, respectively.[159]
- Products covered by the HTS subheadings in tranche 3 are subject to 25 percent ad valorem duty, effective May 10, 2019.[160] Initially, a rate of 10 percent ad valorem was imposed, effective September 24, 2018, but raised to 25 percent on May 10, 2019.[161]
- Products covered by HTS subheadings in tranche 4, list 1 were initially subject to a 10 percent ad valorem duty.[162] This duty was increased from the initial 10 percent ad valorem to 15 percent, effective September 1, 2019.[163] The duty rate was then reduced from 15 percent to 7.5 percent ad valorem on February 14, 2020, after the United States and China signed the bilateral Phase One trade deal and remained at that rate thereafter.[164]

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[158] Rates presented remain the same as of the writing of this report.

[159] USTR, “Notice of Action and Request for Public Comment Concerning Proposed Determination of Action Pursuant to Section 301,” 83 Fed. Reg. 28710 (June 20, 2018);USTR, “Notice of Action Pursuant to Section 301,” 83 Fed. Reg. 40823 (August 16, 2018).

[160] USTR, “Notice of Modification of Section 301 Action,” 84 Fed. Reg. 20459 (May 9, 2019).

[161] USTR, “Notice of Modification of Section 301 Action,” 83 Fed. Reg. 47974 (September 21, 2018); USTR, “Notice of Modification of Section 301 Action,” 83 Fed. Reg. 65198 (December 19, 2018); USTR, “Notice of Modification of Section 301 Action,” 84 Fed. Reg. 7966 (March 5, 2019); USTR, “Notice of Modification of Section 301 Action,” 84 Fed. Reg. 20459 (May 9, 2019); USTR, “Implementing Modification to Section 301 Action,” 84 Fed. Reg. 21892 (May 15, 2019); USTR, “Additional Implementing Modification to Section 301 Action,” 84 Fed. Reg. 26930 (June 10, 2019).

[162] USTR, “Notice of Modification of Section 301 Action,” 85 Fed. Reg. 3741 (January 22, 2020); USTR, “Notice of Modification of Section 301 Action,” 84 Fed. Reg. 43304 (August 20, 2019). The Trade Representative initially proposed additional duties of 25 percent ad valorem on imports under 3,805 full and partial HTS subheadings. USTR, “Request for Comments Concerning Proposed Modification of Action Pursuant to Section 301,” 84 Fed. Reg. 22564 (May 17, 2019). Following review of comments received, the Trade Representative modified the subheadings included in this action and also reduced the additional duties to 10 percent ad valorem and effective dates for subheadings staggered over two dates. For this tranche 4 tariff action, list 1 included 3,229 full HTS subheadings and 4 partial HTS subheadings (annex A). List 2 included 542 full HTS subheadings and 8 partial HTS subheadings (annex C). USTR, “Notice of Modification of Section 301 Action,” 84 Fed. Reg. 43304 (August 20, 2019).

[163] USTR, “Notice of Modification of Section 301 Action,” 84 Fed. Reg. 45821 (August 30, 2019).

[164] USTR, “Notice of Modification of Section 301 Action,” 85 Fed. Reg. 3741 (January 22, 2020). On December 13, 2019, the United States and China concluded negotiations to reach an enforceable Phase One trade deal, which requires China to undertake structural reforms and other changes to its economic and trade regime for intellectual property, technology transfer, agriculture, financial services, and currency and foreign exchange. The technology transfer chapter includes binding and enforceable obligations on China to address several unfair technology transfer practices identified by USTR’s section 301 investigation. USTR, “Economic and Trade Agreement Between the United States of America and the People’s Republic of China,” January 15, 2020.

- The Trade Representative suspended the additional ad valorem duty on products enumerated among the HTS tariff lines in tranche 4, list 2 before these tariffs were implemented.[165]

Product Exclusions

When imposing additional duties on successive tranches of products originating in China, the Trade Representative also established processes for U.S. stakeholders to request exclusions from these additional duties for specific products classifiable within a covered HTS subheading. Among the required information to be provided by requestors is the relevant HTS statistical reporting number covering the specific product and the rationales for considering their exclusion request, specifically whether:

- The product is available only from China or, in cases where a comparable product is available, from either U.S. or third-country sources;
- The imposition of additional duties on the product would cause severe economic harm to either the requestor or other U.S. interests; and
- The product is strategically important or related to "Made in China 2025" or other Chinese industrial programs.

Product exclusions are effective starting on the effective date for each tariff action and will extend for one year after publication of the exclusion determination in the *Federal Register* for products in the first three tranches or one year from September 1, 2019, for products in tranche 4:

- Tranche 1—July 6, 2018;[166]
- Tranche 2—August 23, 2018;[167]
- Tranche 3—September 24, 2018;[168] and
- Tranche 4, list 1—September 1, 2019.[169]

As of March 15, 2022, the Trade Representative had granted nearly 3,000 product exclusion requests, covering nearly 200 HTS statistical reporting numbers and parts of almost 2,800 additional HTS statistical reporting numbers.[170] However, most of these exclusions have expired. The remaining exclusions

[165] USTR, "Notice of Modification of Section 301 Action," 84 Fed. Reg. 69447 (December 18, 2019). The Trade Representative had also previously announced that when duties for HTS subheadings in tranche 4, list 2 went into effect, they would be for 15 percent ad valorem rather than 10 percent. USTR, "Notice of Modification of Section 301 Action, 84 Fed. Reg. 45821 (August 30, 2019).
[166] USTR, "Procedures To Consider Requests for Exclusion of Particular Products From the Determination of Action Pursuant to Section 301," 83 Fed. Reg. 32181 (July 11, 2018).
[167] USTR, "Procedures To Consider Requests for Exclusion of Particular Products From the Determination of Action Pursuant to Section 301," 83 Fed. Reg. 47236 (September 18, 2018).
[168] USTR, "Procedures To Consider Requests for Exclusion of Particular Products From the Determination of Action Pursuant to Section 301," 84 Fed. Reg. 29576 (June 24, 2019).
[169] USTR, "Procedures To Consider Requests for Exclusion of Particular Products From the Determination of Action Pursuant to Section 301," 84 Fed. Reg. 57144 (October 24, 2019).
[170] U.S. notes 20(h), 20(i), 20(j), 20(k), 20(m), 20(n), 20(o), 20(p), 20(q), 20(v), 20(w), 20(x), 20(y), 20(ll), 20(mm), 20(nn), 20(oo), 20(pp), 20(qq), 20(rr), 20(ss), 20(tt), 20(uu), 20(vv), 20(ww), 20(xx), 20(yy), 20(zz)20(aaa), 20(bbb), 20(ccc), 20(ddd), 20(eee), 20(fff), 20(ggg), 20(hhh), 20(iii), 20(jjj), 20(kkk), 20(lll), 20(mmm), 20(nnn), 20(ooo), 20(ppp), 20(qqq), 20(rrr), 20(sss). USITC, *Harmonized Tariff Schedule of the United States (2022) Revision 2*, February 2022, 99-III-50–52–85, 99-III-104–223.

covered 83 full and partial HTS statistical reporting numbers and were set to expire on June 1, 2022.[171] These remaining exclusions primarily covered a variety of medical goods. On March 28, 2022, the Trade Representative announced 352 additional product exclusions, which were made retroactively effective from October 12, 2021, to December 31, 2022.[172]

Products Affected by Tariffs under Sections 232 and 301

Imports of steel and aluminum articles were uniquely subject to both tariffs under sections 232 and 301. Imports of these articles from China were therefore subject to the combined duties under each provision. Table 3.1 presents the tariff coverage for these products.

Table 3.1 Sections 232 and 301 tariff coverage of steel and aluminum imports

Products	HTS headings/subheadings/statistical reporting numbers	232 tariff rate (percentage)	301 tariff rate (percentage)
Steel mill products	7206, 7207, 7218, 7224, 7208, 7209, 7210, 7211, 7212, 7213, 7214, 7215, 7216 (except for 7216.61.00, 7216.69.00, and 7216.91.00), 7217, 7219, 7220, 7221, 7222, 7223, 7225, 7226, 7227, 7228, 7229, 7301.10.00, 7302.10, 7302.40.00, 7302.90.00, 7304, 7305, 7306	25	7.5 or 25
Derivative steel articles	7317.00.30, 7317.00.5503, 7317.00.5505, 7317.00.5507, 7317.00.5560, 7317.00.5580, 8708.10.3020, 8708.29.2120	25	25
Unwrought aluminum	7601	10	7.5
Wrought aluminum products	7604, 7605, 7606, 7607, 7608, 7609, 7616.99.5160, 7616.99.5170	10	7.5 or 25
Derivative aluminum articles	7614.10.50, 7614.90.20, 7614.90.40, 7614.90.50, 8708.10.3030, 8708.29.2130	10	25

Source: USITC, *Harmonized Tariff Schedule of the United States (2022), Revision 2*, February 2022.
Notes: Tariff rates are ad valorem. Section 301 tariff rates reflect rates in effect on March 15, 2022.

[171] These remaining exclusions are listed in U.S. note 20(sss). USITC, *Harmonized Tariff Schedule of the United States (2022) Revision 2*, February 2022, 99-III-219–23, 99-III-265.
[172] USTR, "Notice of Reinstatement of Certain Exclusions: China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation," 87 Fed. Reg. 17380 (March 28, 2022).

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Chapter 4 Trade, Production, and Prices in the U.S. Steel and Aluminum Industries

This chapter presents the observable changes in trade, production, and prices for the steel and aluminum industries from 2016 to 2021. This time period covers the two years preceding the year section 232 and 301 tariffs were imposed on imports of steel and aluminum and the years since, through the end of 2021. This chapter also highlights other factors impacting the steel and aluminum industries during this time period, such as the COVID-19 pandemic and AD/CVD duties on steel and aluminum products. This chapter presents trends and offers perspectives from participants in the steel and aluminum industries regarding the impact of the tariffs on the industries. It does not attempt to disentangle the effects of section 232 and 301 tariffs from these other factors impacting trade, production, and prices during the relevant period. Rather, economic modeling presented in chapter 5 undertakes this effort for section 232 tariffs, and appendix F does so for the combined impacts of sections 232 and 301. Finally, this chapter highlights major upstream and downstream industries that may also be impacted by the tariffs.

Overview of Key Findings

Steel

- Annual U.S. imports of steel decreased by 17.2 percent between 2017 (the year before the tariffs' implementation) and 2021.
- Annual domestic production of steel fluctuated throughout the period, remaining about 5 percent higher in 2021 than in 2017.
- Although domestic steel capacity utilization was growing before the tariffs, it increased more rapidly beginning in 2018, reaching a 14-year high in 2021.
- Investment announcements from a variety of producers since the imposition of the tariffs indicate that production and capacity will likely continue to increase in the coming years.
- Prices have fluctuated over the period. The gap between global and domestic prices has widened since the imposition of the tariffs, and both global and domestic steel prices were much higher at the end of 2021 than in 2017.
- The leading downstream consumers of steel, the construction and automotive industries, faced challenging operating environments, especially during 2020, and this had an impact on steel usage.
- Total domestic steel consumption fluctuated from 2017 to 2021; the share of consumption accounted for by imports trended downward.

Aluminum

- The total volume of annual U.S. imports of aluminum decreased by 19.0 percent between 2017 and 2021. Unwrought aluminum imports decreased by 25.2 percent; wrought imports decreased by 4.8 percent.
- U.S. aluminum production has fluctuated throughout the period but increased overall, with the largest increase (22.5 percent) occurring in the primary segment, followed by 15.4 percent in the wrought segment and 11.5 percent in the secondary segment.
- Primary aluminum smelter capacity utilization increased by more than 20 percentage points between 2017 and 2019. Although it has fallen somewhat since then, it was still about 15 percentage points higher in 2021 than pre-tariff levels.
- Similar to steel, investment announcements from producers in all three aluminum segments since the imposition of the tariffs indicate that production and capacity utilization will likely continue to increase in the coming years.
- Aluminum prices spiked to a seven-year high in May 2018, shortly after the imposition of section 232 tariffs. Despite fluctuating over the period since then, prices at the end of 2021 were much higher than in 2017, and the gap between the U.S. price and global price has widened.
- The transportation, construction, and packaging sectors are the leading downstream consumers of aluminum. These sectors faced challenging operating environments during 2017–21 but also saw increased demand, which led to increased overall domestic consumption of aluminum. The share of aluminum consumption accounted for by imports has trended downward.

Overall, the data generally show a decrease in imports and an increase in production and prices since the imposition of section 232 and 301 tariffs. However, when observing the data on a more granular level, trade, production, and prices for both steel and aluminum display many unexpected fluctuations for several reasons. First, purchasers may not have been able to immediately switch suppliers in response to the tariffs, because they often have long-term contracts in place with suppliers or require particular product specifications to which a new supplier would not be able to adhere right away. Second, industry representatives claim that uncertainty regarding how long tariffs under sections 232 and 301 would remain in effect led to slower response times in terms of investing in and increasing domestic capacity.[173] Finally, several other factors have impacted the steel and aluminum industry in recent years. These other factors have likely, in some cases, had larger impacts on steel and aluminum markets than the tariffs.

Other Factors Impacting the Domestic Steel and Aluminum Industries

In recent years, several factors other than the tariffs under sections 232 and 301 have affected trade, production, and prices in the U.S. steel and aluminum industries. These factors, and their impacts, are summarized below and underline the difficulty of using trends in trade, production, and prices—without engaging in an economic model that can make efforts to disentangle the effects of the tariffs from other

[173] USITC, hearing transcript, July 20, 2022, 88–89 (testimony of Matt Aboud, Century Aluminum).

factors as in chapter 5 for section 232 duties and appendix F of this report—to draw conclusions about the impact of section 232 and 301 duties.

COVID-19 Pandemic (including recovery and related supply chain issues): Between March and April 2020, several steel blast furnaces, wrought aluminum mills, and secondary aluminum smelters reduced production or were temporarily idled because of decreased demand from downstream consumers who had shut down or reduced production in response to the pandemic.[174] The majority of these shutdowns lasted only a few months, but both the steel and aluminum industries saw longer-term impacts from the supply chain issues and demand shifts that followed. Capacity utilization at U.S. steel mills dropped significantly in 2020 owing to COVID-19-pandemic-related shutdowns, and stakeholders in the steel market observed that the COVID-19 pandemic and related recession produced significant supply chain dislocations.[175] Beginning in late 2020, both industries saw significant increases in demand as downstream industries recovered. The higher demand and temporary supply constraints during this period led to higher prices for steel, aluminum, and other commodities.[176]

Surging Energy Prices: As a result of rising global economic activity and various weather-related and other supply disruptions, global energy prices surged in 2021.[177] For the energy-intensive steel industry, this led to increased costs. Steel industry representatives stated that energy is one of the three primary costs of steel production (along with raw materials and labor) and that rising energy costs contributed to increased steel prices in 2021.[178] Higher energy prices also increased the costs of raw material inputs used to produce steel, further driving up production costs and leading to higher steel prices.[179] For the aluminum industry, which is also energy intensive, surging energy prices led to idled capacity and decreased production in China, Europe, and the United States.[180] Decreased supply, along with increased demand, led to tighter supplies and higher delivered costs for aluminum across the globe, including in the United States.[181] According to industry representatives, because the price of aluminum is globally set, producers were unable to respond to higher energy costs by raising prices and therefore were forced to idle production instead.[182]

Russia's Invasion of Ukraine: U.S. steel producers cited the conflict in Ukraine as a driving force behind steel prices that increased following the invasion.[183] Russia and Ukraine are significant producers of steel inputs and steel mill products, and the conflict created uncertainty for U.S. purchasers of such products.

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[174] USGS, *Mineral Commodity Summaries 2021: Aluminum*, January 2021; USGS, *Mineral Commodity Summaries 2022: Aluminum*, January 2022.
[175] AISI, USITC prehearing brief, July 8, 2022, 5, 8.
[176] For more information on commodity price surges affecting steel and aluminum, see USITC, *The 2021 Commodity Price Surge*, June 2022.
[177] USITC, *The 2021 Commodity Price Surge*, June 2022; Fernández Alvarez and Molnar, "What Is Behind Soaring Energy Prices and What Happens Next?" accessed October 28, 2022.
[178] U. S. Steel prehearing brief, July 8, 2022, 32, 35.
[179] USITC, hearing transcript, July 20–21, 2022, 234, 365 (testimonies of Tim Brightbill, ALPPA, and Benjamin Blase Caryl, U. S. Steel).
[180] USITC, *The 2021 Commodity Price Surge*, June 2022; Century Aluminum, "Century Aluminum to Temporarily Idle Hawesville Smelter," June 22, 2022.
[181] USITC, *The 2021 Commodity Price Surge*, June 2022.
[182] For example, see USITC, hearing transcript, July 20, 2022, 68 (testimony of Matt Aboud, Century Aluminum). For additional information on how aluminum prices are set, see the Aluminum section below.
[183] U. S. Steel prehearing brief, July 8, 2022, 23.

For example, pig iron, a raw form of the metal used in the production of steel, was in short supply in the weeks following Russia's invasion of Ukraine. Two-thirds of the pig iron imported by the United States in 2021 came from Russia and Ukraine; however, the conflict brought Ukrainian shipments to a halt, and U.S. importers stopped ordering from Russia.[184] Industry observers have claimed that Ukraine, historically one of the world's leading producers and exporters of steel, has lost about 40 percent of its production capacity since the Russian invasion.[185] Similarly, although the United States only sources a small share of its aluminum imports from Russia, Russia accounts for 5.4 percent of global production of unwrought aluminum and produces several key mill products as well.[186] The Russian invasion of Ukraine has led to supply disruptions and exacerbated surging global aluminum prices. In addition, already surging energy prices have continued to spike because of the conflict, creating higher input costs for aluminum producers.[187]

Antidumping and Countervailing Duty Investigations: Steel and aluminum products have been the subject of numerous antidumping and countervailing duty (AD/CVD) investigations in recent years. Since 2016, 142 AD/CVD orders have been imposed on steel mill products from 34 countries. In addition, several more steel orders imposed before 2016 have been continued. As of January 2022, 311 AD/CVD orders were in force on iron and steel mill products, accounting for 47 percent of existing AD/CVD orders on all products.[188] Some industry observers have identified AD/CVD orders on steel imports as a reason that domestic steel producers have recaptured market share and improved profitability.[189] Furthermore, industry observers stated that these orders helped shield domestic producers from unfair foreign competition by limiting the volume of imports into the U.S. market.[190] In the aluminum industry, 29 AD/CVD petitions have been filed since 2016 on common alloy aluminum sheet, aluminum wire and cable, and aluminum foil.[191] These petitions resulted in the issuance by the U.S. Department of Commerce (USDOC) of AD/CVD orders on imports from 21 countries. According to industry

[184] Tita, "Ukraine War Drives Shortage in Pig Iron, Pushing Steel Prices Higher," April 12, 2022.
[185] Smolienko, "Producers Say Ukraine Lost 40% of Its Steel Industry Due to Russian Invasion," September 6, 2022.
[186] Van Veen, "Russia and Aluminum Supply Chains," June 2022.
[187] USITC, hearing transcript, July 20, 2022, 68 (testimony of Matt Aboud, Century Aluminum). See also World Bank Group, "The Impact of the War in Ukraine on Commodity Markets," April 2022.
[188] CRS, *Domestic Steel Manufacturing: Overview and Prospects*, May 17, 2022, 6.
[189] For example, according to Nucor, a leading U.S. steel producer, section 232 actions played an important role in the steel industry's recovery from the 2008–09 financial crisis. However, Nucor believes that the most important trade remedy toolkit is the U.S. antidumping and countervailing duty laws. The firm maintains that these laws offset the effects of unfair trade and allow them to compete on an even playing field. Nucor also stated that the series of antidumping and countervailing duty orders issued in 2016 and 2017 were the most important driver of the industry's improvement since then. USITC, hearing transcript, July 21, 2022, 298 (testimony of Chris Bedell, Nucor).
[190] CRS, *Domestic Steel Manufacturing: Overview and Prospects*, May 17, 2022, 6.
[191] See USITC, *Aluminum Foil from China, Inv. Nos. 701-TA-570 and 731-TA-1346 (Final)*, April 2018; *Common Alloy Aluminum Sheet from China, Inv. Nos. 701-TA-591 and 731-TA-1399 (Final)*, January 2019; *Aluminum Wire and Cable from China, Inv. Nos. 701-TA-611 and 731-TA-1428 (Final)*, December 2019; *Common Alloy Aluminum Sheet from Bahrain, Brazil, Croatia, Egypt, Germany, India, Indonesia, Italy, Oman, Romania, Serbia, Slovenia, South Africa, Spain, Taiwan, and Turkey, Inv. Nos. 701-TA-639 and 641-642 and 731-TA-1475-1479 and 1485-1492 (Final)*, April 2021; USITC, *Aluminum Foil from Armenia, Brazil, Oman, Russia, and Turkey, Inv. Nos. 701-TA-658-659 and 731-TA-1538-1542 (Final),* October 2021. In addition, AD/CVD orders were continued in Certain Aluminum Extrusions from China in November 2022. See 87 Fed. Reg. 66128 (November 2, 2022).

representatives, the imposition of AD/CVD orders on products from these countries has encouraged domestic investment and increased business certainty.[192]

Other: According to industry representatives, a focus on carbon policy and sustainability concerns is also increasing demand for aluminum, particularly secondary (recycled) aluminum.[193] In addition, several countries imposed retaliatory tariffs on imports of certain steel and aluminum articles from the United States in response to the imposition of tariffs under section 232, which may have decreased demand for U.S. exports to those countries. As discussed below, both steel and aluminum exports have declined since 2017.[194]

Steel

Background

Iron and steel have been referred to as the basic metals of any industrial society and as vital to the United States for its national security and economic well-being.[195] According to a study commissioned by the American Iron and Steel Institute, the U.S. iron and steel industry accounted for more than $520 billion in economic output and nearly 2 million jobs in 2017, when considering the direct and indirect impacts.[196] The U.S. industry supplies the vast majority of the domestic market for steel, accounting for nearly 80 percent of the total domestic market in 2021 (figure 4.5).

The United States steel industry has evolved during the past several decades. Steel mills in the United States primarily produce steel via two distinct production methods that use different types of furnaces as well as raw inputs. The more "traditional" method occurs at large, vertically integrated mills, which use ovens to heat coal into coke, combine the coke with iron ore in a blast furnace to produce pig iron, and then melt the pig iron in a basic oxygen furnace to produce liquid steel. This process is commonly known as the blast-furnace/basic oxygen furnace (BF-BOF) method. Alternatively, production facilities known as "minimills" use electric arc furnaces (EAFs) to melt steel scrap and, in some instances, iron pellets to produce liquid steel. Minimills do not require coke ovens or blast furnaces.[197] In 2021, as much as 29 percent of domestic steel output was produced by only three companies, which operated integrated steel mills in 11 U.S. locations. The remaining 71 percent of domestic steel production was produced by 50 companies, which operated 101 minimills.[198]

Once steel is produced in its liquid state, it is cast into rectangular slabs (long billets a few inches thick) or other shapes and left to cool. Rolling mills then shape the semifinished steel into a variety of

[192] USITC, hearing transcript, July 20, 2022, 20, 88–89 (testimonies of Henry Gordinier, Tri-Arrows Aluminum, and Charles Johnson, Aluminum Association).
[193] USITC, hearing transcript, July 20, 2022, 89–90 (testimony of Matt Aboud, Century Aluminum).
[194] For more information on retaliatory tariffs, see chapter 3 section titled "Global Responses and Retaliatory Tariffs."
[195] USGS, *Mineral Commodity Profiles—Iron and Steel*, 2005.
[196] American Iron and Steel Institute, "The Economic Impact of the American Iron and Steel Industry," May 23, 2018.
[197] CRS, *Domestic Steel Manufacturing: Overview and Prospects*, May 17, 2022.
[198] USGS, *Mineral Commodity Summaries 2022: Iron and Steel*, January 2022.

products, generally classified as either “flat” products (plate and coils of steel sheet) or “long” products (bars, rails, wire rods).

Steel Mill Products

Steel mills produce a range of products that can be classified into general categories: flat, long, pipe and tube, and semifinished. All these products can be produced using various steel types (e.g., carbon, alloy, and stainless). In terms of volume, flat and long products account for the majority of U.S. steel mill production. Most of these products are sold to distributors, machinery manufacturers, and secondary steel manufacturers. A brief description of the main steel mill product groups follows.

> **Flat products:** Hot-rolled and cold-rolled steel sheets and strips. Hot-rolled flat steel is the primary product made by U.S. steel mills. Processors typically further process the steel into products usable by the construction, machinery manufacturing, and automotive industries.[199]
>
> **Long products:** Includes reinforcing steel bars, rails, rods, and beams. Steel bars are frequently used as tension devices in reinforced concrete and other masonry structures. Steel bar consumption is closely linked to demand from residential and nonresidential construction.
>
> **Pipe and tube:** Either seamless or welded pipe and tube. These products are most commonly used in construction and energy sectors.[200]
>
> **Semifinished products:** The intermediate solid forms of molten steel, to be reheated and further forged, rolled, shaped, or otherwise worked into finished steel products. Includes blooms, billets, slabs, ingots, and steel for castings.[201]

In terms of scale on a global basis, the United States produced 85.8 million metric tons (mmt) of raw steel (steel in the first solid state after melting, suitable for further processing or for sale) in 2021, making it the fourth-leading producer in the world, behind China (1,032.8 mmt), India (118.2 mmt), and Japan (96.3 mmt) (Figure 4.1).[202] The U.S. iron and steel industry produced raw steel in 2021 with an estimated value of about $110 billion, a 31.0 percent increase from $84 billion in 2017. Total raw steel production capacity in the United States in 2021 was about 106 million metric tons.[203]

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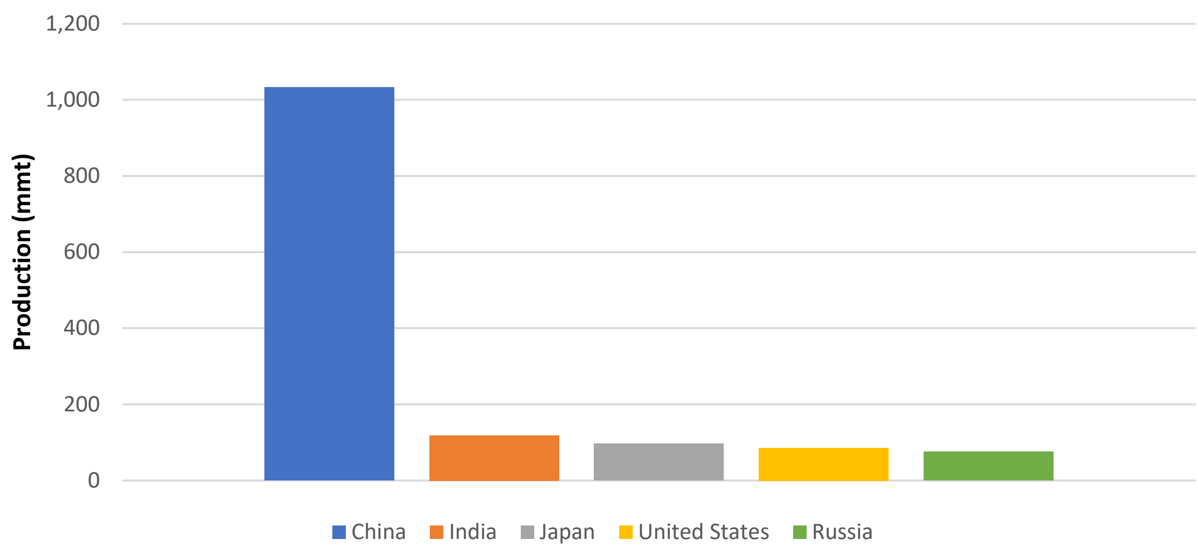
[199] IBISWorld, *Iron and Steel Manufacturing in the US*, February 2022.
[200] USDOC, ITA, *Global Steel Report 2019*, accessed October 13, 2022, 15.
[201] USDOC, ITA, *Global Steel Report 2019*, accessed October 13, 2022, 15.
[202] World Steel Association, “World Steel in Figures 2022,” 2022.
[203] USGS, *Mineral Commodity Summaries 2022: Iron and Steel*, January 2022.

Figure 4.1 Top five leading global producers of raw steel, by country, in 2021

In millions of metric tons (mmt). Underlying data for this figure can be found in appendix E, table E.8.



Source: World Steel Association, "World Steel in Figures 2022," 2022.

Relatively large on a global scale, the U.S. steel industry is also highly concentrated, with the four largest firms accounting for 71.5 percent of industry revenue.[204] Consolidation primarily evolved through considerable industry restructuring and merger activity from 2010 to 2022. This consolidation was attributed to increasing global competition and volatile input costs, combined with fewer smaller firms entering the market.[205] One reason that steel makers may be pursuing consolidation and vertical integration is to reduce production costs. Larger and more diversified operations are able to reduce production costs through economies of scale and mitigate the risk of negative product or market segment conditions.[206]

In addition to consolidation, another notable industry trend has been the shift in steel production methods in the United States. A growing share of domestic production comes from minimills that melt steel scrap in EAFs, continuing the long-term shift away from large, integrated mills that rely on blast furnaces. The minimill sector maintains lower capital and energy costs per ton produced than the integrated mill sector. This transition to minimill steel production coincided with a 10 percent increase in labor productivity at iron and steel mills in the United States from 2011 to 2021.[207]

The U.S. government has imposed AD/CVD duties on steel imports to offset foreign subsidies and remedy unfair import pricing (dumping). Since at least 1978, when the OECD created the Steel Committee, the U.S. has also led and participated in numerous multilateral negotiations to address global excess steel capacity.[208] The United States has also made increased use of domestic preference

[204] IBISWorld, *Iron and Steel Manufacturing in the US*, February 2022.
[205] IBISWorld, *Iron and Steel Manufacturing in the US*, February 2022.
[206] IBISWorld, *Iron and Steel Manufacturing in the US*, February 2022.
[207] BLS, "Labor Productivity for Manufacturing: Iron and Steel Mills and Ferroalloy Production (NAICS 331110) in the United States," September 15, 2022.
[208] For a summary of these negotiations, see U. S. Steel, written submission to the USITC, attachment 5, 1-3, July 8, 2022.

(e.g., "Buy American") laws to require that iron and steel used in many federal projects and those funded by federal grants be produced in the United States.[209]

As reviewed in more detail in chapter 3, section 232 tariffs cover nearly all steel products, including semifinished steel and the major steel mill products. Section 232 tariffs on U.S. imports of these products went into effect on March 23, 2018.[210] Beginning on January 24, 2020, these tariffs also applied to several "derivative steel articles," which include certain nails, tacks (other than thumb tacks), drawing pins, motor vehicle bumper stampings of steel, and steel body stampings for tractors.[211] Section 301 tariffs on imports from China apply to all the aforementioned products, as well as other articles of iron and steel (e.g., pipe fittings and connectors). Nearly all section 301 tariffs on steel products were included in either tranche 3, which was effective beginning September 24, 2018, or tranche 4, list 1, effective September 1, 2019. In addition, many downstream products produced from steel are subject to section 301 tariffs.[212]

Representatives of the U.S. steel industry, including U.S. workers, have been largely supportive of tariffs under sections 232 and 301. These representatives state that these actions provide important relief to the domestic iron and steel industry by applying to the full range of semifinished and finished steel imports from the largest sources of global steel overcapacity. Industry representatives credit these tariffs, in conjunction with AD/CVD orders, for returning the U.S. steel industry to sustainable operating levels, allowing the industry to make needed investments in new technology, reversing years of declining employment, and supporting more and better jobs for the next generation of advanced iron and steel manufacturing.[213] Conversely, many downstream consumers of steel have stated that they were affected adversely by tariffs under sections 232 and 301 as a result of the increased prices of domestic and imported steel.[214] Downstream manufacturers and trade groups that represent them claim that steel prices rose because of both the high demand for manufactured goods and the tariffs on imported steel that were implemented by the Trump administration and continue under the Biden administration.[215]

Trade

U.S. steel imports have exceeded exports for several years, although the volume of annual U.S. imports of steel mill products decreased by 17 percent from 2017 to 2021; corresponding exports declined as well during that period (figure 4.2 and table 4.1).

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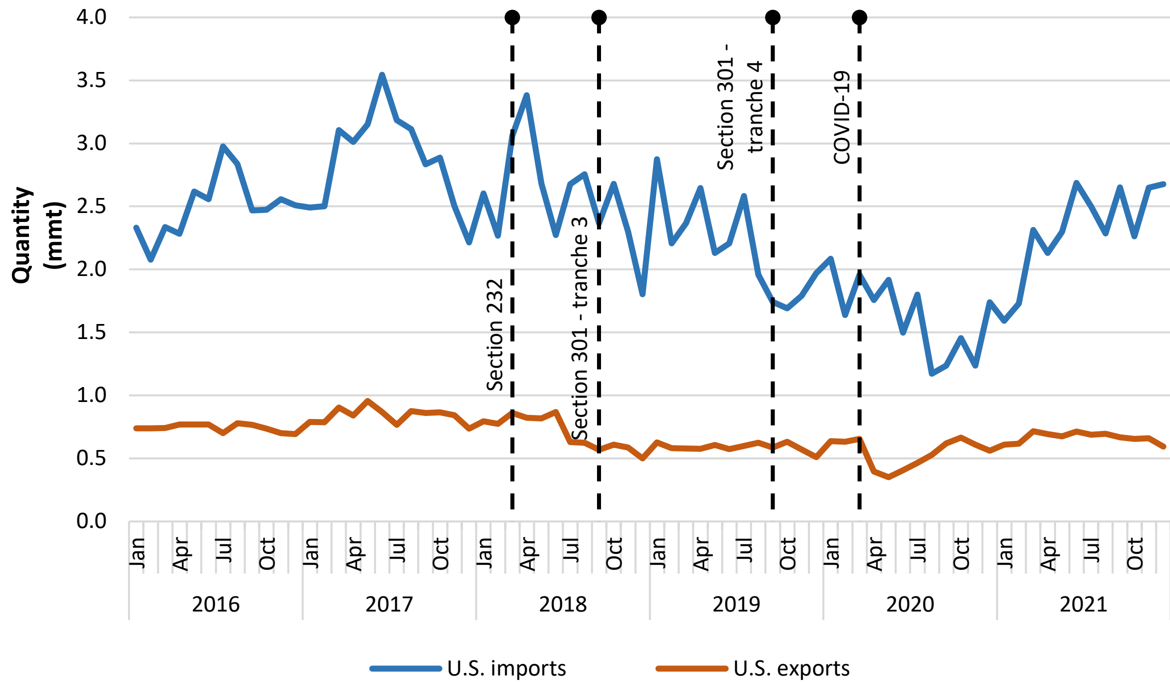
[209] CRS, *Domestic Steel Manufacturing: Overview and Prospects*, May 17, 2022, 1.
[210] 83 Fed. Reg. 11625 (March 15, 2018).
[211] 85 Fed. Reg. 5281 (January 29, 2020).
[212] For more information on section 301 tariff coverage, see chapter 3.
[213] See USITC, hearing transcript, July 22, 2022, panel 4 testimonies.
[214] USITC, hearing transcript, July 20, 2022, 95–97, 216–17 (testimonies of David Klotz, Precision Metal forming Association, and Paul Nathanson, Coalition of American Metal Manufacturers and Users).
[215] Hufford, "High Steel Prices Have Manufacturers Scrounging for Supplies," September 15, 2021; USITC, hearing transcript, July 20, 2022, 263 (testimony of Steve Hawkins, American Concrete Pipe Association).

Figure 4.2 U.S. trade of steel mill products, by month and year, 2016–21

In millions of metric tons (mmt). Underlying data for this figure can be found in appendix E, table E.9.



Source: USDOC, U. S. Steel Executive Summary, August 2022, HTS subheadings 7206.10 through 7216.50, 7216.99 through 7301.10, 7302.10, 7302.40 through 7302.90, and 7304.10 through 7306.90.
Note: This figure does not include derivative steel articles.

Imports were generally volatile from 2016 to 2021 but, following a surge in 2017, trended downward thereafter before rebounding in 2021 (figure 4.2 and table 4.1). Industry representatives have attributed the decline in steel imports to section 232 quotas and tariffs, in combination with AD/CVD orders.[216]

In terms of product-level imports, in 2021, flat products (e.g., sheet and plate) accounted for the largest share of U.S. steel imports at 39 percent, or 11.2 mmt. Semifinished products (e.g., slab and billet) accounted for 26 percent, or 7.5 mmt, followed by long products (e.g., wire rod and bar) at 17 percent (4.8 mmt), pipe and tube products at 14 percent (4.0 mmt), and stainless products at 4.0 percent (1.1 mmt).[217]

[216] American Iron and Steel Institute, prehearing brief, July 8, 2022, 4.
[217] USDOC, "Steel Imports Report: United States," accessed September 30, 2022, 4.

Table 4.1 Quantity of U.S. imports for consumption of steel mill products, by product type and year, 2016–21

In thousand metric tons (mt) and number of items in thousands (no.).

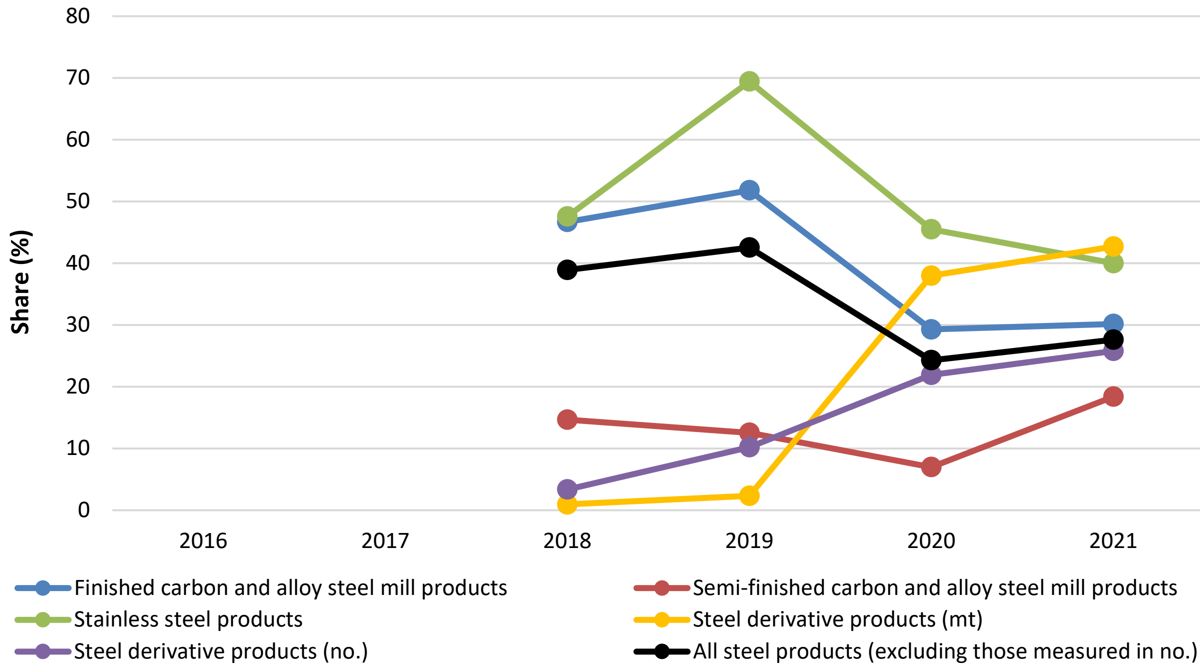
Category	2016	2017	2018	2019	2020	2021
Finished steel mill products, carbon and alloy (mt)	23,094.5	26,014.2	22,547.5	18,473.8	14,144.4	19,904.1
Semifinished, carbon and alloy (mt)	6,004.8	7,500.0	7,157.6	6,041.1	5,147.9	7,510.5
Stainless steel products (mt)	918.3	1,108.5	962.4	768.3	695.3	1,143.2
Steel derivatives (mt)	224.5	222.0	266.4	264.9	251.3	286.3
Steel derivatives (no.)	14,701.0	11,715.1	13,378.8	12,150.8	8,088.2	8,856.0
All steel products (excluding derivative products measured in no.) (mt)	30,242.1	34,844.8	30,933.9	25,548.1	20,238.8	28,844.2

Source: USITC DataWeb/Census, accessed August 16, 2022.

Note: Flat products are composed of imports under HTS subheadings 7208.10, 7208.25, 7208.26, 7208.27, 7208.36, 7208.37, 7208.38, 7208.39, 7208.40, 7208.51, 7208.52, 7208.53, 7208.54, 7208.90, 7209.15, 7209.16, 7209.17, 7209.18, 7209.25, 7209.26, 7209.27, 7209.28, 7209.90, 7210.11, 7210.12, 7210.20, 7210.30, 7210.41, 7210.49, 7210.50, 7210.61, 7210.69, 7210.70, 7210.90, 7211.13, 7211.14, 7211.19, 7211.23, 7211.29, 7211.90, 7212.10, 7212.20, 7212.30, 7212.30, 7212.40, 7212.50, 7212.60, 7225.11, 7225.19, 7225.30, 7225.40, 7225.50, 7225.91, 7225.92, 7225.99, 7226.11, 7226.19, 7226.91, 7226.92, 7226.99, 7226.93, and 7226.94. Steel long products are composed of imports under HTS subheadings 7213.10, 7213.20, 7213.91, 7213.99, 7214.10, 7214.20, 7214.30, 7214.91, 7214.99, 7215.10, 7215.50, 7215.90, 7216.10, 7216.21, 7216.22, 7216.31, 7216.32, 7216.33, 7216.40, 7216.50, 7216.99, 7217.10, 7217.20, 7217.30, 7217.90, 7226.20, 7227.10, 7227.20, 7227.90, 7228.10, 7228.20, 7228.30, 7228.40, 7228.50, 7228.60, 7228.70, 7228.80, 7229.20, 7229.90, 7301.10, 7302.10, 7302.40, 7225.20, and 7229.10. Steel pipe and tube is composed of imports under HTS subheadings 7304.19, 7304.23, 7304.29, 7304.31, 7304.39, 7304.51, 7304.59, 7304.90, 7305.11, 7305.12, 7305.19, 7305.20, 7305.31, 7305.39, 7305.90, 7306.19, 7306.29, 7306.30, 7306.50, 7306.61, 7306.69, 7306.90, 7304.10, 7304.21, 7306.10, 7306.20, and 7306.60. Stainless steel is composed of imports under HTS subheadings 7218.10, 7218.91, 7218.99, 7219.11, 7219.12, 7219.13, 7219.14, 7219.21, 7219.22, 7219.23, 7219.24, 7219.31, 7219.32, 7219.33, 7219.34, 7219.35, 7219.90, 7220.11, 7220.12, 7220.20, 7220.90, 7221.00, 7222.11, 7222.19, 7222.20, 7222.30, 7222.40, 7223.00, 7304.11, 7304.22, 7304.24, 7304.41, 7304.49, 7306.11, 7306.21, and 7306.40. Steel derivatives are composed of imports under HTS statistical reporting numbers 7317.00.3000, 7317.00.5503, 7317.00.5505, 7317.00.5507, 7317.00.5560, 7317.00.5580, 7317.00.6560, 8708.10.3020, and 8708.29.2120. Imports under HTS statistical reporting numbers 8708.10.3020 and 8708.29.2120 are recorded in number of items rather than metric tons.

Figure 4.3 Share of the quantity of U.S. steel imports subject to tariffs under sections 232 and 301, by product type and year, 2016–21

In percentages. mt = measured in metric tons; no. = measured in number of items. Underlying data for this figure can be found in appendix E, tables E.10 through E.15.



Source: USITC DataWeb/Census, accessed August 16, 2022.

Figure 4.3 illustrates that, overall, since 2018 less than half of U.S. steel imports were subject to tariffs under sections 232 or 301, and this share has declined in recent years.

The top 10 source countries for U.S. steel imports represented 81.9 percent of the total steel import volume in 2021, at 24.3 mmt. Canada accounted for the largest share of U.S. imports at 24.0 percent (7.1 mmt), followed by Mexico at 18.1 percent (5.3 mmt), Brazil at 13.4 percent (4.5 mmt), South Korea at 8.6 percent (2.5 mmt), Russia at 5.0 percent (1.5 mmt), Germany at 3.9 percent (1.1 mmt), Japan at 3.3 percent (0.99 mmt), Turkey at 3.1 percent (0.92 mmt), Vietnam at 2.9 percent (0.85 mmt), and Taiwan at 2.8 percent (0.80 mmt).[218]

Import sources varied by product types and many of the leading sources were either completely exempt from section 232 tariffs (e.g., Canada and Mexico) or exempt under quotas (e.g., Brazil and South Korea) for much of 2018–21. By 2021, many leading import sources were no longer subject to section 232 tariffs, though import volumes continued to be constrained for quota countries. The United States imported the largest share of flat products from Canada in 2021, at 36.3 percent, followed by South Korea at 11.8 percent. Canada was also the largest source for long product imports, at 23.7 percent, and Mexico was the second-largest supplier of long products, at 19.7 percent. The United States imported 22.4 percent of its pipe and tube imports from South Korea, followed by Canada at 17.1 percent. The majority of U.S. imports of semifinished steel in 2021 came from Brazil, at 47.3 percent. Mexico and Russia were also major sources of semifinished steel, at 22.6 percent and 17.2 percent, respectively.

[218] USDOC, "Steel Imports Report: United States," accessed September 30, 2022, 4.

Germany was the largest source of imported stainless products, at 30.3 percent, followed by Taiwan at 15.4 percent.[219] In addition to country exemptions, the share of imports subject to tariffs under sections 232 and 301 also decreased in 2020 and 2021 as more product exclusions were granted and importers were able to switch their sourcing.

Production

Production Trends

Between 2016 and 2021, domestic annual raw steel production fluctuated between roughly 70 and 90 mmt (figure 4.4), generally increasing since 2016 with the exception of a low point coming amid COVID-19-pandemic-related production curtailments in 2020. U.S. steel production in 2021 was 5.1 percent higher than in 2017, before section 232 tariffs were implemented. Capacity utilization in the steel industry had been trending upward since 2016 (excluding a drop in 2020), increasing from 71 percent to 81 percent from 2016 to 2021, with 2 percentage points of the increase occurring from 2018 to 2019 coinciding with the imposition of section 232 tariffs in 2018.[220] In 2021, 81.1 percent of U.S. steel production capacity was utilized, the highest level since 2007.[221] The USDOC identifies an 80 percent capacity utilization rate in steel production as a minimum threshold for long-term financial viability of the industry and cites industry sources that attribute a jump in earnings when utilization rates increase from 80 percent to 85 percent.[222] According to U.S. Census Bureau data, U.S. steel producers recorded $29.6 billion in profits in 2021 compared with $5.5 billion in 2017, before the imposition of tariffs under sections 232 and 301, as capacity utilization reached the highest level since the early 2000s.[223] Some market participants attributed this increased profitability to the impact of section 232 tariffs.[224]

[219] For more information on top importers of specific steel products, see appendix E, table E.29. USDOC, *Steel Imports Report: United States*, accessed September 30, 2022.

[220] Tranche 3 of section 301, which covered steel products was also imposed in 2018.

[221] American Iron and Steel Institute, prehearing brief, July 8, 2022, 6.

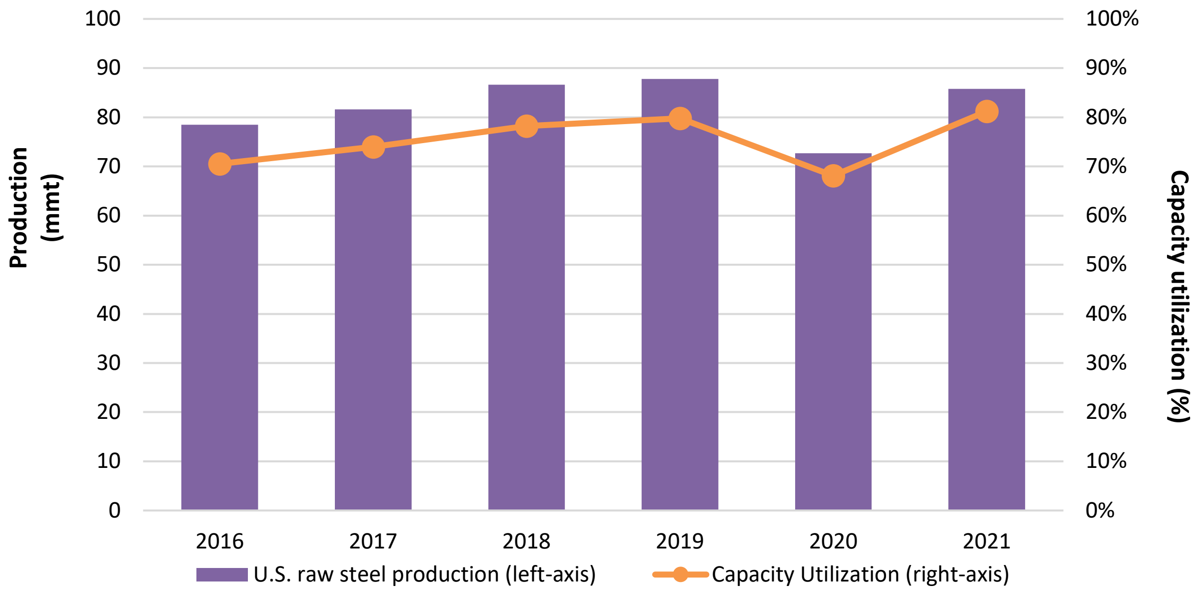
[222] USDOC, BIS, *The Effect of Imports of Steel on the National Security*, January 11, 2018, 48.

[223] Census, From the Quarterly Financial Report database: "Iron, Steel, and Ferroalloys: U.S. Total—Not Seasonally Adjusted Income (Loss) from Operations [Millions of Dollars], Business and Industry: Time Series/Trend Charts," accessed September 30, 2022.

[224] An industry representative stated that "they benefited from section 232 tariffs that increased the price of imports, allowing them to increase their own prices and the higher effective import prices have increased demand for domestic production. This has allowed us to operate more efficiently, increasing our production capacity. Prior to 2017, we were forced to accept orders for low volume and low yield products to fill our books. The growing demand for domestic product permitted us to focus on higher volume and higher yield orders. By doing so, we improved our production capacity for cold rolled without any physical capacity expansions." USITC, hearing transcript, July 21, 2022, 304 (testimony of Tamara Weinert, Outokumpu Business Area Americas). Some other market participants have cited the cumulative effects of the broader section 232 tariffs and more narrowly focused AD/CVD orders as factors that benefited U.S. producers. One industry representative also noted that the economic recovery following the COVID-19 pandemic increased demand for steel, also contributing to increased profitability. USITC, hearing transcript, July 21, 2022, 362 (testimony of Tamara Weinert, Outukumpu Business Area Americas). See also USITC, hearing transcript, July 21, 2022, 298, 330–331, 419–420 (testimonies of Chris Bedell, Nucor; Philip Bell, Steel Manufacturers Association; and Scott N. Paul, Alliance for American Manufacturing).

Figure 4.4 U.S. steel production and capacity utilization, by year, 2016–21

In million metric tons (mmt) and percentages. Underlying data for this figure can be found in appendix E, table E.16.



Source: World Steel Association and American Iron and Steel Institute, prehearing brief, July 8, 2022, 6.

Some steel producers have transitioned to harder-to-make steel products, such as advanced high-strength steel or lightweight steel for automotive uses, to better compete in the domestic market and lessen the impact of cheaper steel imports.[225]

Additional Restarts and Investments

A significant development in the U.S. steel industry during the past few years has been an influx in capital investment. Specifically, many U.S. steel producers have announced plans for new mills, expansions, and restarts of idled plants. The investments currently underway are expected to significantly add to industry steelmaking capacity and are focused principally on minimills, continuing the longstanding shift away from integrated production. According to the American Iron and Steel Institute, the imposition of section 232 tariffs incentivized new capital spending by domestic steel makers, with announced investments of nearly $22 billion in new, expanded, or restarted production since March 2018. Since then, approximately 20 mmt of steelmaking capacity has either come online or been announced. Much of the new capacity is expected to come online between 2022 and 2024.[226] Some of this additional steel production capacity will replace outdated capacity that was taken offline in previous years.[227] Industry observers also noted the multiple announcements of capital investment projects that are expected to add domestic steelmaking capacity in the future were influenced by the

[225] USDOC, "U.S. Steel Downstream Monitor," accessed September 30, 2022.
[226] USITC, hearing transcript, July 21, 2022, 313–14 (testimony of Kevin Dempsey, American Iron and Steel Institute).
[227] OECD, *Latest Developments in Steelmaking Capacity-2021*, September 22, 2021, 22; Verret, "New Steel Capacity Unlikely to Depress Prices," May 18, 2022.

higher domestic steel prices and government initiatives such as the recently enacted Infrastructure Investment and Jobs Act.[228]

A variety of new investments from a breadth of producers could lead to significant growth in U.S. steelmaking capacity in the coming years (table 4.2).[229] For example, Nucor Corporation commissioned a new EAF facility in December 2020 in Frostproof, Florida, and obtained permits for a new electric arc furnace (EAF) mill in Brandenburg, Kentucky, which opened in 2022. In addition, Nucor expanded its steelmaking capacity in Ghent, Kentucky, as announced in September 2020.[230] Since 2018, Cleveland Cliffs has made multiple acquisitions and invested an additional $2 billion to expand and upgrade its production facilities.[231] Big River Steel started a new EAF in November 2020, expanding steelmaking capacity at its Arkansas mill by about 1.5 mmt, and the United States Steel Corporation (U. S. Steel) also expanded capacity, starting a new EAF facility at its Fairfield Works plant in Alabama in October 2020.[232]

Furthermore, Australia's BlueScope Steel's subsidiary North Star started construction of a new EAF in Delta, Ohio, in early 2020, completing it by mid-2022.[233] Steel Dynamics is building a new EAF mill with a capacity of about 3.0 mmt in Sinton, Texas. ArcelorMittal/Nippon Steel Calvert will build a new EAF in Alabama that is expected to open in 2023.[234] Nucor and U. S. Steel are both planning significant new EAF projects in 2024, each adding more than 3 mmt of steel production capacity.[235]

[228] CRS, *Domestic Steel Manufacturing: Overview and Prospects*, May 17, 2022, 1.
[229] For example, Nucor cited section 232 tariffs in combination with AD/CVD orders on steel imports as factors that allowed it to invest in domestic steel production. Nucor has invested nearly $4 billion in new, expanded, or improved facilities since 2017. USITC, hearing transcript, July 21, 2022, 298 (testimony of Chris Bedell, Nucor).
[230] OECD, *Latest Developments in Steelmaking Capacity-2021*, September 22, 2021, 22.
[231] According to Cleveland Cliffs, section 232 tariffs, together with the AD/CVD orders on imports, allowed them to make major capital investments. USITC, hearing transcript, July 21, 2022, 325 (testimony of Patrick Bloom, Cleveland Cliffs).
[232] OECD, *Latest Developments in Steelmaking Capacity-2021*, September 22, 2021, 22.
[233] North Star BlueScope Steel, *North Star Facility Expansion Boosts Production,* May 13, 2022.
[234] OECD, *Latest Developments in Steelmaking Capacity-2021*, September 22, 2021, 22.
[235] OECD, *Latest Developments in Steelmaking Capacity-2021*, September 22, 2021, 22.

Table 4.2 Existing and planned new iron and steelmaking capacity, by starting year and company, since 2018
In million metric tons (mmt).

Projected starting year	Firm	Location	Additional capacity (mmt)
2018	Commercial Metals	Durant, OK	0.4
2020	Nucor	Sedalia, MO	0.4
2020	Big River Steel	Osceola, AR	1.5
2020	Nucor	Frostproof, FL	0.4
2020	U. S. Steel	Fairfield, AL	1.6
2021	JSW	Mingo Junction, OH	1.5
2022	Steel Dynamics	Sinton, TX	3.0
2022	Nucor	Ghent, KY	1.4
2022	North Star BlueScope	Delta, OH	0.9
2022	Nucor	Brandenburg, KY	1.2
2023	ArcelorMittal/Nippon Steel	Calvert, AL	1.7
2023	Commercial Metals	Mesa, AZ	0.5
2024	Nucor	Weirton, WV	3.0
2024	Nucor	TBA	0.6
2024	U. S. Steel	Osceola, AR	3.0
TBA	Nucor	Lexington, NC	0.4

Source: American Iron and Steel Institute, prehearing brief, July 8, 2022, 7.

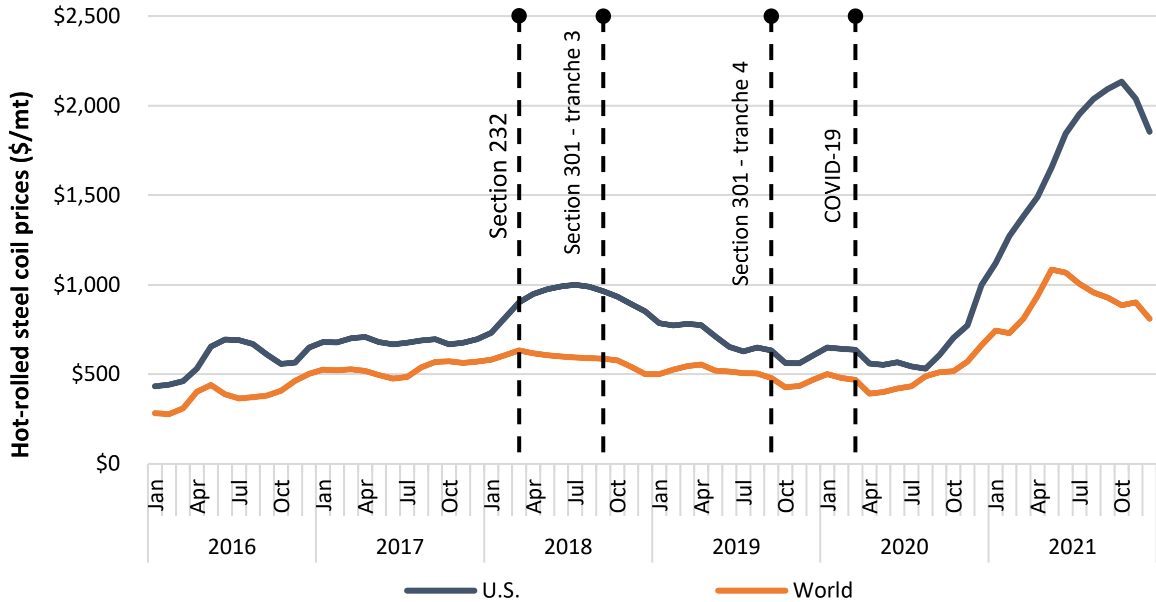
Prices

U.S. steel prices increased at a relatively steady rate from 2016 to 2018. Steel prices increased 54 percent from January 2016 to January 2017. Prices continued to increase in 2017, then increased more rapidly starting in January–February 2018 just before the imposition of section 232 duties in March 2018. Prices continued to increase through mid-2018, then declined though the end of the year and in 2019. This trend continued into the first half of 2020, owing to falling demand for steel stemming from the slowdown in economic activity during the COVID-19 pandemic. However, the downturn in prices was relatively brief; many steelmakers quickly cut their production levels in response to the drop in demand and overall uncertainty during that period. Prices subsequently increased in all regional markets, starting in the latter half of 2020, driven by the relatively quick recovery in China's steel demand, followed by a similar rebound in other major steel-consuming countries. Coinciding with the price increases that began during the second half of 2020, U.S. prices of hot-rolled steel coil (a common steel product frequently used to track steel prices) experienced an increase that was considerably larger than corresponding increases in other regions around the world (figure 4.5).

In the first quarter of 2021, steel prices increased 30–90 percent year on year compared to the first quarter of 2020, depending on product and market, followed by further gains in the second quarter. The United States, where steel demand recovered strongly, recorded the largest price increases in 2021, ending the year 85 percent higher than at yearend 2020 (figure 4.5). The prices of hot-rolled steel coil in the U.S. at the end of 2021 were more than quadruple those at the beginning of 2016. Asian and European steel prices also posted multiyear highs. Other factors that contributed to the price increases included supply chain disruptions and constraints (notably in shipping containers as well as energy supplies) and speculation about possible reductions in China's steel output.[236] Global steel prices have trended downward since late 2021, but the divergence between U.S. steel prices and those in other regions has lingered.[237]

Figure 4.5 U.S. and world prices of hot-rolled steel coil, by month and year, January 2016–December 2021

In dollars per metric ton (mt). Underlying data for this figure can be found in appendix E, table E.17.



Source: USDOC, "Steel Executive Summary" August 2022, 4. https://www.trade.gov/data-visualization/us-steel-executive-summary.

Consumption and Downstream Industries

Steel is a major component of many consumer and industrial products, including vehicles, farm machinery, and appliances, as well as in commercial and residential construction.[238] Industry observers noted that "demand for steel is highly cyclical, coming overwhelmingly from interest rate-sensitive sectors, such as construction and automotive manufacturing."[239] Apparent consumption of domestic finished steel mill products (calculated as production plus imports minus exports) was 97.1 mmt in 2021, up 21.4 percent from 2020—when the COVID-19 pandemic led to temporary shutdowns of auto plants—but well below the peak of 107 mmt in 2014 and 99.8 mmt in 2018 (figure 4.5).[240] The two largest end markets for steel in 2021—construction and automotive—accounted for 47 percent and 25

[236] EIU, *Commodity Forecast: Steel*, September 1, 2022, 8.
[237] EIU, *Commodity Forecast: Steel*, September 1, 2022, 8. Many participants at the Commission's hearing mentioned that section 232 and 301 duties contributed to U.S. steel prices remaining higher than prices in other regions. For example, see USITC, hearing transcript, July 20, 2022, 135–36 (testimony Scott Buehrer, B. Walter & Company).
[238] CRS, *Domestic Steel Manufacturing: Overview and Prospects*, May 17, 2022, 1.
[239] CRS, *Domestic Steel Manufacturing: Overview and Prospects*, May 17, 2022, 1.
[240] World Steel Association, "Steel Statistical Yearbook 2021," December 14, 2021, 82; World Steel Association, "World Steel in Figures 2022," 2022.

percent of consumption, respectively. They were followed by machinery and equipment, 9 percent; appliances and energy, 5 percent each; and other applications, 9 percent.[241]

Construction: Construction represents the largest market for steel products, and this segment was expected to generate 40 percent of sector revenue in 2022. Steel is widely used in nonresidential buildings, and as companies increase investment in this sector, demand and revenue generated from such products is expected to increase.[242] The state of the construction industry is often tied to the broader economic environment, and this can lead to volatility in this sector as evidenced by the steep decline in new construction during most of 2020 owing to the COVID-19 pandemic.[243] Overall, construction spending has trended upward in recent years as nonresidential construction activity in particular picked up, helping boost steel demand from this segment.[244] According to hearing testimony from one industry representative, section 232 tariffs have increased demand for domestically produced steel in industries that had previously relied on imports. They explained that, because the construction sector often is required to purchase American-made steel in order to be in compliance with domestic content laws, the increased demand for domestically produced steel from other sectors has negatively impacted supply of steel to the construction sector, resulting in delays in major infrastructure projects.[245]

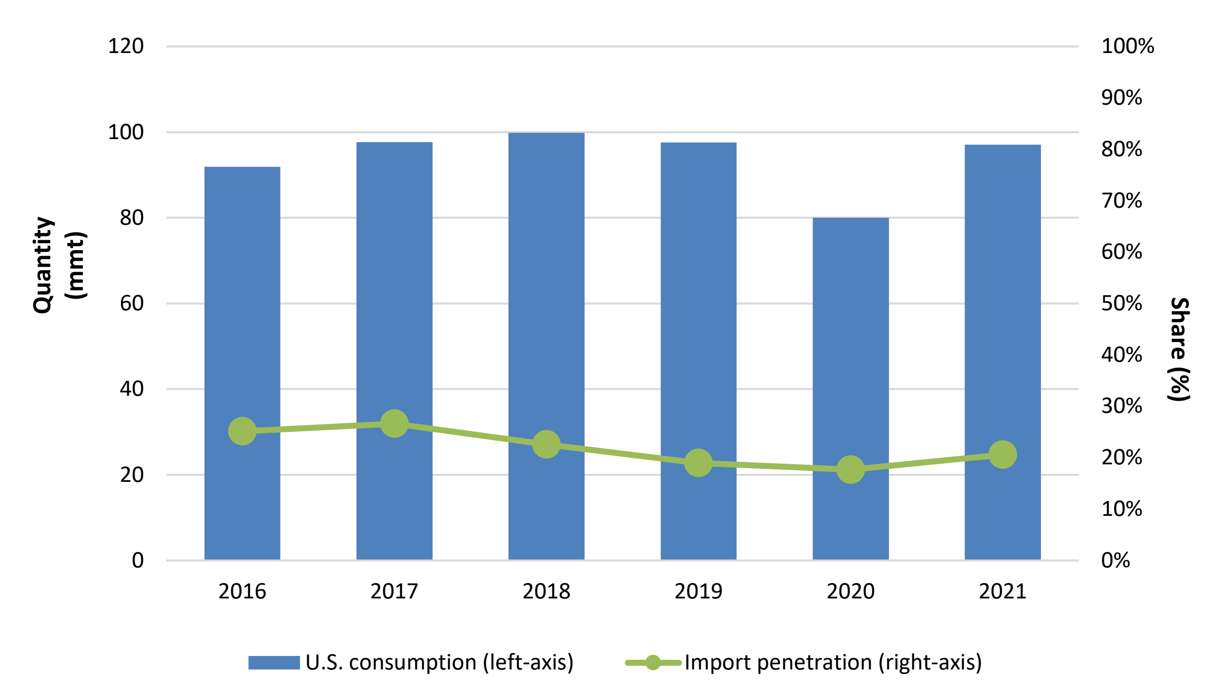
Automotive: Automotive manufacturing is the second-largest steel consumer, accounting for 25 percent of sector revenue in 2022.[246] Similar to the construction industry, demand from this segment has been volatile as a result of the COVID-19 pandemic, as auto sales are closely tied to the overall economic environment. This segment has declined as a share of steel revenue during the past five years, especially as manufacturers of new vehicles substitute aluminum for steel in an attempt to reduce vehicle weight in order to meet new fuel efficiency standards, while also facing supply chain issues and semiconductor chip shortages.[247] According to several industry representatives who participated in the hearing, section 232 tariffs on steel have led to decreased supplies of automotive steel products and increased input costs for automotive manufacturers. They also recount that, in some cases, limited availability of steel inputs has created longer lead times for automotive manufacturers.[248]

Import penetration (the ratio of imports to apparent consumption) in the U.S. steel market has generally trended downward since 2017, coinciding with the increases in capacity utilization and declines in U.S. imports (figure 4.6). Import penetration levels following the imposition of section 232 tariffs in 2018 were generally lower than they had been before tariffs were imposed.

[241] USGS, *Mineral Commodity Summaries 2022: Iron and Steel*, January 2022.
[242] Statista, Year-on-year growth forecast of nonresidential building spending in the United States from 2023 to 2024, by type of building, February 7, 2023..
[243] IBISWorld, *Iron and Steel Manufacturing in the US*, February 2022, 19.
[244] Census, Annual Rate for Total Construction Spending, 2016–21, Seasonally Adjusted, accessed September 30, 2022; IBISWorld, *Iron and Steel Manufacturing in the US*, February 2022, 19.
[245] USITC, hearing transcript, July 20, 2022, 190–194 (testimony of Steve Hawkins, American Concrete Pipe Association).
[246] IBISWorld, *Iron and Steel Manufacturing in the US*, February 2022, 19.
[247] IBISWorld, *Iron and Steel Manufacturing in the US*, February 2022, 19.
[248] USITC hearing transcript, July 20, 2022, 96–97, 110–111, 124 (testimonies of David Klotz, Precision Metalforming Association, Mark Vaughn, Vaughn Manufacturing, and Dan Walker, Industrial Fasteners Institute).

Figure 4.6 U.S. apparent consumption and import penetration of finished steel mill products, by year, 2016–21

In million metric tons (mmt) and percentages. Underlying data for this figure can be found in appendix E, table E.18.



Source: World Steel Association, "World Steel in Figures 2022," 2022; USITC DataWeb/Census, accessed August 16, 2022.

The recent changes in production and import penetration are also likely to have positive impacts on domestic demand for upstream materials used to make steel mill products, but the extent of that impact is unclear owing to the U.S. steel industry's shift in production technology. The primary raw materials used in the production of steel are iron ore in the case of integrated steel mills, and steel scrap in the case of minimills, which are refined into crude steel.[249] In the United States, both iron ore and steel scrap are typically mined or processed by the steel producers themselves, so they are easily able to translate increased demand for steel into increased production of upstream inputs. Domestic iron ore production was estimated to be 47.5 mmt in 2021, a slight decrease from 47.9 mmt in 2017.[250] In 2021, however, significant increases were reported in domestic iron ore production and shipments compared with 2020, when production was lower than normal because of the COVID-19 pandemic. Despite an increase between 2020 and 2021, overall domestic iron ore production has trended downward since 2018 because more domestic steel is produced in minimills, which primarily use scrap as feed, instead of integrated mills, which process iron ore to make steel.[251] While the direct impact of section 232 tariffs on upstream production is not clear, at the Commission's hearing a leading steel producer stated that section 232 tariffs combined with AD/CVD orders and decarbonization initiatives had incentivized the

[249] USGS, *Minerals Yearbook 2018: Iron and Steel [Advance Release]*, October 2021, 37.1.
[250] USGS, *Minerals Industry Survey December 2021: Iron Ore*, March 2022.
[251] USGS, *Mineral Commodity Summaries 2022: Iron Ore, January 2022*.

firm to invest over $1 billion to build new capacity and upgrade facilities that produce upstream steel products.[252]

Aluminum

Background

Aluminum, known for its light weight, high strength, and recyclability, is the world's second most consumed metal, after steel. It is used in numerous applications across several sectors.[253] The aluminum industry is divided into three segments: primary unwrought, secondary unwrought, and wrought products. Primary unwrought aluminum is produced by mining and refining bauxite ore and smelting aluminum oxide (alumina). Secondary unwrought aluminum is produced by recycling and remelting aluminum scrap. Output of primary and secondary unwrought production is principally semifinished forms, such as ingot, billet, and slab. These semifinished forms of unwrought aluminum—whether of primary or secondary origin—are converted into wrought aluminum products via mechanical processes, including rolling, drawing, extruding, and forging. The wrought aluminum segment includes several products such as aluminum bars, rods, and profiles; plate, sheet, and strip; foil; aluminum wire; pipes and tubes; and castings and forgings.[254]

The global aluminum industry is largely divided into two groups of countries—countries with a competitive advantage in primary unwrought production—largely due to low-cost electricity sources—and countries with a longstanding competitive advantage in secondary unwrought and wrought production.[255] With approximately 93.3 percent of its total aluminum production belonging to the secondary and wrought segments in 2021, the United States belongs to the latter group.[256] Although global production statistics on these segments are not publicly available, the Commission's 2017 study on *Aluminum: Competitive Conditions Affecting the U.S. Industry* found that the United States was the world's largest secondary unwrought producer and second-largest producer of wrought aluminum.[257] The United States accounted for only 1.3 percent of global primary unwrought production in 2021.[258]

Many countries have expanded primary aluminum production in recent years, leading to overall growth in global production, but the United States has seen a contraction in this segment.[259] The USDOC found that this decline in domestic production of aluminum had occurred despite growing demand.[260] According to one domestic producer, 18 of the 23 U.S. primary aluminum smelters closed between 2000

[252] USITC hearing transcript, July 21, 2022, 406–7 (testimony of Patrick Bloom, Cleveland-Cliffs, Inc.).
[253] See "Consumption" section for more details on aluminum applications.
[254] USITC, *Aluminum: Competitive Conditions Affecting the U.S. Industry*, June 2017, 49–50.
[255] USITC, *Aluminum: Competitive Conditions Affecting the U.S. Industry*, June 2017, 65.
[256] Primary and secondary production statistics provided by the Aluminum Association. Wrought production data provided by Refinitiv World Bureau of Metal Statistics, 2022 Yearbook. Note that wrought production may be underreported because it does not include aluminum castings.
[257] USITC, *Aluminum: Competitive Conditions Affecting the U.S. Industry*, June 2017, 72–73.
[258] USGS, *Mineral Commodity Summaries 2022: Aluminum*, January 2022.
[259] From 2001 to 2015, global primary aluminum production increased by 137 percent and U.S. production fell by 40 percent. USITC, *Aluminum: Competitive Conditions Affecting the U.S. Industry*, June 2017, 67.
[260] USDOC, BIS, *The Effect of Imports of Aluminum on the National Security*, January 17, 2018, 2–3.

and 2017.[261] Furthermore, between 2011 and 2017, annual U.S. primary unwrought aluminum production fell from nearly 2 million metric tons to 741,000 metric tons.[262] Although it has increased somewhat since the imposition of tariffs under sections 232 and 301, domestic primary production is still less than half of what it was a decade ago. Meanwhile, secondary unwrought and wrought production have grown steadily over the past decade.[263]

As reviewed in more detail in chapter 3, section 232 tariffs cover nearly all aluminum products, including unwrought aluminum (whether primary or secondary) and all the major wrought aluminum products. Section 232 tariffs on imports of these products went into effect on March 23, 2018.[264] Beginning on January 24, 2020, these tariffs also applied to several “derivative aluminum articles,” which include stranded wire, cables, plaited bands and similar articles of aluminum, motor vehicle bumper stampings of aluminum, and aluminum body stampings for tractors.[265] Section 301 tariffs apply to all the aforementioned products, as well as aluminum waste and scrap (inputs in the production of secondary aluminum) and aluminum flakes and powders.[266] Nearly all section 301 tariffs on aluminum products were included in either tranche 3, which went into effect on September 24, 2018, or tranche 4, list 1, effective September 1, 2019.[267] In addition, many downstream products produced from aluminum are subject to section 301 tariffs.[268]

U.S. aluminum industry representatives have generally expressed support for tariffs under sections 232 and 301, which they say have had positive impacts when imposed in conjunction with AD/CVD orders.[269] However, the level of support varies between unwrought primary producers, who reportedly have seen larger benefits from the price increases associated with the tariffs, and wrought and secondary producers, who often see higher input costs.[270] In general, although the U.S. aluminum industry claims that section 301 tariffs have had a smaller impact than section 232 tariffs, section 301 tariffs appear to have gained more support in the aluminum industry. This is likely because the aluminum industry is globally integrated and many U.S. companies have plants in other countries (outside of China) that are

[261] USITC, hearing transcript, July 20, 2022, 10 (testimony of Matt Aboud, Century Aluminum).
[262] USGS, *Mineral Commodity Summaries 2016–22: Aluminum*.
[263] For years 2011–15, see USITC, *Aluminum: Competitive Conditions Affecting the U.S. Industry*, June 2017, 151–52. For 2016–21, see table 4.5.
[264] 83 Fed. Reg. 11619, March 15, 2018.
[265] 85 Fed. Reg. 5281, January 29, 2020.
[266] Aluminum flakes and powders are used in a variety of applications from makeup to fireworks.
[267] HTS subheading 7614.90.20 (covering certain derivative aluminum products) was included in tranche 2, which became effective on August 23, 2018. All other subheadings within the derivative aluminum articles category are included in tranche 3. HTS subheading 7616.99.51 (covering certain wrought aluminum products, including castings and forgings) was also included in tranche 3. All other subheadings covering wrought aluminum products and unwrought aluminum were included in tranche 4, list 1.
[268] For more information on section 301 tariff coverage, see chapter 3.
[269] See USITC, hearing transcript, July 20, 2022, panel 1 testimonies; industry representatives, interviews by USITC staff, June 15, 2022, and October 6, 2022.
[270] See USITC hearing transcript, July 20, 2022, panel 1 testimonies; industry representatives, interviews by USITC staff, October 6, 2022.

subject to section 232 tariffs.[271] In addition, industry representatives have stated that uncertainty regarding the longevity of tariff actions under sections 232 and 301 has made it difficult to increase investment in response to these actions.[272] Some have also noted that unilateral trade actions in general are not sufficient in addressing global overcapacity and unfair market practices coming from China.[273] Moreover, industry representatives cite the numerous product exclusions, which they claim allow some foreign imports to enter at a lower price than domestic like products.[274]

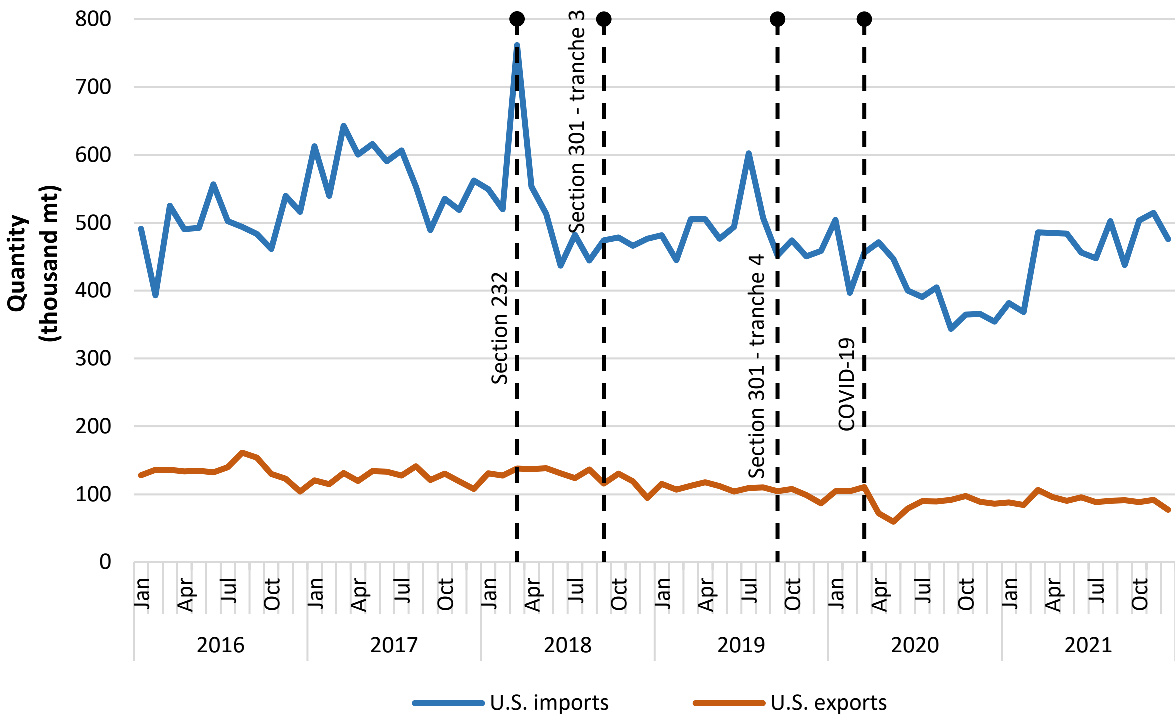
Trade

The United States was the world's largest aluminum importer in 2021, with the vast majority of its imports being unwrought aluminum. It was also the seventh-largest global exporter. Wrought aluminum accounted for 87.8 percent of aluminum exports in 2021.[275] In general, aluminum imports and exports have both decreased since the imposition of the tariffs. Imports have been a bit more volatile; exports have seen a steadier, but much smaller, decrease (figure 4.7).

[271] Industry representatives, interview by USITC staff, October 6, 2022. Industry representatives also note that section 301 tariffs target the main source of global overcapacity, China, and encourage China to address the unfair subsidies which have led to this overcapacity issue. Industry representatives, interview by USITC staff, June 15 and October 6, 2022. See also USITC, hearing transcript, July 20, 2022, 17 (testimony of Charles Johnson, Aluminum Association).
[272] USITC, hearing transcript, July 20, 2022, 88–89 (testimony of Matt Aboud, Century Aluminum); industry representatives, interviews by USITC staff, July 11, 2022, and October 6, 2022.
[273] Industry representatives, interview by USITC, June 15, July 11, and October 6, 2022. See also USITC, hearing transcript, July 20, 2022, 22 (testimony of Buddy Stemple, Aluminum Association).
[274] Industry representatives, interviews by USITC staff, October 6, 2022.
[275] USITC, DataWeb/Census, accessed September 20, 2022. Export share does not include aluminum scrap and waste, which accounts for the largest share of all aluminum-based exports.

Figure 4.7 U.S. aluminum imports and exports, by month and year, 2016–21

In thousand metric tons. Underlying data for this figure can be found in appendix E, table E.19.



Source: USITC DataWeb/Census, HTS headings 7601, 7604, 7605, 7606, 7607, 7608, 7609, and HTS statistical reporting numbers 7616.99.5160 and 7616.99.5170, accessed September 20, 2022.
Note: This figure does not include derivative aluminum articles.

In March 2018, imports spiked by approximately 46.6 percent, compared to the month before.[276] According to one news source, this spike was due to consumers making larger purchases to avoid the extra cost of the impending section 232 tariffs.[277] Imports fell sharply for the three months following the imposition of the tariffs, before beginning to level out in July 2018. Another spike in imports occurred in July 2019, coinciding with reinstated section 232 exemptions for the largest import suppliers of aluminum: Canada and Mexico. Subsequently, imports declined through February 2021, before increasing again as demand grew following the COVID-19 pandemic recovery.[278]

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[276] USITC, DataWeb/Census, accessed September 20, 2022.
[277] Long, “Foreign Suppliers are Flooding the U.S. Market,” March 1, 2018.
[278] USITC, *Trade Shifts 2021: The 2021 Commodity Price Surge*, June 2022.

Table 4.3 Quantity of U.S. imports for consumption of aluminum, by product type and year, 2016–21
In thousand metric tons (mt) and number of items in thousands (no.).

Category	2016	2017	2018	2019	2020	2021
Unwrought aluminum (mt)	4,267.4	4,876.9	4,180.0	3,801.6	3,279.6	3,648.9
Wrought aluminum (mt)	1,679.1	1,991.4	1,976.3	2,050.7	1,618.9	1,895.3
Derivate aluminum articles (mt)	8.1	6.7	9.4	15.2	13.3	25.6
Derivate aluminum articles (no.)	14,701.0	11,715.1	13,378.8	12,150.8	8,088.2	8,856.0
All aluminum (mt)	5,954.6	6,875.0	6,165.7	5,867.5	4,911.8	5,569.7

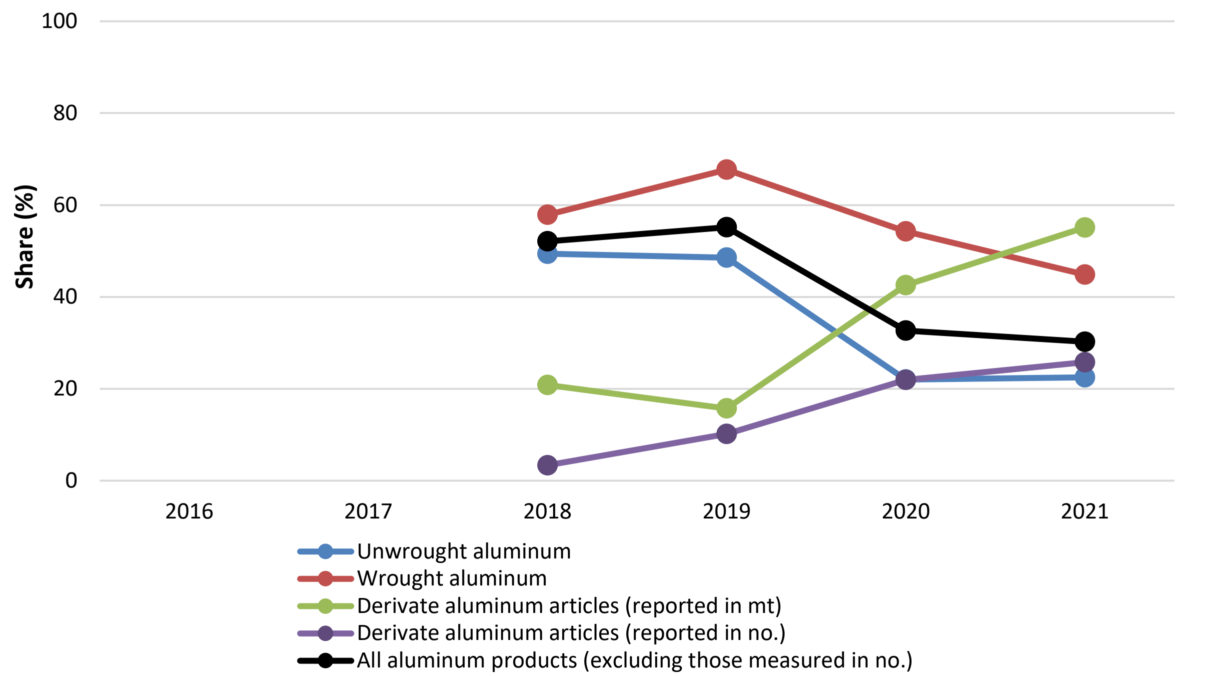
Source: USITC DataWeb/Census, accessed September 9, 2022.
Notes: Unwrought aluminum is composed of imports under HTS heading 7601. Wrought aluminum is composed of imports under HTS headings 7604, 7605, 7606, 7607, 7608, 7609, and HTS statistical reporting numbers 7616.99.5160 and 7616.99.5170. Derivative aluminum articles are composed of imports under HTS subheadings 7614.10.50, 7614.90.20, 7614.90.40, and 7614.90.50 and statistical reporting numbers 8708.10.3030 and 8708.29.2130. Imports under HTS statistical reporting numbers 8708.10.3030 and 8708.29.2130 are recorded in number of items rather than metric tons.

Import volumes for nearly all aluminum segments (with the exception of derivative aluminum articles) fell since section 232 tariffs went into effect (table 4.3). Figure 4.8 shows that, overall, less than 60.0 percent of aluminum imports were subject to tariffs under sections 232 or 301 since 2018, and the share of imports subject to the tariffs within each segment, other than derivative aluminum articles, has also decreased.[279] The same pattern can be observed in import values. Although section 232 covers nearly all aluminum products, major sources of imported aluminum such as Canada, Mexico, and EU countries have been either exempted completely or subject to quotas, and these exemptions have grown over time.[280] Product exclusions also account for some of the decreasing tariff coverage in many cases, but the largest share of the decrease in coverage is due to country exemptions. In addition, because of the prevalence of contracts and purchase orders that fix sourcing decisions in the short term, domestic purchasers were more likely able to shift sourcing to exempted countries in later years. For example, Canada, which became exempt from section 232 tariffs in May 2019, accounted for 69.7 percent of U.S. imports of unwrought aluminum in 2021. The same pattern can be observed for wrought products where Canada and Mexico (which also became exempt in May 2019) are among the top five import sources for several wrought products such as bars, rods, and profiles and pipe, tube, and fittings. Argentina, which is exempt from the tariffs but subject to quotas, is also a top source of wire imports.[281]

[279] Imports of derivative aluminum articles do not follow the same trend as other aluminum imports. Section 232 tariffs on these articles did not go into effect until nearly two years later, in February 2020. As of yet, no mechanism exists to apply for tariff exclusions for imports of derivative aluminum articles.

Figure 4.8 Share of the quantity of U.S. aluminum imports subject to tariffs under sections 232 and 301, by product type and year, 2016–21

In percentages. mt = measured in metric tons; no. = measured in number of items. Underlying data for this figure can be found in appendix E, tables E.20 through E.24.



Source: USITC DataWeb/Census, accessed August 16, 2022.

Production

As discussed above, in the United States, wrought production is the largest of the three production segments, followed by secondary unwrought production. Many producing firms make up both wrought and secondary unwrought domestic production. Primary unwrought production, the smallest segment, comprises only three producers who operated six smelters in 2021.[282]

Table 4.4 U.S. aluminum production by segment, by year, 2016–21

Production in thousand metric tons.

Type	2016	2017	2018	2019	2020	2021
Primary unwrought production	818	741	897	1,126	1,027	908
Secondary unwrought production	4,244	4,464	4,298	4,535	4,715	4,976
Total unwrought production	5,062	5,205	5,195	5,661	5,742	5,884
Wrought production	8,022	7,792	8,888	8,799	7,896	8,995

Source: The Aluminum Association, email message to USITC staff, November 2, 2022; Refinitiv World Bureau of Metal Statistics, 2022 Yearbook, 2022.
Note: Wrought production may be underreported as it does not include aluminum castings.

[282] USGS, *Mineral Commodity Summaries 2022: Aluminum*, January 2022.

Primary Unwrought Production

Primary unwrought aluminum production is capital intensive, with high fixed costs and continuous production cycles, i.e., 24 hours a day, 7 days a week. As a result, during periods of weak demand or low aluminum prices, firms may select individual production lines (potlines) to either operate at near capacity or shut down completely, rather than run them at reduced capacity. Primary unwrought production is also energy intensive and, therefore, highly reliant on affordable electricity.[283]

Table 4.5 U.S. aluminum primary production, smelter capacity and capacity utilization, by year, 2016–21

Production and year-end capacity in thousand metric tons. Capacity utilization in percentages.

Type	2016	2017	2018	2019	2020	2021
Primary unwrought production	818	741	897	1,126	1,027	908
Primary smelter year-end capacity	2,000	1,830	1,790	1,790	1,790	1,640
Smelter capacity utilization (%)	40.9	40.5	50.1	62.9	57.4	55.4

Source: The Aluminum Association, email message to USITC staff, November 2, 2022; USGS Mineral Commodity Summaries, 2016–22.
Note: Smelter capacity utilization calculated as primary unwrought production divided by primary smelter year-end capacity. This may be slightly overreported or underreported depending on capacity changes throughout the year.

Primary unwrought production and smelter capacity utilization began increasing in 2018, when section 232 tariffs went into effect (table 4.5). Century Aluminum, a primary unwrought producer, claims it invested more than $160 million to restart several idled production lines at both its smelters in Mount Holly, South Carolina, and Hawesville, Kentucky, and expanded billet production at a third smelter right after the tariffs were imposed.[284] That same year, Alcoa also ramped up production to reach full capacity at its smelter in Evansville, Indiana, and Magnitude 7 Metals restarted 100,000 metric tons per year of capacity at its smelter in New Madrid, Missouri. However, overall U.S. capacity decreased in 2018 as a result of the permanent shutdown of 38,000 metric tons per year of capacity at Alcoa's smelter in Wenatchee, Washington.[285]

Production and capacity utilization growth continued into 2019; that same year, in September, additional section 301 tariffs were imposed on unwrought imports. Production fell incrementally in 2020, coinciding with reduced demand during the initial COVID-19 outbreak,[286] and then decreased again—more significantly—in 2021. According to industry representatives, despite rising demand and prices for unwrought aluminum in 2021, U.S. primary aluminum producers also faced high energy costs, which likely led to decreased production.[287] This issue has continued to impact domestic production in 2022, with Century Aluminum announcing in July that it would temporarily idle its smelter in Hawesville, Kentucky, because of "soaring energy prices."[288]

[283] USITC, *Aluminum: Competitive Conditions Affecting the U.S. Industry*, June 2017, 54–55.
[284] USITC, hearing transcript, July 20, 2022, 11 (testimony of Matt Aboud, Century Aluminum).
[285] USGS, *2018 Minerals Yearbook: Aluminum*, August 2021, 5.3.
[286] USGS, *Mineral Commodity Summaries 2021: Aluminum*, January 2021. It is possible that Canada's reinstated exemption from the tariffs in mid-2019 also led to decreased demand for domestically produced aluminum in 2020.
[287] Industry representative, email message to USITC staff, September 15, 2022. See also, USITC, hearing transcript, July 20, 2022, 55 (testimony of Jeffrey Henderson, Aluminum Extruders Council).
[288] Century Aluminum, "Century Aluminum to Temporarily Idle Hawesville Smelter," June 22, 2022. See also, USITC, hearing transcript, July 20, 2022, 12 (testimony of Matt Aboud, Century Aluminum).

Secondary Unwrought Production

Secondary unwrought production is far less capital and energy intensive and has lower fixed costs than primary production. Competitiveness in the secondary aluminum segment is reliant on access to cheap and reliable scrap supplies.[289]

Secondary unwrought production, which was increasing before the tariffs, saw decreased production in 2018 followed by three consecutive years of increasing production from 2019 through 2021 (table 4.4). According to industry representatives, demand for secondary aluminum is growing rapidly because of a rising consumer interest in "greener" products and recycled content. Secondary production is cheaper and also helps firms meet commitments to reduce their carbon footprints.[290] In addition, original equipment manufacturers (OEMS) and other consumers of aluminum are interested in closed-loop production systems in which their scrap can be sold back to the aluminum firms they purchase from.[291] In October 2019, Novelis broke ground in Greensboro, Georgia, for a $36 million expansion of its recycling plant to meet this increased demand.[292] Additional investments in secondary production are expected to come online in 2023 and 2024.[293]

Wrought Production

Wrought aluminum includes a wide variety of products, some of which compete according to quality or performance differentiations while others are more standardized and compete largely on price. In general, wrought production is less capital intensive and has lower fixed costs than primary production. However, costs are highly dependent on the cost and availability of unwrought aluminum inputs. Proximity to end users and the ability to produce high-value-added and differentiated products are also major factors of competitiveness for domestic wrought producers.[294]

Domestic wrought production saw a 14.1 percent increase between 2017 and 2018, and, aside from a dip in 2020, production has remained fairly level (table 4.4). Wrought producers note that, although section 232 tariffs have been beneficial, they have had limited impacts on production, which is mainly driven by demand trends in downstream consuming industries. In addition, these producers claim that the various exclusions on imports of wrought aluminum have made similar domestic products less competitive.[295] However, as noted in the sections below, significant investments in new production capacity for wrought product indicate U.S. production will likely increase in the coming years.

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[289] USITC, *Aluminum: Competitive Conditions Affecting the U.S. Industry*, June 2017, 53.
[290] Industry representatives, interviews with USITC staff, June 15 and October 6, 2022, and email message to USITC staff, October 24, 2022. See also, USITC, hearing transcript, July 20, 2022, 90 (testimony of Charles Johnson, Aluminum Association).
[291] Industry representatives, interview with USITC staff, October 6, 2022.
[292] Novelis, "Novelis Invests $36 Million to Expand, Upgrade Aluminum Recycling Capabilities," October 30, 2019.
[293] Hydro Aluminium, "Hydro on Track to Build New State-of-the-Art Recycling Plant," November 18, 2021; Gränges, "Gränges to Enable Near-Zero Aluminium Solutions by USD 52 Million Investment in Expanded Recycling and Casting Centre," April 13, 2022.
[294] USITC, *Aluminum: Competitive Conditions Affecting the U.S. Industry*, June 2017, 55, 105–7.
[295] Because wrought imports do not include the Midwest premium in their prices, they see a significant price advantage over domestic products when excluded from the additional tariffs. Industry representatives, interview by USITC staff, October 6, 2022. See Prices section on the following page for additional details.

Additional Restarts and Investments

According to industry representatives, restarting capacity or investing in new capacity requires a sustained period of improved market conditions and stability. Therefore, it is often a lengthy process in which increased production may not be seen for several years. In addition, industry representatives claim that uncertainty about how long section 232 tariffs would remain in effect contributed to slower response times in terms of investing and increasing capacity.[296] Numerous capacity investments have been made or announced since the imposition of the tariffs and are expected to come online in the near future.

According to the Aluminum Association, its members have announced approximately $5.2 billion worth of domestic investments since 2018, including $3.5 billion between August 2021 and August 2022. The association claims that this $3.5 billion amount is greater than total investments over the prior 10 years.[297] Although many of these investments focus on expanding capacity in the secondary unwrought and wrought segments, the primary segment has seen small developments as well. For example, a coalition of environmental groups and labor unions, backed by Blue Wolf Capital Partners, has been in negotiations to reopen Intalco Works (Ferndale, Washington), a primary smelter formerly owned by Alcoa. The smelter would focus on producing low carbon-emission aluminum.[298] In addition, the domestic aluminum industry is also investing in research and development for lower carbon-emitting production processes and in expanded recycling capacity.[299]

Prices

Unwrought aluminum pricing is typically based on trading prices at the London Metal Exchange (LME), a metal futures trading market. The LME price acts as a global reference price, but major consuming regions also often have regional premiums that are added on top of the LME price. One example of this is the Midwest Premium, which serves as the benchmark price for unwrought aluminum in the Midwest United States. U.S. purchasers of both domestic and imported unwrought aluminum pay the Midwest premium. Therefore, a higher Midwest premium benefits domestic unwrought producers because it allows them to charge a higher price for their products without increasing the competitiveness of imports.

Wrought products have a slightly different price structure. They include a conversion premium, which accounts for producers' costs to convert the unwrought aluminum into a wrought product. Prices for domestically produced wrought products include the Midwest premium, while wrought imports do not include the Midwest premium. Thus, when the Midwest premium for unwrought aluminum is far above the global LME price, domestic wrought production incurs higher input costs. According to industry analysts, the additional tariffs on imported wrought products do not fully offset the higher domestic

[296] USITC, hearing transcript, July 20, 2022, 12, 88–89 (testimony of Matt Aboud, Century Aluminum); industry representative, interview by USITC staff, July 11, 2022.
[297] Aluminum Association, written submission to the USITC, August 12, 2022, 2–3.
[298] Bernton, "Will Federal Climate Legislation Help Reopen a WA Aluminum Plant?," August 17, 2022.
[299] Aluminum Association, written submission to the USITC, August 12, 2022, 2–3.

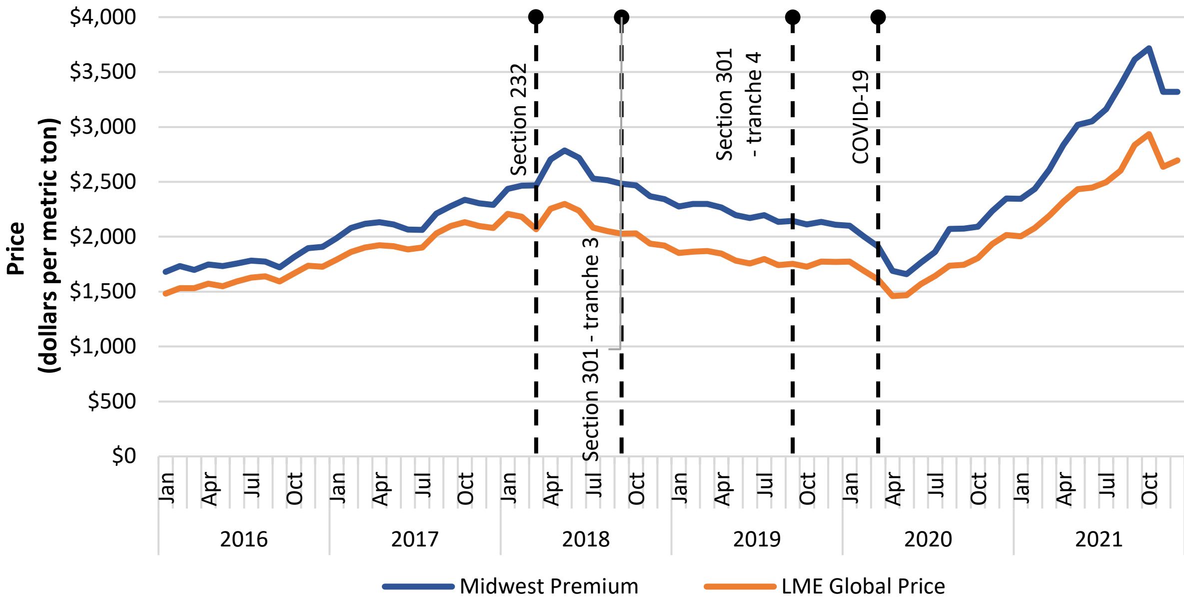
prices. The price difference is even greater for products that have been granted an exclusion from the additional tariffs.[300]

Aluminum prices spiked to a seven-year high in May 2018, shortly after the imposition of section 232 tariffs. This spike also coincided with U.S. sanctions on Rusal, one of the world's largest aluminum producers, which were announced in April 2018.[301] Between June 2018 and December 2019, prices fell steadily, then decreased more sharply in 2020 as COVID-19 pandemic-related shutdowns and production curtailments began to occur in China and later in the rest of the world.[302] Prices began increasing again in June 2020 and reached a 13-year high in October 2021.[303] The effects of the COVID-19 pandemic (and related supply disruptions and demand recovery), along with the global spike in energy prices, were significant factors affecting prices in the aluminum industry, challenging efforts to pinpoint the effects of the additional tariffs during this period. However, as seen in figure 4.9, the gap between U.S. prices and global prices widened following the implementation of the additional tariffs and remained that way through most of the period.

[300] Industry representatives, interview with USITC staff, October 6, 2022.
[301] Imbert, "Aluminum Prices Surge to Highest Level Since 2011," April 16, 2018. Rusal was placed on the Specially Designated Nationals and Blocked Persons List pursuant to Executive Orders 13661 and 13662 for being owned or controlled by EN+ GROUP PLC, which was determined to be subject to Executive Orders 13661 and 13662. These orders placed sanctions on persons or entities contributing to the situation in Ukraine. 83 Fed. Reg. 19138 (May 1, 2018); Exec. Order No. 13661, 79 Fed. Reg. 15533 (March 19, 2014); Exec. Order No. 13662, 79 Fed. Reg. 16167 (March 24, 2014).
[302] According to news sources, the steady fall in prices through 2019 is largely attributed to a global economic slowdown causing weakened demand and expectations that supply from China would continue growing. Trefis, "Aluminum Prices: 15-Year Price Analysis," accessed September 27, 2022; AlCircle, "Recap 2019: Slow Demand and Price Downtrend Crippled Primary Aluminium Sector," December 18, 2019.
[303] Fastmarkets, Aluminum P1020A all-in price, delivered Midwest US, US cents/lb, accessed July 27, 2022; World Bank, Commodity Price Data (The Pink Sheet), accessed July 27, 2022.

Figure 4.9 Average monthly U.S. and global prices for primary unwrought aluminum, by year and month, 2016–21

In U.S. dollars per metric ton. Underlying data for this figure can be found in appendix E, table E.25.



Source: Fastmarkets, Aluminum P1020A all-in price, delivered Midwest US, US cents/lb, accessed July 27, 2022; World Bank, Commodity Price Data (The Pink Sheet), accessed July 27, 2022.

Consumption and Downstream Industries

Although aluminum is used in a wide variety of industries and applications, the transportation, construction, and packaging sectors accounted for the largest share of domestic aluminum consumption during 2016–21.[304] Other major consuming industries included electrical, consumer durables, and machinery.[305] Some industries do not consume a significant share of aluminum by volume, but aluminum makes up a large share of their production costs. These industries include soft drink and ice manufacturing, for which aluminum accounts for 18.4 percent of the cost of production; metal can, box, and other metal container (light gauge) manufacturing (46.5 percent); and household nonupholstered furniture (14.3 percent).[306] The section below describes some of the largest aluminum-consuming industries and factors affecting demand for aluminum in these industries in recent years. As demonstrated in chapter 5, these downstream consuming industries are also likely to be impacted by additional tariffs on steel and aluminum.

[304] USGS, *Mineral Commodity Summaries 2022: Aluminum*, January 2022. According to hearing testimony from one industry representative, all three of these sectors have historically been predominantly served by the U.S. market and have been increasing demand for domestically produced aluminum in recent years. USITC hearing transcript, July 20, 2022, 44,77 (testimony of Charles Johnson, Aluminum Association).

[305] USGS, *Mineral Commodity Summaries 2017–22: Aluminum*.

[306] USITC calculations using the Bureau of Economic Analysis' (BEA's) 2012 Use Table and 2012 Import Matrix. For more information, see chapter 5.

Transportation: Transportation accounted for 35 percent of domestic aluminum consumption in 2021.[307] Aluminum is used in several transportation applications, including truck and vehicle bodies, engines, wiring, aerospace bodies and parts, and railway freight cars. In recent years, demand for aluminum in the transportation industry has increased, particularly in vehicles, because it serves as a lightweight alternative to steel. The lighter weight allows for several performance improvements, including improved fuel economy (or longer range for electric cars) and lower emissions.[308] The share of aluminum inputs in motor vehicles has increased; however, overall domestic motor vehicle production has decreased since 2018 and declined significantly in 2020 because of pandemic-related closures.[309] According to one industry representative, shipments from wrought aluminum producers to auto producers saw a large decrease in mid-2020 as a result of these closures.[310]

Representatives from the transportation sector have had mixed opinions on the impacts of additional tariffs on aluminum. Boeing suggested that despite the high value and volume of aluminum inputs in aircrafts, the tariffs would have “little to no discernable effect on major suppliers”.[311] According to the Motor & Equipment Manufacturer’s Association, the removal of tariffs and the imposition of tariff-rate quotas on imports from EU countries, the UK, and Japan under Section 232 have been beneficial to the automotive industry in recent years.[312]

Construction: Aluminum’s high strength-to-weight ratio, airtightness, and durability are among the characteristics that make it suitable for a variety of construction applications, including architectural and window frames, doors, siding, air conditioning systems, and solar protection. During 2016–21, annual construction spending increased by 32.9 percent, likely increasing demand for aluminum from this sector.[313] One industry representative claimed that, although some commercial construction projects stopped in early 2020 because of COVID-19 pandemic, the pandemic actually boosted aluminum demand in the construction sector as a result of growth in housing market demand and an increase in home renovations.[314]

Packaging: Aluminum’s physical and chemical properties allow it to maintain food temperatures and protect food from light, liquid, and bacteria. In addition, aluminum beverage containers are lower carbon-emitting than glass beverage containers and are more recyclable than plastic beverage containers. Rising consumer interest in “greener” packaging in recent years—as well as the growing popularity of craft beers, hard seltzers, and other beverages increasingly being offered in cans—has significantly increased demand for aluminum in the packaging industry.[315] According to one industry

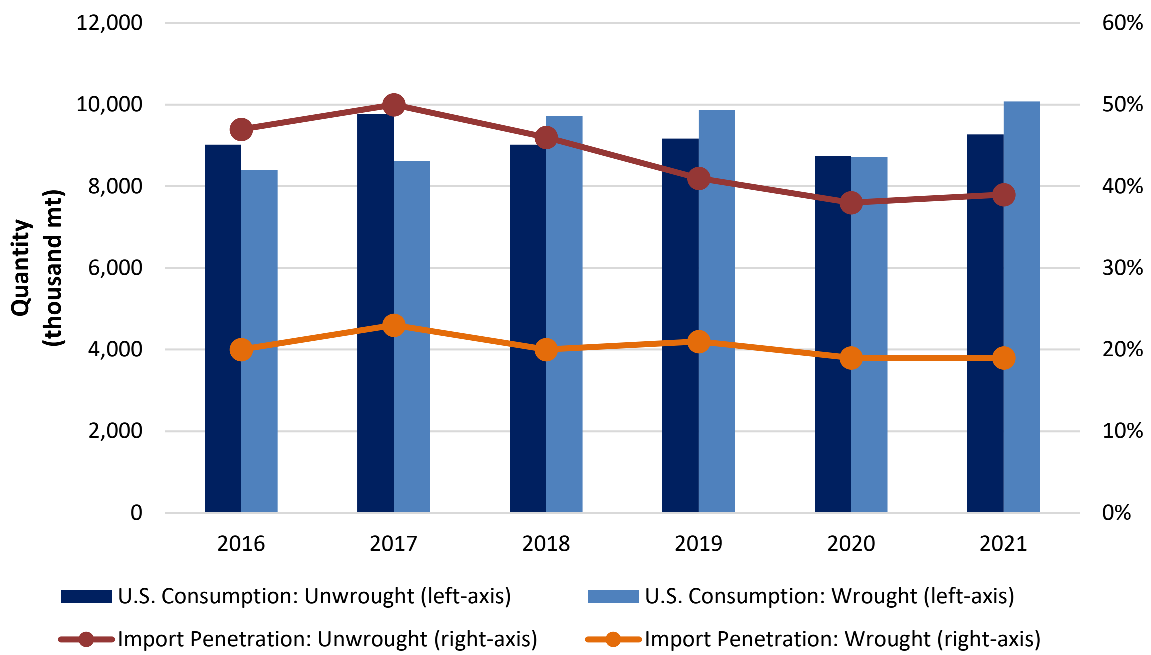
[307] USGS, *Mineral Commodity Summaries 2022: Aluminum*, January 2022.
[308] Montijo, “Aluminum in Cars,” July 7, 2021.
[309] OICA, “Motor Vehicle Production Statistics,” accessed November 3, 2022.
[310] Industry representative, interview with USITC staff, October 6, 2022.
[311] Leeham News, “Insignificant Impact on Boeing from Aluminum Tariff,” March 2, 2018.
[312] USITC, hearing transcript, July 21, 2022, 182 (testimony of Bill Frymoyer, MEMA). While most hearing testimony from automotive representatives focused on the increasing costs of steel inputs, it is likely that the costs of some aluminum inputs have also increased. See chapter 5.
[313] Census, “Annual Rate for Total Construction Spending, 2016–21, Seasonally Adjusted,” accessed September 30, 2022.
[314] Industry representative, interview with USITC staff, October 6, 2022.
[315] USITC, *Trade Shifts 2021: The 2021 Commodity Price Surge*, June 2022.

representative, section 232 tariffs have raised production costs and inhibited investment in the beer industry as a result of the high cost of aluminum packaging.[316]

Apparent U.S. consumption of aluminum has increased overall since 2017, although consumption of unwrought aluminum decreased slightly over the period. At the same time, import penetration of both wrought and unwrought aluminum has decreased compared to 2017 (figure 4.10). Supply and demand shifts in downstream consuming industries are the main reason for changes in consumption.

Figure 4.10 U.S. apparent consumption and import penetration of unwrought and wrought aluminum, by year, 2016–21

In thousand metric tons and percentages. Underlying data for this figure can be found in appendix E, table E.26.



Source: The Aluminum Association, Refinitiv World Bureau of Metal Statistics, 2022 Yearbook; USITC DataWeb/Census, accessed September 9, 2022.
Notes: Apparent consumption is calculated as production plus imports minus exports. Import penetration is calculated as imports divided by consumption. Unwrought aluminum is composed of imports and exports in HTS heading 7601. Wrought aluminum is composed of imports and exports in HTS headings 7604, 7605, 7606, 7607, 7608, 7609, and HTS statistical reporting numbers 7616.99.5160 and 7616.99.5170.

While literature and hearing testimony on section 232 tariffs tended to focus on impacts to the aluminum industry and downstream consumers, the aforementioned changes in production and import penetration are also likely to have positive impacts on domestic demand for upstream materials used to make aluminum products. However, it is difficult to discern the isolated impact of the tariffs, owing to a major shift in production technology. The major raw materials used in the production of aluminum are bauxite, which is refined into alumina to produce primary aluminum, and aluminum scrap and waste, which are used to produce secondary aluminum. The United States does not produce a significant volume of bauxite. However, domestically refined alumina accounted for approximately 43.3 percent of apparent consumption in 2021. Domestic alumina production has been declining since 2018, with one

[316] USITC, hearing transcript, July 20, 2022, 31 (testimony of Mary Jane Saunders, The Beer Institute).

refinery closing in 2020.[317] The United States is a major producer of aluminum scrap, supplying the vast majority of domestic consumption as well as significant exports.[318] In the United States, aluminum scrap is typically processed by the aluminum producers themselves, so they are easily able to translate increased demand for aluminum into increased production of upstream inputs. Although public data on domestic scrap recovery are not available, several investments have been made in expanding scrap collection and recycling since the implementation of the additional tariffs.[319] In recent years, the aluminum industry has shifted to increasing production of secondary aluminum, which is likely a major reason for increasing scrap investment and decreasing alumina production.

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[317] USGS, *Mineral Commodity Summaries 2021: Bauxite and Alumina,* January 2021; USGS, *Mineral Commodity Summaries 2022: Bauxite and Alumina,* January 2022.
[318] USGS, *Mineral Commodity Summaries 2022: Aluminum*, January 2022.
[319] Aluminum Association, written submission to the USITC, August 12, 2022, 2–3.

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Chapter 5
Economic Effects of Section 232 Tariffs on Trade, Production, and Prices in Most-Affected Industries

This chapter provides a modeling-based quantitative analysis of the economic impacts of section 232 tariffs on U.S. trade, production, and prices for the industries directly and most affected. This analysis estimates the economic effects of section 232 tariffs in place in each year modeled from 2018 to 2021.[320] To estimate the economic effects of section 232 tariffs on the U.S. steel industry, U.S. aluminum industry, and most-affected downstream industries, the analysis employs a customized partial equilibrium model of the U.S. market. The model has both primary industries and downstream industries, defined using the North American Industry Classification System (NAICS), where primary industries include the U.S. steel- and aluminum-producing industries and downstream industries include user U.S. industries whose total steel or aluminum cost shares were greater than 5 percent.

Overview of Key Findings

- The increase in tariffs on steel (25 percent) and aluminum (10 percent) imports increased the relative price of imports and led consumers of steel and aluminum to increase sourcing from domestic suppliers. This increase in demand for domestic steel and aluminum resulted in higher prices of steel and aluminum and an expansion of domestic production. However, higher prices of steel and aluminum translated into higher costs for production inputs for downstream industries.
- From 2018 to 2021, section 232 tariffs are estimated to have increased the price of domestically produced steel by about 0.7 percent, on average, and increased the quantity of steel production by about 1.9 percent. During the same time period, section 232 tariffs are estimated to have increased the price of domestically produced aluminum by 0.9 percent, on average, and increased the quantity of domestic production by about 3.6 percent. The increases in production quantity in the steel and aluminum industries translated to an increase of about $2.25 billion in 2021 for these industries combined.
- The increases in the prices of imported steel and domestically produced steel led to a weighted-average steel price increase of about 2.4 percent. The increases in the prices of imported aluminum and domestically produced aluminum led to a weighted-average aluminum price increase of about 1.6 percent.
- The economic effects on downstream industries were all negative but varied in magnitude across industries. In 2021, the top three downstream industries most negatively affected by

[320] Because of insufficient data for 2022, the analysis does not estimate the effects of the tariffs in 2022. Also, as described in chapter 1, this analysis does not directly assess the effect of import volumes being constrained by the quotas and TRQs.

section 232 steel and aluminum tariffs, in terms of percentage decline in the quantity of their downstream domestic production, were Industrial Machine Manufacturing (NAICS 3332); Cutlery and Handtool Manufacturing (NAICS 3322); and Motor Vehicle Steering, Suspension Components, and Brake Systems (NAICS 336330 and 336340).

- In terms of the decline in the absolute dollar value of their downstream domestic production, the downstream industries experienced a decline of about $3.48 billion in 2021 because of the steel and aluminum tariffs. The top three industries most negatively affected by section 232 steel and aluminum tariffs were Other General Purpose Machinery (NAICS 3339); Agricultural, Mining, and Construction Machinery Manufacturing (NAICS 3331); and Other Fabricated Metal Products (NAICS 3329).
- Additionally, the steel and aluminum tariffs on imports were estimated to have shifted some sourcing of inputs from imports to domestically produced products. The top three industries that shifted steel sourcing in 2021, by value, were Architectural and Structural Metals Manufacturing (NAICS 3323); Agriculture, Construction, and Mining Machinery Manufacturing (NAICS 3331); and Other General Purpose Machinery (NAICS 3339). The top three industries that increased their domestic aluminum sourcing in 2021, by value, were Boiler, Tank, and Shipping Container Manufacturing (NAICS 3324); Soft Drink Manufacturing (NAICS 312110); and Architectural and Structural Metals (NAICS 3323).

Description of the Analytical Approach

The steel and aluminum model developed for this analysis is a multi-industry partial equilibrium model of the U.S. market that is calibrated to available data.[321] The benefit of constructing a structural model to analyze the impacts of section 232 tariffs is that the model can isolate the effect of this policy from other market changes. In contrast, analysis of trade data alone, without the aid of a structural model, cannot distinguish the effects of section 232 tariffs from the combined effects of other industry changes, such as rising global energy costs, section 301 tariff effects, changes in AD/CVD orders, Russia's invasion of Ukraine, and the COVID-19 pandemic. A partial equilibrium framework can be customized to fit the unique details of an industry using available data and estimate the direct effects of a specific policy.

The model has two primary industries and many downstream industries. The primary industries include a detailed representation of both the U.S. steel and U.S. aluminum industries. Domestic production of steel and aluminum, along with imports, flows to a number of downstream industries that consume steel or aluminum intensively. The primary and downstream industries are linked, so a change in costs in the primary industry, such as an increase in tariffs, will affect the downstream industries as a cost of production. Downstream domestic industries use a combination of U.S. steel, imported steel, U.S. aluminum, imported aluminum, and all other production inputs. Imported steel and aluminum are disaggregated into those products that are subject to section 232 tariffs and those that are not.[322]

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[321] Note that this model was developed specifically for this report and has not been used in any past Commission factfinding reports. The model has similar elements to modeling analyses in other Commission studies, but the design is specific to this analysis.

[322] As described in the data inputs section, imports that received exclusions from 232 tariffs are included in the non-subject import group. Therefore, the impact of the tariffs on production, prices, and imports factors exclusions into the analysis.

U.S. industries are included in the downstream segment of the model if their total steel or aluminum cost shares of production were higher than 5 percent in 2012,[323] indicating that the industry uses these products intensively.[324] Examples of these industries include Motor Vehicle Metal Stamping; Other Motor Vehicle Parts industries; Architectural and Structural Metals manufacturing; Spring and Wire manufacturing; and Boiler, Tank, and Shipping Container manufacturing. Some additional industries, such as Aircraft Manufacturing, had cost shares below 5 percent but were included in the model because they were identified in the hearing and through Commission research as substantial users of steel or aluminum inputs.[325] Most downstream industries are defined at the NAICS 4-digit industry group level; however, some industries are defined at the NAICS 6-digit level to capture additional detail about certain most-affected industries. Table 5.1 lists all 33 downstream industries in the model.

[323] As discussed below, 2012 data were the latest available at the time of writing.
[324] Russ and Cox, "Will Steel Tariffs Put U.S. Jobs at Risk?," February 26, 2018.
[325] USITC, hearing transcript, July 20, 2022, 123 (testimony of Dan Walker, Industrial Fasteners Institute).

Table 5.1 Downstream industries analyzed in the model

NAICS code	Industry name
2110	Oil and Gas Extraction
312110	Soft Drink Manufacturing
3149	Other Textile Product Mills
3322	Cutlery and Handtool Manufacturing
3323	Architectural and Structural Metals
3324	Boiler, Tank, and Shipping Containers
3325	Hardware
3326	Springs and Wires
3327	Machine Shop Turned Product and Screws, Nuts, and Bolts
3328	Coating, Engraving, Heat Treating, and Allied Activities
3329	Other Fabricated Metal Products
3331	Agriculture, Construction, and Mining Machinery
3332	Industrial Machines
3334	Ventilation, Heating, Air-conditioning, and Commercial Refrigeration Equipment
3335	Metalworking Machinery
3336	Engines and Turbines
3339	Other General Purpose Machinery
3351	Electric Lighting Equipment
3352	Household Appliances
3353	Electrical Equipment
3359	Other Electrical Equipment and Components
336212	Truck Trailers
336214	Travel Trailers and Campers
336350	Motor Vehicle Transmission and Power Train Parts
336370	Motor Vehicle Metal Stamping
336390	Other Motor Vehicle Parts
336330, 336340	Motor Vehicle Steering, Suspension, and Brake Systems Manufacturing
336411	Aircraft Manufacturing
3365	Railroad Rolling Stock
3366	Ships and Boats
3369	Other Transportation Equipment
3372	Office Furniture
3399	Other Miscellaneous Manufacturing

Source: USITC compiled.

To generate accurate and realistic economic effect estimates, the model is designed as follows. First, the elasticity of substitution model parameters are econometrically estimated using a panel of U.S. import data (see data inputs section below). Then, the model is calibrated to actual production and import data from 2018 to 2021, a period that captures economic outcomes that are inclusive of section 232 tariffs. The model takes the econometrically estimated parameters and actual production and import data as inputs to set up the equations. Then, the model simulation estimates what prices and quantities would have looked like if section 232 tariffs were not in place for each year from 2018 to 2021.[326] Then, the estimated economic effects are calculated and reported as the effects of the tariffs, comparing actual market outcomes with the simulated counterfactual. The steel and aluminum tariffs are changed

[326] This analysis estimates the economic effects of actual section 232 tariffs in place in each year modeled from 2018 to 2021. Because of insufficient data for 2022, the analysis does not estimate the effects of the tariffs in 2022.

concurrently to simulate their combined effect, capturing spillover effects across industries that consume both steel and aluminum. Additional details about the modeling approach can be found in the technical modeling appendix.

The degree to which the tariffs pass-through from foreign producers into U.S. prices is an important question and a key element impacting the model's results. This model includes two types of pass-through that can be measured. First, the tariffs can pass through at the point of entry into U.S import prices of steel and aluminum. The second point of pass-through occurs in the downstream consumer prices, after the steel or aluminum has been used in the production of the downstream products. Pass-through at the point of entry in this model is largely a function of the estimated demand and supply elasticities.[327] The second point of pass-through into downstream consumer prices in this model is largely a function of the cost shares of steel and aluminum used in downstream production.

Data Inputs

The model is calibrated to data from several sources. U.S. imports and exports data for 2018–21 were obtained from USITC DataWeb.[328] Imports were disaggregated into covered and non-covered groups, depending on whether a duty was paid. Imported steel and aluminum products that were subject to a section 232 tariff and paid a duty were included in the subject group. Meanwhile, imports of these products that did not pay an additional duty—such as those subject to product exclusions, country exemptions, or were within quota limits—were included in the non-covered group.[329] The use of steel and aluminum by downstream industries, from both foreign and domestic sources, was calculated using the Bureau of Economic Analysis (BEA) 2012 Use Table and 2012 Import Matrix.[330] Domestic production data for 2018–20 were obtained from the U.S. Census Annual Survey of Manufactures (ASM 2020) or estimated by the Commission's industry analysts using available production data from industry sources,

[327] See "Data Inputs" section below for more details.
[328] USITC, "DataWeb/Census," accessed September 28, 2022.
[329] Chapter 99 of the HTS provides for products for which temporary tariff modifications apply pursuant to trade legislation such as sections 232 and 301, among other provisions. U.S. Census rate provision codes 69 and 79 indicate which imports enter as "dutiable at rates prescribed in Rates of Duty columns of HTS chapter 99" and therefore apply to imports subject to tariffs under sections 232 and 301. Covered imports therefore were limited to imports recorded under these rate provision codes. Goods entering under an exclusion, quota, or TRQ would generally not be dutiable at rates prescribed in HTS chapter 99 and therefore are not recorded under rate provision codes 69 and 79. Those imports are factored into the non-covered group. However, between 2018 and 2021, rate provision codes 69 and 79 do apply to a small share of imports of aluminum from Argentina that are subject to a quota under section 232. Imports of aluminum from Argentina comprise less than 1 percent of total imports subject to section 232 tariffs, depending on the year. Additionally, a small subset of goods may enter under dutiable rates that are prescribed in chapter 99 related to measures other than the 232 and 301 tariffs and therefore may be recorded as imports under rate provision codes 69 and 79. For more information on this approach, see chapter 1.
[330] BEA, "Input-Output Accounts Data," accessed October 17, 2022. For a detailed explanation on how the downstream industry use shares of semifinished steel, unwrought aluminum, and aluminum and steel mill products were calculated, see technical appendix F.

if not available from the ASM.[331] Domestic exports were subtracted from domestic production data to isolate U.S. apparent consumption of domestic supply in a given year.

The elasticity of substitution between foreign and domestically sourced varieties is estimated for both primary and downstream products using variation in international trade costs, such as freight costs and tariffs, and a panel of U.S. import values from 2016 to 2021 obtained from DataWeb.[332] Additionally, each downstream industry has a separate elasticity of substitution estimate at the NAICS 4-digit and 6-digit product levels. Primary industry import supply elasticities were calibrated to the steel- and aluminum-specific pass-through results in the chapter 6 econometric analysis.[333] Finally, domestic supply elasticities for steel and aluminum were estimated using information from Commission staff reports of recent AD/CVD investigations, as well as available capacity utilization data.[334]

Model Limitations

With respect to the share of primary steel and aluminum inputs used by the 33 downstream industries, the Commission relies on the 2012 BEA Use Table and Import Matrix to estimate these values (shares) from both domestic and foreign sources. However, because the latest available year for these data is 2012, it is possible that the data are not reflective of current aluminum and steel use in one or more downstream industries. To mitigate this limitation, the steel and aluminum input shares were reviewed by Commission industry analysts and updated using available industry information.[335]

Additionally, the covered imports used in the model are steel and aluminum articles imported under chapter 99 for which duties were paid, in which one or more of the provisions in chapters 1 through 98 are temporarily amended or modified. This includes imports subject to section 232 tariffs, section 301

[331] Census, "Annual Survey of Manufactures," accessed October 17, 2022. Production data in the ASM are available only up to 2020. The production data for 2020 are used in both the 2020 and 2021 estimates and adjusted as required by industry analysts. Production values for 2021 were adjusted using available industry data sources, for example using monthly spot prices for crude to estimate production in the oil and gas extraction industry.
[332] Svendsen, "Aluminum Continues Unprecedented Growth in Automotive Applications," October 20, 2020. More information about the econometric model used to estimate the elasticity of substitution for each product can be found in technical appendix F.
[333] The section 301 modeling analysis in chapter 6 found nearly 100 percent pass-through of the tariffs into U.S. import prices for the steel and aluminum industries. This finding was estimating using tariff changes under both sections 232 and 301, so it can be appropriately used to describe how importers pass both sets of tariffs through to U.S. prices during the investigation windows. This finding is used in the section 232 modeling analysis to calibrate the steel and aluminum import supply elasticities. In other words, the import supply elasticities were chosen such that nearly 100 percent of the tariff passed through into steel and aluminum import prices. See appendix F for additional details.
[334] USITC, *Cut-to-Length Carbon-Quality Steel Plate from India, Indonesia, Italy, Japan, and Korea*, December 2011; USITC, *Hot-Rolled Flat-Rolled Carbon-Quality Steel Products from Brazil, Japan, and Russia*, June 2011; USITC, *Certain Hot-Rolled Steel Flat Products from Australia, Brazil, Japan, Korea, the Netherlands, Turkey, and the United Kingdom*, July 2016; USITC, *Cold-Rolled Steel Flat Products from China and Japan*, July 2016; Bown and Russ, "Biden and Europe Remove Trump's Steel and Aluminum Tariffs, but It's Not Free Trade," November 11, 2021.
[335] For example, the use of steel and aluminum inputs by the motor vehicle industry has changed substantially. Since 2012, the industry has significantly increased its use of aluminum as demand for lighter-weight materials, among other factors, has increased. Svendsen, "Aluminum Continues Unprecedented Growth in Automotive Applications," October 20, 2020.

tariffs, and other temporary modifications.[336] For U.S. imports of steel and aluminum imported under chapter 99, the majority are assumed to be subject to section 232 tariffs. However, these data may include values imported under other tariff actions, such as section 301 tariffs in the case of steel and aluminum imports from China. It is assumed that the value of these imports of steel and aluminum not subject to section 232 tariffs is small. The model estimates the direct economic effects of tariffs on semifinished steel, steel mill products (also known as finished steel products), unwrought aluminum, and aluminum mill products (also known as wrought aluminum products), but it does not assess the economic effects on the group of derivative products defined in the tariff declaration that are also subject to section 232 tariffs.[337] Derivative products were not modeled because they are narrowly defined and would require significantly more disaggregated data, which were not available. The defined derivative products represent a small share of total imports of all steel and aluminum products subject to section 232 tariffs. In 2021, for example, the share of derivative product imports of total imports was 2.3 percent for steel and 2.7 percent for aluminum by value.[338] In addition, the model does not assess the economic effects on upstream raw materials used to produce steel and aluminum. Major raw materials used in the production of steel and aluminum include iron ore, steel scrap, bauxite, alumina, and aluminum scrap. For more information on upstream industries, see chapter 4.

For the downstream industries, the model estimates the effects of direct use of primary steel and aluminum products. However, a downstream industry may also be indirectly affected by steel and aluminum tariffs if any of its other intermediate inputs directly use a sizable share of primary steel/aluminum products. The model does not capture these indirect effects, which could have an additional impact on downstream producer costs.

The partial equilibrium models are static, meaning that each year is examined in isolation, and run using each year's respective data inputs. Within each year, the model compares a counterfactual scenario (the absence of section 232 tariffs) to the actual data (the presence of section 232 tariffs). The model has no dynamic links across years, meaning that it does not fully address the effects of the tariffs on long-term factors such as investment, capacity changes, inventory storage, or supply chain adjustments.

[336] It is not possible to separate imports under section 232 tariffs from imports under section 301 tariffs in the chapter 99 data. However, the chapter 99 data along with information on tariff rates by statistical reporting number were used to estimate the share of imports subject to 232 tariffs, and the model estimates the effect of only the 232 tariffs.

[337] Steel derivative articles (enumerated in annex II) subject to the 25 percent ad valorem tariffs include: non-threaded fasteners (HTS subheading 7317.00.30 and HTS statistical reporting numbers 7317.00.5503, 7317.00.5505, 7317.00.5507, 7317.00.5560, 7317.00.5580, and 7317.00.6560); bumper stampings for certain motor vehicles (HTS subheading 8708.10.30); and body stampings for agricultural tractors (HTS subheading 8708.29.21). Derivative aluminum articles (enumerated in annex I) subject to the 10 percent ad valorem tariffs include: stranded wires, cables, and plaited bands (HTS subheadings 7614.10.50, 7614.90.20, 7614.90.40, and 7614.90.50); bumper stampings for certain motor vehicles (HTS subheading 8708.10.30); and body stampings for agricultural tractors (HTS subheading 8708.29.21). For and in-depth discussion of derivative products subject to section 232 tariffs, see chapter 3.

[338] USITC estimates.

Estimated Economic Effects of Section 232 Steel and Aluminum Tariffs on Trade, Production, and Prices in the U.S. Market

In the sections below, modeling results are presented for the U.S. steel industry, U.S. aluminum industry, and most-affected downstream industries from 2018 to 2021. Model results show the economic effects of the 25 percent steel tariff and 10 percent aluminum tariff on trade, production, and prices.[339] Both the section 232 steel tariff and section 232 aluminum tariff were added to the model concurrently. This means that direct and indirect effects are present in the model results. For example, the domestic steel industry directly benefitted from the steel 232 tariff as steel imports became less competitive with domestic production. At the same time, this direct benefit was partially offset by the indirect negative effect of the aluminum 232 tariff on the steel industry. The increased cost of aluminum inputs as a result of the aluminum 232 tariffs lowered downstream domestic production, thus lowering demand for all steel. The separate effects of each tariff are provided in a sensitivity analysis in the technical appendix F.

The increase in tariffs on steel and aluminum imports increased the relative price of imports and led consumers of steel and aluminum to increase sourcing from domestic suppliers. This increase in demand for domestic production of steel and aluminum resulted in increases in the price of domestically produced steel and aluminum and the quantity of domestic steel and aluminum production in these industries. However, the higher prices of steel and aluminum translated into higher costs of production inputs for downstream industries. This effect negatively impacted the downstream industries that purchase steel and aluminum because costs increase per unit of production. As a result, downstream industries were buying a greater share of domestic steel and aluminum inputs but decreasing the quantity produced of downstream products.

Estimated Effects on the U.S. Steel Industry

The increases in prices of imported steel and domestically produced steel led to a weighted-average steel price increase of about 2.4 percent each year from 2018 to 2021 (table 5.2). Effects on prices of steel in the United States are small, in part, because imported steel is a relatively small share of the total U.S. market, with U.S.-produced steel representing more than two-thirds of total consumption of steel. Section 232 tariffs increased the delivered price of covered steel imports in the U.S. market by a little more than 22 percent per year on average (table 5.2).[340] The delivered price of covered steel imports increasing by nearly the full value of the tariff is consistent with the chapter 6 econometric results and the academic literature, which both estimate that tariffs under sections 232 and 301 passed through fully into U.S. importer prices.[341] Demand for domestic steel rose, increasing the price of domestic steel

[339] This analysis estimates the economic effects of actual section 232 tariffs in place in each year modeled from 2018 to 2021. Due to a lack of sufficient data for 2022, this analysis does not estimate the effects of the tariffs in 2022.
[340] The model is not able to perfectly represent full pass-through of the tariffs but was parameterized to represent as close to full pass-through as possible.
[341] See chapter 6 for a discussion of the economic literature on this topic.

by about 0.7 percent per year on average. Domestic production of steel increased by about 1.9 percent, or $1.5 billion, per year on average.[342] Non-covered imports also increased as they became relatively less expensive alternatives to imports subject to the tariff.

Table 5.2 Estimated effects of section 232 steel and aluminum tariffs on U.S. steel production, U.S. steel prices, and U.S. steel imports
In percentage changes.

Variable	Impact in 2018	Impact in 2019	Impact in 2020	Impact in 2021	Average effect
Price of domestically produced steel	0.81	0.87	0.52	0.75	0.74
Producer price of covered steel imports	−1.80	−1.78	−1.87	−1.81	−1.81
Delivered price of covered steel imports	22.75	22.77	22.66	22.74	22.73
Non-covered import prices	0.21	0.22	0.13	0.19	0.19
Average steel price in U.S.	2.68	2.80	1.62	2.47	2.39
Quantity of domestic steel production	2.04	2.19	1.30	1.90	1.86
Quantity of covered steel imports	−23.82	−23.62	−24.66	−23.98	−24.02
Quantity of non-covered steel imports	3.14	3.41	2.00	2.93	2.87

Source: USITC estimates.
Note: Economic effects reported in this table are calculated as the percentage change between actual economic outcomes in each year and a counterfactual scenario where no section 232 tariffs were in place. The producer price of covered imports is the price that the foreign producer receives for the imported steel products subject to the duties. The delivered price of covered imports is the price that the U.S. downstream industry pays for imported steel subject to the duties.

Comparing effects across years by percentage change, economic effects on U.S. producers are larger in the first two years after section 232 tariffs were implemented. Percentage changes are larger in the first two years because the share of covered imports in total imports is larger. Covered imports of steel were 45 percent in 2018 and 31 percent in 2021. This is attributable to a few factors. First, the COVID-19 pandemic that began in 2020 significantly changed the market.[343] As shown in the steel profile in chapter 4, total imports of applicable steel products decreased from $37 billion in 2018 to $21 billion in 2020. Also, because of the prevalence of contracts and purchase orders that fix sourcing decisions in the short term, domestic purchasers were more likely able to shift sourcing to domestic production in the later years of the modeling window, resulting in lower covered imports in 2020 and 2021. Another factor is the timing of product exclusions.[344] A first round of general approved exclusions went into effect in December 2020, followed by another round in December 2021.[345] Economic effects on U.S. imports are similar across the four years modeled because of the estimated nearly full pass-through of the 25 percent steel tariff to consumer prices. See figure G.1 in appendix G for steel and aluminum pass-through estimates.

[342] The estimated increases in the value of domestic steel production were $1.90 billion in 2018, $1.86 billion in 2019, $0.92 billion in 2020, and $1.33 billion in 2021.
[343] See chapter 4 for a detailed discussion on the impact of the COVID-19 pandemic on the steel and aluminum industries. Note that the analysis does not attempt to estimate the impact of the COVID-19 pandemic on the industries modeled. It does, however, take into account how the COVID-19 pandemic affected the impact of the tariffs, through changing market sizes and market shares.
[344] See chapter 4, figure 4.2, which shows the share of steel imports subject to section 232 tariffs decreasing in 2020 and 2021.
[345] For more information on general approved exclusions and other section 232 product exclusions, see chapter 3.

Estimated Effects on the U.S. Aluminum Industry

The increases in the prices of imported aluminum and domestically produced aluminum led to a weighted-average aluminum price increase of about 1.6 percent (table 5.3). Effects on domestic prices are small in part because imported aluminum is a relatively small share of the total U.S. market, with U.S.-produced aluminum representing more than two-thirds of total consumption of aluminum. The delivered price of covered aluminum imports increased by 8.0 percent per year on average after the implementation of section 232 tariffs (table 5.3).[346] This led to an increase in the price of domestic aluminum by about 0.9 percent per year on average. Increased demand for domestically produced aluminum following the relative price increase of imports led to increases in domestic aluminum production of 3.6 percent per year, or $1.3 billion, on average.[347] It also led to an increase in demand for non-covered aluminum imports of 7.3 percent per year on average. Similar to the estimated effects on the U.S. steel industry, the domestic impact was greater in the first two years modeled, when the share of imports covered by the tariffs was larger. Covered imports of aluminum were 54 percent in 2018 and 31 percent in 2021.

Table 5.3 Estimated effects of section 232 steel and aluminum tariffs on U.S. aluminum production, U.S. aluminum prices, and U.S. aluminum imports
In percentage changes.

Variable	Impact in 2018	Impact in 2019	Impact in 2020	Impact in 2021	Average effect
Price of domestically produced aluminum	1.02	1.10	0.67	0.71	0.87
Producer price of covered aluminum imports	−1.79	−1.76	−1.92	−1.91	−1.84
Delivered price of covered aluminum imports	8.04	8.07	7.89	7.90	7.97
Non-covered import prices	0.41	0.44	0.27	0.28	0.35
Average aluminum price in the United States	1.82	1.94	1.18	1.27	1.55
Quantity of domestic aluminum production	4.15	4.46	2.72	2.86	3.55
Quantity of covered aluminum imports	−30.25	−29.83	−32.17	−32.00	−31.06
Quantity of non-covered aluminum imports	8.57	9.22	5.58	5.85	7.30

Source: USITC estimates.
Note: Economic effects reported in this table are calculated as the percentage change between actual economic outcomes in each year and a counterfactual scenario where no section 232 tariffs were in place. The producer price of covered imports is the price that the foreign producer receives for the imported aluminum products subject to the duties. The delivered price of covered imports is the price that the U.S. downstream industry pays for imported aluminum subject to the duties.

Comparing the differential effects on the steel and aluminum industries, the larger steel tariff (25 percent) had a greater effect on the delivered price of covered imports compared to the 10 percent tariff on aluminum imports. However, because the elasticity of substitution between sources of steel is significantly smaller than the elasticity of substitution between sources of aluminum, the tariffs had a smaller relative effect on domestic production of steel. In other words, compared to aluminum, domestic producers of steel were less able to take advantage of the increase in covered import price of steel because consumers of steel cannot shift sourcing from imports to domestically produced products as easily.

[346] The model is not able to perfectly represent full pass-through of the tariffs but was parameterized to represent as close to full pass-through as possible.
[347] The estimated increases in the value of domestic aluminum production were $1.74 billion in 2018, $1.72 billion in 2019, $0.88 billion in 2020, and $0.92 billion in 2021.

Estimated Effects on Downstream U.S. Industries

Next, model results are presented for the top 10 most-impacted downstream industries in the model.[348] Downstream industries are ranked by the magnitude of the impacts of section 232 tariffs on each model outcome. Therefore, the most-impacted industries are defined as industries that have the biggest estimated: (1) dollar value change in inputs, (2) percentage change in quantity of output, and (3) dollar value change in output. The results in the sections below are ordered according to the economic narrative that section 232 tariffs first affect the primary steel and aluminum industries that compete with imports directly affected, which then affects the price of primary steel and aluminum inputs purchased by the downstream industries, and ultimately affects the price and quantity of downstream outputs.

The magnitude of economic effects—and ranking order of industries—depends on several key factors. First, the steel and aluminum cost shares of production are an important factor. If the downstream industry has a high cost share of affected products, then additional tariffs of 10 percent and 25 percent on aluminum and steel, respectively, will have a larger impact on downstream prices and output. The second factor is the share of steel and aluminum inputs in downstream production that is sourced from imports. If an industry has a large steel cost share, but nearly all its steel is purchased from domestic suppliers, then it is less affected by a 25 percent tariff on imports than if it sourced inputs from imports. Another important factor is the elasticity of substitution across sources of steel and across sources of aluminum. A higher elasticity of substitution implies that downstream purchasers can more easily switch primary steel and aluminum sources—from imports to domestic production—leading to larger percentage increases in domestic prices of steel and aluminum.

The first set of downstream results shows the impact of section 232 tariffs on the cost of inputs into downstream production. The steel and aluminum tariffs on imports are estimated to have shifted some sourcing of inputs from imports to domestically produced products. The Architectural and Structural Metals Manufacturing (NAICS 3323) industry is estimated to have the largest dollar value increase in domestic steel sourcing at $213.5 million in 2021 (table 5.4). This increase is primarily due to the substantial size of domestic production ($96.3 billion in 2021) and steel cost share (more than 10 percent). Other top industries include Agriculture, Construction, and Mining Machinery Manufacturing ($119.1 million) and Other General Purpose Machinery ($104.2 million).

[348] A full set of model results can be found in appendix F.

Table 5.4 Estimated increase in domestic sourcing of steel in 2021 as a result of section 232 tariffs for the top 10 ranked industries
In millions of dollars.

NAICS code	Industry name	Estimated increase in domestic sourcing of steel (millions of $)
3323	Architectural and Structural Metals	213.52
3331	Agriculture, Construction, Mining Machinery Manufacturing	119.11
3339	Other General Purpose Machinery	104.22
2110	Oil and Gas Extraction	102.07
336370	Motor Vehicle Metal Stamping	93.29
3329	Other Fabricated Metal Manufacturing	86.57
3327	Machine Shops Turned Product and Screw, Nut, Bolt Manufacturing	86.54
3328	Coating, Engraving, Heat Treating	61.04
336390	Other Motor Vehicle Parts	54.41
3324	Boiler, Tank, and Shipping Containers	53.56

Source: USITC estimates.
Note: Economic effects reported in this table are calculated as the dollar value change (in millions of dollars) between actual economic outcomes and a counterfactual scenario where no section 232 tariffs were in place.

With regard to increases in domestic aluminum inputs, the Boiler, Tank, and Shipping Container Manufacturing (NAICS 3324) industry is the highest dollar value increase, an estimated $204.1 million increase in domestic aluminum purchasing (table 5.5). This industry, which includes the production of aluminum cans for beverages, had the largest aluminum cost share of all downstream industries at 20.3 percent in 2021, a sizeable share of which was from imports. Other notable industries with large increases in domestic aluminum purchasing include Soft Drink Manufacturing ($200.9 million) and Architectural and Structural Metals ($74.3 million).[349]

[349] Soft drink manufacturing (NAICS 312110) includes manufacturing of soft drinks by companies such as PepsiCo and Coca-Cola. Boiler, Tank, and Shipping Container Manufacturing (NAICS 3324) includes manufacturing of metal cans and lids by companies such as Ball and Mauser. Some companies buy the aluminum cans already made for use (NAICS 3324); others produce the cans during the manufacturing of their soft drink product (NAICS 312110).

Table 5.5 Estimated increase in domestic sourcing of aluminum in 2021 as a result of section 232 tariffs for the top 10 ranked industries

NAICS code	Industry name	Estimated increase in domestic sourcing of aluminum (millions of $)
3324	Boiler, Tank, Shipping Containers	204.11
312110	Soft Drink Manufacturing	200.88
3323	Architectural and Structural Metals	74.33
336370	Motor Vehicle Metal Stamping	68.00
3329	Other Fabricated Metal Manufacturing	42.78
3327	Machine Shops Turned Product and Screw, Nut, Bolt Manufacturing	40.66
336390	Other Motor Vehicle Parts	39.62
3339	Other General Purpose Machinery	29.90
336212	Truck Trailer Manufacturing	27.76
3334	Ventilation, Heating, Air-Conditioning	21.75

Source: USITC estimates.
Note: Economic effects reported in this table are calculated as the dollar value change (in millions of dollars) between actual economic outcomes and a counterfactual scenario where no section 232 tariffs were in place.

Downstream domestic prices increased by 0.2 percent per year on average, with the largest price increase of 0.9 percent in 2018 (see appendix F, tables F.5–F.8 for results by industry). The Boiler, Tank, and Shipping Container Manufacturing (NAICS 3324) industry consistently had the largest price changes for each year in the modeling period. This is unsurprising, given that this industry has an aluminum cost share of about 20 percent. Spring and Wire Manufacturing (NAICS 3326), Motor Vehicle Metal Stamping (NAICS 336370), and Cutlery and Handtool Manufacturing (NAICS 3322) also all consistently rank at the top of the list in terms of highest downstream price changes.

The model estimates the pass-through of section 232 tariffs from primary industries to downstream industries. Based on the econometric analysis performed in chapter 6 that estimated the degree of section 232 and 301 tariff pass-through, the import supply elasticities in this model were chosen so that the 25 percent steel tariff nearly all passed through into the steel import price (23 percent increase). The same is true for the 10 percent aluminum tariff (8 percent increase). However, the 25 percent and 10 percent tariffs on steel and aluminum, respectively, do not translate to a 25 percent and 10 percent increase in downstream prices. This is because steel and aluminum only make up a fraction of downstream total costs. The degree to which the tariffs pass through into the downstream prices depends on the cost shares and import shares of production inputs. As shown in appendix tables F.5–F.8, the model estimates that the tariffs have a relatively minor effect on downstream prices, with the largest price increases at less than 1 percent.

Downstream domestic production in the most affected industries in the model decreased by 0.6 percent per year on average, with the largest annual industry-specific percentage decrease in production of 3.2 percent in 2018 in Cutlery and Handtool Manufacturing (NAICS 3322) (table 5.6). Cutlery and Handtool Manufacturing (NAICS 3322), Motor Vehicle Steering and Suspension Components (NAICS 3363A0), and Industrial Machine Manufacturing (NAICS 3332) consistently rank as the industries with the largest decreases in domestic production as a result of section 232 tariffs. The determinants of these large effects differed by industry. Many industries like Cutlery and Handtool Manufacturing exhibit large impacts because of large cost shares of steel and aluminum. For Cutlery and Handtool Manufacturing, the combined cost share is more than 37 percent. Other industries have large impacts because of their relatively small domestic sales where even modest impacts can translate into large percentage changes. For example, Industrial Machine Manufacturing—an industry that includes semiconductor, paper, and food machinery manufacturing—is quite large overall ($36.1 billion in 2021) but only about 15 percent of production remains in the domestic market and the rest is exported.

Table 5.6 Top 10 most-affected downstream industries each year based on change in production quantity due to estimated effects of section 232 steel and aluminum tariffs, by industry and year, 2018–21

In percentage changes. MV = motor vehicle; AG = agricultural machinery.

Top industries impacted in 2018 (NAICS code)	Change in domestic quantity in 2018 (%)	Top industries impacted in 2019 (NAICS code)	Change in domestic quantity in 2019 (%)	Top industries impacted in 2020 (NAICS code)	Change in domestic quantity in 2020 (%)	Top industries impacted in 2021 (NAICS code)	Change in domestic quantity in 2021 (%)
Cutlery/Handtool (3322)	−3.18	Cutlery/Handtool (3322)	−2.90	Cutlery/Handtool (3322)	−1.35	Industrial Machine (3332)	−2.98
MV Steering, Suspension (3363A0)	−1.68	MV Steering, Suspension (3363A0)	−1.64	MV Steering, Suspension (3363A0)	−0.84	Cutlery/Handtool (3322)	−2.56
Industrial Machine (3332)	−1.52	Spring/Wire (3326)	−1.47	Spring/Wire (3326)	−0.79	MV Steering, Suspension (3363A0)	−1.57
Spring/Wire (3326)	−1.40	Industrial Machine (3332)	−1.14	Industrial Machine (3332)	−0.67	Spring/Wire (3326)	−1.37
Other Fabricated Metal (3329)	−1.23	Other Fabricated Metal (3329)	−1.11	Engines and Turbines (3336)	−0.59	Engines and Turbines (3336)	−1.25
Boiler, Tank, Shipping Container (3324)	−1.17	Boiler, Tank, Shipping Container (3324)	−1.07	Boiler, Tank, Shipping Container (3324)	−0.53	AG, Construction, Mining Machinery (3331)	−1.03
AG, Construction, Mining Machinery (3331)	−1.11	AG, Construction, Mining Machinery (3331)	−0.94	Other Fabricated Metal (3329)	−0.47	Other Fabricated Metal (3329)	−0.92
Electrical Equipment (3353)	−1.00	Engines and Turbines (3336)	−0.92	AG, Construction, Mining Machinery (3331)	−0.47	Other Transportation Equipment (3369)	−0.91
Household Appliance (3352)	−0.98	Electrical Equipment (3353)	−0.88	Other Transportation Equipment (3369)	−0.46	Other General Purpose Machinery (3339)	−0.88
Other General Purpose Machinery (3339)	−0.98	Other Transportation Equipment (3369)	−0.86	Other General Purpose Machinery (3339)	−0.44	Boiler, Tank, Shipping Container (3324)	−0.80

Source: USITC estimates.

Notes: This table lists the top 10 industries the model indicates were most affected each year from 2018 to 2021 in terms of the estimated percentage decrease in domestic production as a result of section 232 steel and aluminum tariffs. Industry names are shortened for brevity. Economic effects reported in this table are calculated as the percentage change between actual economic outcomes in each year and a counterfactual scenario where no 232 tariffs were in place.

The largest dollar value decrease in the value of downstream domestic production was in Other General Purpose Machinery (NAICS 3339), which experienced a decrease of $557 million (table 5.7) in 2018. This is, in part, due to the size of that industry, with domestic production valued at more than $110.3 billion in 2018. After Other General Purpose Machinery, Agriculture, Construction, and Mining Machinery Manufacturing (NAICS 3331); Other Fabricated Metal Product Manufacturing (NAICS 3329); and Motor Vehicle Steering and Suspension Components Manufacturing (NAICS 3363A0) consistently rank as the industries with the largest decreases in the value of domestic production as a result of section 232 tariffs. Across all industries included in the model, downstream U.S. producers are estimated to have produced $3.4 billion less on average each year between 2018 and 2021, as a result of section 232 tariffs.[350]

[350] The estimated decreases in the value of downstream production were $4.2 billion in 2018, $3.9 billion in 2019, $1.8 billion in 2020, and $3.5 billion in 2021.

Table 5.7 Top 10 most-affected downstream industries each year based on change in value of production due to estimated effects of section 232 steel and aluminum tariffs, by industry and year, 2018–21

In millions of dollars. MV = motor vehicle; AG = agricultural machinery; misc. = miscellaneous.

Top industries impacted in 2018 (NAICS code)	Change in value in 2018 (millions of $)	Top industries impacted in 2019 (NAICS code)	Change in value in 2019 (millions of $)	Top industries impacted in 2020 (NAICS code)	Change in value in 2020 (millions of $)	Top industries impacted in 2021 (NAICS code)	Change in value in 2021 (millions of $)
Other General Purpose Machinery (3339)	−557.34	Other General Purpose Machinery (3339)	−502.97	Other General Purpose Machinery (3339)	−238.68	Other General Purpose Machinery (3339)	−468.91
AG, Construction, Mining Machinery (3331)	−496.53	AG, Construction, Mining Machinery (3331)	−452.05	AG, Construction, Mining Machinery (3331)	−197.55	AG, Construction, Mining Machinery (3331)	−440.13
Other Fabricated Metal (3329)	−423.23	Other Fabricated Metal (3329)	−381.94	Other Fabricated Metal (3329)	−161.71	Other Fabricated Metal (3329)	−321.47
Electrical Equipment (3353)	−218.63	Electrical Equipment (3353)	−202.31	Electrical Equipment (3353)	−93.74	Electrical Equipment (3353)	−171.52
Other Electrical Equipment (3359)	−207.29	Other Electrical Equipment (3359)	−197.07	Oil and Gas (2110)	−91.73	Cutlery/Handtool (3322)	−159.45
Cutlery/Handtool (3322)	−197.76	Cutlery/Handtool (3322)	−181.66	Other Electrical Equipment (3359)	−91.15	Other Electrical Equipment (3359)	−159.40
Oil and Gas (2110)	−180.97	Oil and Gas (2110)	−174.69	Cutlery/Handtool (3322)	−85.18	Engines and Turbines (3336)	−154.23
Other Misc. Manufacturing (3399)	−174.89	Engines and Turbines (3336)	−168.52	Engines and Turbines (3336)	−83.13	Industrial Machine (3332)	−144.04
MV Steering, Suspension (3363A0)	−172.56	MV Steering, Suspension (3363A0)	−159.43	MV Steering, Suspension (3363A0)	−72.70	Oil and Gas (2110)	−138.51
Engines and Turbines (3336)	−168.13	Other Misc. Manufacturing (3399)	−159.09	Other MV Parts (336390)	−70.77	Other Misc. Manufacturing (3399)	−136.12

Source: USITC estimates.

Notes: This table lists the top 10 industries most affected each year from 2018 to 2021 by dollar value change of domestic production. Industry names are shortened for brevity. Economic effects reported in this table are calculated as the dollar value change (in millions of dollars) between actual economic outcomes in each year and a counterfactual scenario where no 232 tariffs were in place.

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Chapter 6 Economic Effects of Section 301 Tariffs on Trade, Production, and Prices in Directly Affected Industries

This chapter addresses how section 301 tariffs impacted trade, production, and prices in directly affected U.S. industries.[351] It focuses on imports of the affected products from China because section 301 tariffs applied only to such products. In the aggregate, prices paid by U.S. importers for goods from China increased as a result of the tariffs but the exporter prices received by Chinese firms were mostly unchanged. As the importer prices rose for Chinese products, the quantity of such imports fell leading to a significant decline in their import value. These changes led to increases in production and prices in U.S. industries that were competing with the imports.

Background

The first section 301 tariffs on Chinese products were imposed in July 2018. Additional tranches of tariffs were imposed in August and September 2018, and later in September 2019.[352] The analysis in this chapter is conducted at the HTS statistical reporting number level. Section 301 tariffs covered 13,591 HTS statistical reporting numbers, comprising imports with an average value of $291.6 billion in 2016 and 2017 (before the imposition of tariffs, table 6.1).

[351] Given the large number of industries affected by section 301 tariffs, it was not possible to present the estimated impacts on every affected industry so as to determine the "most affected" industries as done in chapter 5. Instead, this chapter presents the estimated impacts for industries directly affected by the tariffs. Industries directly affected by the tariffs are industries for which imports of products falling under HTS statistical reporting numbers were covered by section 301 tariffs but does not include industries that were only indirectly affected by the tariffs, for example, by being consumers of such products.
[352] See chapter 3 for a detailed chronology and description of section 301 tariffs.

Table 6.1 Section 301 tariff coverage, by tariff action
In percentages and billions of dollars.

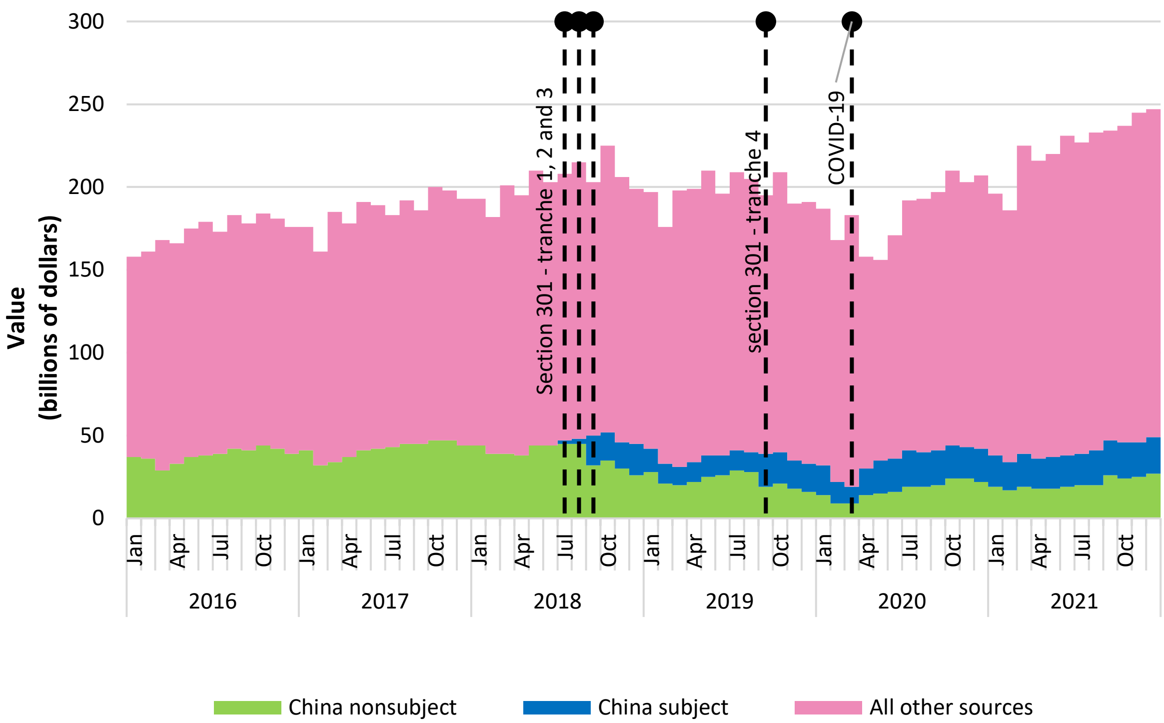
301 tariff action	Date of tariff action	HTS statistical reporting numbers affected	301 tariff rate in 2021 (%)	Average annual import value of affected products in 2016 and 2017 ($)	Annual import value of affected products in 2021 ($)
Tranche 1	July 6, 2018	1,481	25	30	24
Tranche 2	August 23, 2018	395	25	13	10
Tranche 3	September 24, 2018	7,265	25	146	120
Tranche 3	September 24, 2018	42	25	6	6
Tranche 4, list 1	September 1, 2019	4,408	7.5	98	105

Source: USITC DataWeb/Census, accessed July 7, 2022, and calculations by USITC.
Note: The number of statistical reporting numbers affected is based on 2016 and 2017 trade and therefore does not include statistical reporting numbers that were targeted by the tariffs but had zero imports from China in both years. Section 301 tariffs were almost entirely implemented at the subheading level. Imports from China subject to section 301 duties under tranche 3 were originally subject to 10 percent tariffs before the rate increased to 25 percent on May 10, 2019. Duties on imports under tranche 4, list 1 were reduced from 15 percent to 7.5 percent on February 14, 2020. For more information on the chronology of section 301 tariff actions and the individual tranches, see chapter 3.

Section 301 tariffs were only implemented for imports from China, but information on imports from the rest of the world is reported throughout this chapter and is included in the analysis. Use of these other imports provides important context and allows affected trade to be compared with trade that was not subject to additional section 301 tariffs. This comparison helps to separate the effect of section 301 tariffs from the effects of the COVID-19 pandemic, supply chain disruptions, and other events occurring during the same time period. Figure 6.1 gives a snapshot of all imports for consumption, showing that by 2020, about half of all import value from China came from statistical reporting numbers that were subject to a section 301 tariff. Table 6.2 shows imports of products, regardless of source, classified under the HTS statistic reporting numbers that are subject to section 301 tariffs when imported from China. In 2017, imports from China accounted for about 17 percent of the value of total imports of these products from the world. By 2021, this share decreased to about 12 percent (table 6.2).

Figure 6.1 U.S. imports for consumption, by month and whether they were subject to section 301 tariffs, 2016–21

Underlying data for this figure can be found in appendix E, table E.27.



Source: USITC DataWeb/Census, accessed July 7, 2022, and calculations by USITC.
Note: “Subject” in the figure legend specifically refers to products that are subject to section 301 tariffs.

Table 6.2 U.S. imports for consumption of products classified under HTS statistic reporting numbers subject to section 301 tariffs if imported from China, by source and period, 2016–21
In billions of U.S. dollars

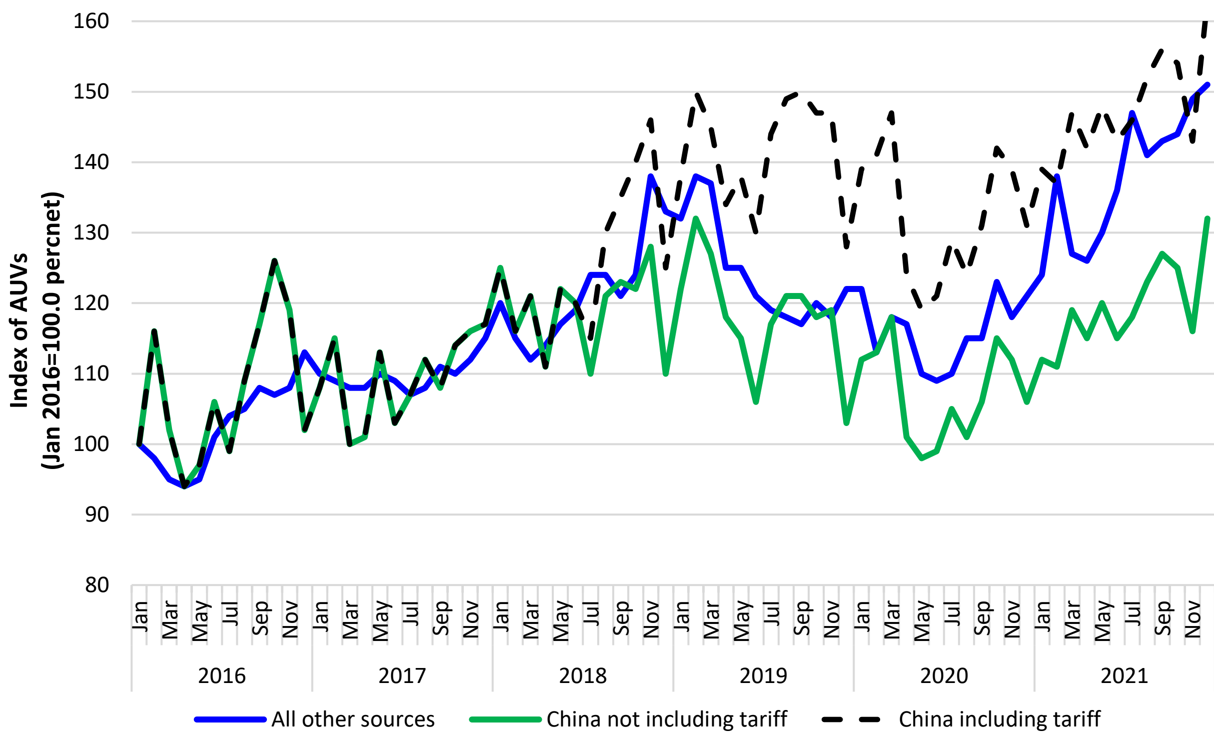
Source	2016	2017	2018	2019	2020	2021
China	271.7	311.3	345.4	270.5	243.4	265.1
All other sources	1,191.6	1,521.6	1,669.4	1,705.1	1,562.0	1,942.8
All sources	1,463.3	1,832.9	2,014.8	1,975.7	1,805.3	2,207.9

Source: USITC DataWeb/Census, accessed July 7, 2022, and calculations by USITC.
Note: These values are for all 10-digit HTS statistical reporting numbers that were at some point targeted by section 301 tariffs. Only imports from China were targeted, and only in 2018 and later.

Tariffs can impact prices, production, and trade in several ways. Exporter and importer prices reflect the most direct effect. When a tariff is imposed, it creates a “wedge” between the price received by sellers (the exporter price) and the price paid by buyers (the importer price). When a tariff is imposed, economic theory predicts that the foreign exporter price will fall or the domestic importer price will rise, or some combination of the two. The extent to which the importer price rises as a result of the tariff is considered the extent of the “pass-through” of the tariff. Under full pass-through, prices for Chinese exporters would not be significantly affected while prices paid by U.S. importers would rise 1-to-1 with the imposed tariffs. For purposes of the analysis presented in this chapter, the extent of the pass-through of section 301 tariffs was analyzed by comparing U.S. import average unit values (AUVs) not inclusive of the tariff for products from China with those from other sources. U.S. import nontariff-inclusive AUVs in the trade data follow similar trends for products from China and other sources, which is generally suggestive of a full pass-through effect. However, nontariff-inclusive AUVs from China are generally a little lower than AUVs from the rest of the world in 2018 and onward, which could indicate less-than-full pass-through (figure 6.2). The modeling results in this chapter control for nontariff-related events that also impact prices and ultimately find evidence of full pass-through of section 301 tariffs. This is consistent with the literature on section 301 tariffs as presented later in this chapter.[353]

Figure 6.2 Index of average unit values (AUVs) of U.S. imports for consumption, by source, period, and whether they were subject to section 301 tariffs

Underlying data for this figure can be found in appendix E, table E.28.



Source: USITC DataWeb/Census, accessed July 7, 2022, and calculations by USITC.
Note: Only statistical numbers with positive import values from China at some point during the time series are included here. The average unit value under each statistical reporting number is normalized to 100 in the first month that it is imported in the sample period by country. Average unit values for the rest of world and China, not including tariffs, are calculated as customs value divided by quantity. Average unit values including tariffs are calculated by multiplying the average unit value by one plus the section 301 tariff rate. To be consistent with the event study analysis later in this chapter, tariff-inclusive values are approximated at the HTS 10-digit statistical reporting number rather than using rate provision code information. Subsequent values are normalized according to that first value. The figure shows the trade-value-weighted average of the normalized prices after dropping outliers outside of the 5th and 95th percentile by month.

The methods used in this chapter estimate the pass-through of the tariff to importer prices but do not estimate the subsequent pass-through of increased importer costs to final buyers and consumers. Section 301 tariffs may have had an effect on downstream industries and other related goods, but oral

[353] A list of related studies from the literature is provided in appendix H.

and submitted hearing testimony suggests that many importers largely absorbed the higher importer prices through decreased profit margins without substantially increasing prices for final consumers.[354] That lack of pass-through to final retail prices is also observed in Cavallo et al. (2021).[355] Therefore, the modeling and analysis in this chapter, by covering the industries most directly affected by section 301 tariffs, likely captures the most significant impacts of these tariffs in the short run.

Some effects of section 301 tariffs would likely be delayed. It may take time for importers to change their supply chain to import from other sources or find domestic producers. Investment in additional domestic production, if necessary, would take time to come online but would eventually increase domestic production and reduce the price of the domestic good. These effects would all increase the longer-run impact of section 301 tariffs, particularly if importers and domestic producers anticipated the tariffs remaining in place long enough to make these costly changes worthwhile.

The effects of section 301 tariffs may be influenced by the perceived uncertainty regarding the tariffs. For example, if importers and exporters believe that the tariffs may be temporary, their response to these tariffs may be muted. The uncertainty would delay the effects of tariffs because the importers and exporters would wait to see if the tariffs remain, increase, or decrease in the future. The methodology used in this section does not separate the impact of uncertainty from the overall impact of tariffs.

Given the large number of industries affected by section 301 tariffs, it is not possible to present the estimated impacts on each affected industry individually. Therefore, we present the estimated impacts on the 10 most directly affected industries individually and the estimated aggregate impact on all directly affected industries.[356]

The rest of this chapter provides a modeling-based quantitative analysis of the economic impacts of section 301 tariffs on U.S. trade, production, and prices for industries directly affected by these tariffs. The analysis in this chapter is similar to the analysis of the steel and aluminum industries in chapter 5 but forgoes downstream analysis in order to analyze a broader variety of affected industries.

Overview of Key Findings

- An econometric model shows full pass-through of section 301 tariffs to prices paid by importers.
- Import quantities and import values of products subject to section 301 duties were negatively affected, each decreasing by about 2 percent for affected products for each percentage point of the tariffs.
- A model of aggregate effects finds for directly affected industries an overall increase in the value of domestic production by 0.4 percent on average each year from 2018 to 2021, with part of

[354] Some testimony indicated more substantial pass-through of costs to consumer prices. The testimony related to absorbing the costs are the following: USITC, hearing transcript, July 20, 2022, 144 (testimony of Laurin Baker, Industrial Fasteners Institute), 150 (testimony of Mark Vaughn, Vaughn Manufacturing Company); USITC, hearing transcript, July 21, 2022, 444–45 (testimony of Bill Hanvey, Auto Care Association), 460–61 (Deanne Hix, California Manufacturing and Engineering Co.).
[355] Cavallo et al., “Tariff Pass-through at the Border and at the Store,” March 2021, 19–34.
[356] The 10 most directly affected industries are the industries with the highest volume of imports in 2016 and 2017, before the imposition of section 301 tariffs, for products classified under HTS statistical reporting numbers covered by the section 301 tariffs.

that value increase coming from a 0.2 percent increase in the price of affected products that are domestically produced. It also estimates a 13 percent decline in the value of U.S. imports from China in sectors affected by section 301 duties.

- A set of industry-specific models show that the impact on a domestic industry depends on the average tariff on imports from China in that industry and the estimated substitutability between the Chinese and U.S. goods. For the 10 industries with the highest value of imports covered by section 301 tariffs, the models estimate that the value of U.S. production rose between 1.2 percent and 7.5 percent in 2021 as a result of section 301 tariffs.

Description of the Analytical Approach

Economic theory suggests that the tariffs would raise prices paid by U.S. importers and decrease quantities of imports and import values from China. The magnitude of the declines would depend on how easy it is for buyers (importers) to substitute the tariff-affected goods with goods from domestic or other foreign sources. Demand for domestically produced substitutes would rise, resulting in increased prices and production for the domestic good.

On the other hand, increasing the price of intermediate goods (directly through the tariff or indirectly through the increase in the demand for domestic substitutes) would increase the cost and lower the domestic production of downstream goods. An example of that effect is seen in Cigna et al. (2020), which found that most of the affected goods were intermediate goods and that Chinese exporters accounted for a high market share in those goods, which would make it hard for importers to substitute in the short run.[357] Because of the wide variety of products considered in this chapter, this report estimates only the direct effect of section 301 tariffs on targeted products and does not estimate the impact on upstream or downstream products.

This chapter uses two types of economic modeling to estimate the impact of section 301 tariffs on directly affected industries overall and for the 10 most directly affected industries individually. In both cases, the methodologies focus on direct effects—how section 301 tariffs impacted prices, production, and trade for products that are subject to section 301 tariffs as well as domestic sectors that compete directly with those imports. The two complementary methodologies are used to take advantage of the highly detailed trade data that are available and estimate the impact of section 301 tariffs on affected domestic industries. The modeling in this chapter does not capture the impact on upstream or downstream industries or indirect effects on the economy.

The first type of modeling is an econometric approach that uses detailed trade data to estimate the impacts of section 301 tariffs on Chinese exporter and U.S. importer prices, import quantities, and import values at different time horizons after the tariffs were first imposed. A similar methodology has been used in several recent publications to estimate the impacts of section 301 tariffs and other recent tariff actions.[358] A primary benefit of this approach is that it takes advantage of the rich trade data available and allows for a detailed month-by-month analysis of the impact of the tariffs on prices paid by U.S. importers and quantities of imports, without imposing structural assumptions like a specific

[357] Cigna et al., "The Impact of US Tariffs against China on US Imports," January 2022, 162–73.
[358] Amiti, Redding, and Weinstein, *Who's Paying the US Tariffs?*, January 2020; Fajgelbaum et al., "The Return to Protectionism," February 1, 2020, 1–55.

functional form for demand. However, this approach can only estimate the impact of section 301 tariffs on imports from China and cannot estimate the impacts on the domestic market or other sources of imports. The econometric model estimates the effects of section 301 tariffs using monthly trade data that reflect trade patterns and tariffs during that month.

The second type of modeling is a set of partial equilibrium models that link section 301 tariffs to domestic prices and production in each of the sectors with the highest value of imports covered by section 301 duties. In this chapter, the partial equilibrium models are systematically applied to a set of 10 North American Industry Classification System (NAICS) 4-digit industry groups. Most of the model parameters for the partial equilibrium model are econometrically estimated using trade and domestic data, with the parameter measuring substitutability between sources being estimated separately for each modeled sector. An aggregate version of this model is applied to the aggregate of all affected sectors to estimate total impacts. The model simulations estimate what prices and quantities would have looked like if section 301 tariffs were not in place for each year from 2018 to 2021. Then, the estimated economic effects are calculated and reported as the effects of increasing the tariffs, comparing actual market outcomes with the simulated counterfactual.

Lacking sufficient data for 2022, the partial equilibrium model does not analyze the effects of the tariffs that may have been in effect on March 15, 2022, but were not in effect as of December 31, 2021. However, the model results for 2021 are reflective of the likely effects of section 301 tariffs that were active on that date because changes in section 301 tariffs between those dates were limited to narrowly defined product exclusions that likely had only minor impacts on overall import volumes.

Similar models have been used in many Commission reports, and the simplicity and flexibility of the partial equilibrium structure is well suited for analysis of specific sectors.[359] The partial equilibrium models in this chapter are also similar to the partial equilibrium model used in chapter 5 of this report. A similar demand structure is used for models in both chapters, and the same methods are used for the estimation of most model parameters. However, while the chapter 5 modeling includes downstream effects, the model used in this chapter covers only direct effects. A more detailed comparison between the modeling in each chapter is included in appendix G.

Data Inputs

The trade data used in both types of modeling come from official U.S. import statistics. The data are monthly U.S. imports for consumption from all trading partners from January 2017 through December 2021.[360] The data for the econometric analysis are at the HTS 10-digit statistical reporting number level, which is the most disaggregated publicly available trade data. The partial equilibrium modeling

[359] Some USITC reports that extensively used partial equilibrium models similar to the ones in this chapter include *Squash: Effect of Imports on U.S. Seasonal Markets, with a Focus on the U.S. Southeast, Inv. 332-584*; *Cucumbers: Effect of Imports on U.S. Seasonal Markets, with a Focus on the U.S. Southeast, Inv. 332-583; Caribbean Basin Economic Recovery Act: Impact on U.S. Industries and Consumers and on Beneficiary Countries*; *Raspberries for Processing: Conditions of Competition between U.S. and Foreign Suppliers, with a Focus on Washington State, Inv. 332-577*; and *U.S.-Mexico-Canada Trade Agreement: Likely Impact on the U.S. Economy and on Specific Industry Sectors, Inv. TPA-105-003*.

[360] The econometric model used to determine the pass-through of the tariffs and to directly assess the effects of the tariffs on imports employed data through March 2022.

employed trade data aggregated up to the NAICS 4-digit industry group level, using annual concordances from the U.S. Census Bureau. These data also include additional port of entry information to estimate some model parameters.

Tariff data were compiled by USITC staff from *Federal Register* notices and the *Harmonized Tariff Schedule*. These data were combined with the monthly trade data.

Annual domestic production data used in the partial equilibrium modeling are gross domestic output at the NAICS 6-digit national industry level from the Bureau of Economic Analysis (BEA), which are then aggregated to the NAICS 4-digit industry group.

The end of the chapter includes price-level information for imports and domestic production. The exporter and importer price levels are calculated using the same trade data as above. The domestic price levels use the Producer Price Index from the Bureau of Labor Statistics (BLS) for each industry group. These price levels are not used as an input for the modeling, which only requires value or expenditure data, but the models do include changes in prices as an output. The price data are reported for each of the included industry groups to give context for those model price changes.

The sector-specific results focus on the sectors that had the highest import value covered by section 301 tariffs. Specifically, these are the NAICS 4-digit industry groups that are associated with the HTS statistical reporting numbers that had the highest dollar import value from China in 2016 and 2017 (the last two full years before any section 301 tariffs were imposed) that were later subject to these tariffs. Using the years before the implementation of section 301 tariffs ensures that sectors with a large drop in imported goods as a result of the tariffs are not excluded, as could be the case if the criteria used the import values in 2018 or later.

Table 6.3 lists these 10 industries, using the criteria described above as well as the average dollar value of imports from China in 2016 and 2017 for products in these sectors that would subsequently be covered by section 301 tariffs. It also includes the average dollar value of the total imports from China in 2016 and 2017 for the sector and the average section 301 tariff rate applied to products associated with the sector in 2020.[361] Additional tables at the end of this chapter show more information about each sector by year.

[361] This average section 301 tariff rate was calculated by computing the mean applicable additional tariff rate for all products (at the HTS statistical reporting number level) falling within a sector/industry identified as most directly affected. For products falling within the sector but not subject to section 301 tariffs, the additional tariff rate was set at zero.

Table 6.3 Industries with highest import values before implementation of section 301 tariffs

NAICS 4-digit industry group	Description	Average value of subsequently affected imports from China in 2016 and 2017 ($B)	Average value of all imports from China in 2016 and 2017 ($B)	Average 301 tariff in 2020
3152	Cut and Sew Apparel Manufacturing	21.9	22.6	14.7
3344	Semiconductors and Other Electronic Components	19.9	19.9	25.0
3341	Computer Equipment	16.1	54.7	1.9
3371	Household and Institutional Furniture and Kitchen Cabinets	15.7	16.7	22.4
3363	Motor Vehicle Parts	13.0	13.0	24.5
3359	Other Electrical Equipment and Components	11.2	11.5	22.2
3399	Miscellaneous Manufactured Commodities	10.9	35.0	4.5
3343	Audio and Video Equipment	10.2	12.0	10.2
3339	Other General Purpose Machinery	8.8	10.2	19.0
3261	Plastics Products	8.3	11.9	13.2

Source: USITC DataWeb/Census, accessed July 7, 2022, and calculations by USITC.
Note: The list of selected industry groups is based on import data from 2016 and 2017, the last two full years before section 301 tariffs.

For some of these industries, like Motor Vehicle Parts (NAICS 3363) or Household and Industrial Furniture and Kitchen Cabinets (NAICS 3371), almost all associated products imported from China were covered by section 301 tariffs. For others, like Computer Equipment (NAICS 3341), most associated products were not covered by these tariffs, but the import value of the affected products was sufficiently high to put the industry in the list of selected sectors.

Model Limitations

The biggest limitation of the modeling in this chapter comes from the level of aggregation of the domestic data. The trade data provide information for specific products, but domestic price and quantity data are only systematically available at aggregated industry levels. This aggregation means that the domestic and import data are imperfectly linked. This hides the fact that some specific products within an industry could experience impacts that differ from those of the industry overall.

The model estimates the elasticity of various trade statistics at different time horizons using variation in both section 301 tariffs and section 232 tariffs on steel and aluminum. This was necessary because the imposition of tariffs under each of these trade actions occurred over the same time period. Because the estimation results are elasticities, the implicit assumption is that the statistics—especially for products subject to tariffs under both trade actions—responded similarly to a tariff increase of the same magnitude imposed under either tariff action. For example, the results assume that a 10 percentage point increase in the tariff rate had the same impact on import quantities regardless of whether that increased rate came from section 301 tariffs or section 232 tariffs. Appendix G includes an alternate specification that performs a similar analysis only on products covered by section 232 tariffs (including products that are also covered by section 301 tariffs).

The partial equilibrium models are static, meaning that each year is examined in isolation and modeled using each year’s respective data inputs. Within each year, the model compares a counterfactual scenario (the absence of section 301 tariffs) to the actual data (and the presence of section 301 tariffs).

The model has no dynamic links across years, meaning that it does not fully address the effects of the tariffs on long-term factors such as investment, capacity changes, inventory storage, or supply chain adjustments.

As explained in chapter 3, some product exclusions are applied to imports at a more detailed level. These exclusions cause a downward bias of the estimated impact of the tariffs for imports coming in under that particular HTS statistical reporting number because the actual average tariff would be lower than the tariff used to estimate the models, making the tariffs appear to have smaller effects in percentage terms. The econometric estimates of the tariff effects are essentially lower bounds on the magnitude of the effects if a product is covered and reflect upper bounds on the number of products that are covered.

The analysis presented here focuses on impacts to imports from China and U.S. domestic industries. Section 301 tariffs may have impacted imports from other countries, but these effects are not considered in this chapter.

Additional model details, including a discussion of technical limitations and caveats, are included in appendix G.

Estimated Sensitivity of U.S. Trade Statistics to Section 301 Tariffs

The direct effects of section 301 tariffs are on U.S. imports that are covered by those tariffs. A statistical model was used to estimate the effects of section 301 tariffs on prices, quantities, and values of imports. In addition to the results presented in this section, these estimates are also used as an input to the partial equilibrium models later in this chapter, which expand the analysis to consider the impact of section 301 tariffs on the prices and production of goods produced in the United States.

Because section 301 tariffs could have impacts that change over time, the impact of section 301 tariffs on prices, quantities, and values of imports is estimated at different monthly horizons after each product was first affected by section 301 tariffs.

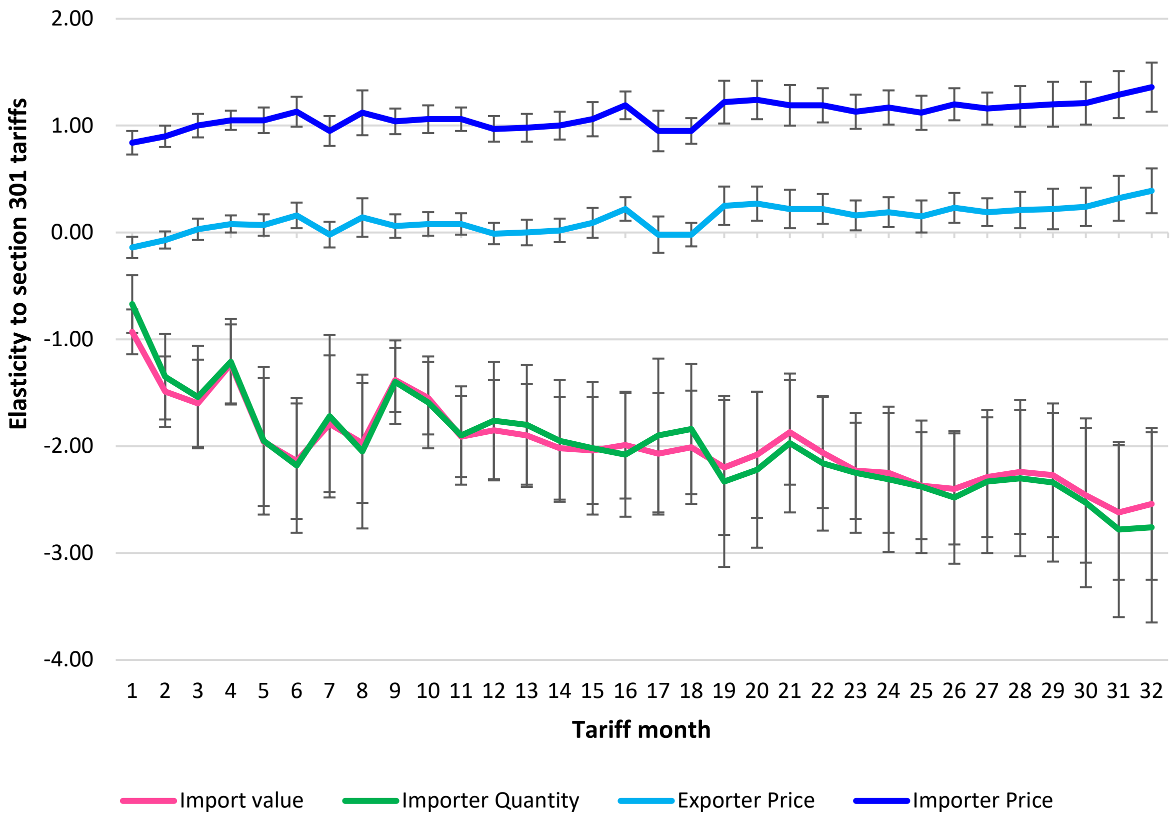
The impacts of section 301 tariffs on prices, quantities, and values of imports are estimated as elasticities, which measure the sensitivity of one variable to another. In this case, the elasticity is the percentage change in the trade statistic (e.g., import quantity) given a percentage change in the section 301 tariff rate. Figure 6.3 shows the average sensitivity of exporter price, importer price, import value, and import quantity to section 301 tariffs at different time horizons. The results show that the elasticity of the exporter price with respect to section 301 tariffs is consistently close to zero, which indicates that the tariffs did not have a significant impact on the price received by Chinese exporters. On the other hand, the elasticity of the importer price with respect to the tariffs is close to one, indicating that importer prices rose about 1 to 1 in response to the tariff increase.[362] This is consistent with the recent work of Amiti et al. (2019), Fajgelbaum et al. (2020), Carvallo et al. (2021), and Jiao et al. (2022), who also largely estimate full pass-through of recent tariff actions from exporters to importers.[363] These findings consistently indicate that the cost of section 301 tariffs have been borne almost entirely by U.S. importers. Chinese exporters have largely maintained the same prices and U.S. importers have absorbed the costs of the tariffs through a combination of less-favorable margins for sellers and higher prices for consumers or downstream buyers.

[362] One unexpected result is that after about the 18th month, the estimated elasticity for importer price is greater than 1 and the estimated elasticity for exporter price is greater than 0. These results are inconsistent with typical economic theory, which implies that the importer price elasticity should be between 0 and 1 and the exporter price elasticity should be between 0 and −1. The current estimates suggest that after 18 months prices in the United States rose beyond the value of the tariffs and prices received in China increased as well. One likely explanation is that these econometric estimates may be capturing additional factors in these later periods that are closely correlated with the tariffs but are not being fully controlled for elsewhere in the model. Alternatively, these later estimates may imply that some of the longer-term reactions to the tariffs were stronger than basic economic theory would predict.

[363] Notably, these studies have arrived at comparable results using different approaches and data samples, underlining the robustness of the findings. Fajgelbaum et al., "The Return to Protectionism," February 1, 2020, 26; Amiti, Redding, and Weinstein, "The Impact of the 2018 Tariffs on Prices and Welfare," November 1, 2019, 197; and Jiao et al., "The Impacts of the U.S. Trade War on Chinese Exporters," 2022, 2–3.

Figure 6.3 Estimated sensitivity of import trade statistics to section 301 tariffs

Underlying data for this figure can be found in appendix E, table E.29.



Source: USITC DataWeb/Census, accessed July 7, 2022, and calculations by USITC.
Note: The I-beams for each line show the 95 percent confidence interval of the estimated elasticity. The elasticity estimates presented in this figure include tariff rates that come from section 232 tariffs on steel and aluminum in addition to section 301 tariffs. This was necessary because the tariff actions occurred during the same time period. A detailed explanation of the regressions that produced this figure and the input variables to that regression are described in appendix G.

The elasticities of import value and import quantity to section 301 tariffs track closely, with an elasticity of about −2 for each. That means that for every 1 percent increase in the tariff rate, import value and import quantity are estimated to fall by about 2 percent. This effect is stronger (that is, the estimated value is more negative) farther out from the first imposition of section 301 tariffs. This could be the result of importers adjusting their supply chain to either import from other sources or buy from domestic sources. Both are longer-term responses to the initial tariff rate change and could take months or years to be observed in the trade data. This result is consistent with the fact that elasticities tend to be higher in the long run compared to the short run.

Estimated Economic Effects of Section 301 Tariffs on Trade, Production, and Prices in the U.S. Market

The previous section looked at all imports that were directly affected by section 301 tariffs and this section looks at the effects on all industries affected by these tariffs. It also looks at the 10 most directly affected sectors but expands the analysis to include effects of section 301 tariffs on additional economic variables that are not reflected in trade data.

Section 301 Tariff Effects on the 10 Most Directly Affected Industries

Estimating the effects of section 301 tariffs on the 10 most directly affected industries is done through sector-specific partial equilibrium models that relate imports from China and other sources to production that occurred in the United States. These models are estimated using data on both trade and domestic production and also take into account the full pass-through result observed in the previous section.

The sector-specific model results hold constant all other events that occurred during each year in order to isolate the estimated impact of section 301 tariffs on Chinese products. For products covered by both section 301 and section 232 tariffs, section 232 tariffs are implicitly accounted for in the actual data and the results therefore show the effect of section 301 tariffs while keeping section 232 tariffs in place. Table 6.4 summarizes the main results of the partial equilibrium modeling by sector in 2021, the last full year considered in this report with section 301 tariffs in effect. The results are expressed as percentage changes in prices and values for imports from China and U.S. domestic production that occurred because of these tariffs. The model results indicate that section 301 tariffs increased the value of domestic production by between 1.2 percent for Computer Equipment and 7.5 percent for Household and Institutional Furniture and Kitchen Cabinets in 2021. Later sections have additional results for 2017 through 2021 for each sector.

Table 6.4 Effect of section 301 tariffs on prices and value of U.S. imports from China and U.S. production in 2021
In percentage changes.

NAICS industry group	Description	Price of imports from China	Price of domestically produced products	Average price in the United States	Tariff-inclusive value of imports from China	Value of U.S. production
3152	Cut and Sew Apparel Manufacturing	14.5	3.1	4.3	−39.1	6.3
3344	Semiconductors and Other Electronic Components	25.0	3.1	4.1	−72.3	6.4
3341	Computer Equipment	1.5	0.6	0.8	−5.3	1.2
3371	Household and Institutional Furniture and Kitchen Cabinets	22.4	3.7	7.1	−25.4	7.5
3363	Motor Vehicle Parts	24.5	1.5	2.3	−50.1	3.0
3359	Other Electrical Equipment and Components	21.2	3.4	5.5	−37.7	7.0
3399	Other Miscellaneous Manufacturing	4.3	1.2	1.7	−11.7	2.4
3343	Audio and Video Equipment	10.6	3.2	4.0	−37.8	6.4
3339	Other General Purpose Machinery	19.2	2.6	3.8	−47.6	5.3
3261	Plastics Products	12.4	1.4	2.3	−23.7	2.8

Source: Calculation by USITC. For a complete description of the model details and inputs, see appendix G.
Note: These values are calculated from the model estimates of 2021, the latest year for which data were available. Results for other years and for other sources are summarized at the end of the chapter. The change in average price is a weighted average that considers the estimated substitutability between products from different sources. The percentage change in "tariff-inclusive value" refers to the change in the value of imports from China, including the value of the section 301 duties themselves but not the value of any other duties.

Aggregate Section 301 Tariff Effects

The section above presents the impact of section 301 tariffs on the 10 most directly affected industries. This section shows the effects on all industries affected by these tariffs. As discussed in chapter 3, these tariffs cover a wide range of goods produced by many industries. When considering NAICS 4-digit industries (as in the above section), most U.S. industries in the agriculture, mining, and manufacturing sectors had products that were subject to section 301 tariffs (94 of 98 NAICS 4-digit industries in sectors 11, 21, 31, 32, and 33 include products that were covered).[364]

[364] Sector 11 is Agriculture, Forestry, Fishing and Hunting; sector 21 is Mining, Quarrying, and Oil and Gas Extraction; and sectors 31–33 are Manufacturing.

The methodology for obtaining aggregate effects of section 301 tariffs is similar to the industry-specific partial equilibrium model used for individual industries. It uses a structural model to connect the change in the tariffs to domestic effects. The partial equilibrium model is estimated using aggregate data on trade and domestic production instead of data on specific industries. The data sources are the same as in the previous section. The same limitations apply, but many are mitigated here by the fact that this is an aggregate analysis. The estimates reflect the impact of section 301 tariffs in each year relative to a counterfactual in which the tariffs were not in place, averaged across years from 2018 to 2021.

The model estimates that section 301 tariffs resulted in a 13 percent drop in the value of U.S. imports from China on average in sectors affected by the tariffs.[365] The model also estimates a 0.2 percent average increase in the price of covered products that are produced domestically and a 0.4 percent average increase in the value of domestic production (shipments) of those products.[366] The 0.4 percent increase in domestic production value is an average effect for all products affected by the tariffs, but, as described earlier in this section, some sectors and products are affected more than others.

Sector-Specific Data and Model Results

The following sections contain data and modeling results for each of the ten NAICS 4-digit industry groups that had the highest import value covered by section 301 tariffs as measured by 2016 and 2017 levels. For each of these 10 most directly affected industries, tables show recent U.S. production output; nontariff-inclusive import values from China and other sources; and nontariff-inclusive price indices for products sourced from the United States, China, and other sources. These tables reflect observable trends and do not address the effect of section 301 tariffs or other factors affecting trade or prices during the time period observed, 2016–21. For each sector, this section then presents the estimated impacts of section 301 tariffs on U.S. imports and gross output, according to the partial equilibrium modeling results.

The data on imports use the same underlying dataset as the data described throughout this chapter, aggregated from HTS statistical reporting numbers to NAICS industry groups. Exporter prices are inferred from nontariff-inclusive AUVs, which means that changes in prices and import values are closely related. The gross output and price data for U.S. production come from the BEA and the BLS, respectively.

In addition to observable data and counterfactual model results, the subsections also reference relevant testimony and written submissions from the Commission’s hearing. These references provide additional context for the results, in some cases supporting the quantitative results and in other cases highlighting important modeling caveats.

Because no section 301 tariffs were imposed before 2018, the model results always have zero estimated impact in 2016 and 2017. Because of the model parameterization, the change in importer prices for

[365] Sectors affected by the tariffs include any sector that includes products falling within the HTS statistical reporting numbers subject to section 301. However, in most cases, these sectors also include products that are not covered by section 301 tariffs. As a result, the effects of the tariffs on the sectors presented in this section are often smaller than those estimated in the “Estimated Sensitivity of U.S. Trade Statistics” section because the tariffs were only applied to the portion of products within each sector that were covered by the tariffs.
[366] Affected products refers to products, which if imported from China, would be subject to section 301 duties.

imports from all other sources besides China are estimated to be zero and are omitted from the results tables. The model prices presented are section 301 tariff-inclusive prices paid by U.S. importers.

Cut and Sew Apparel Manufacturing

Trade, Production, and Price Trends

Table 6.5 U.S. nontariff-inclusive import value and domestic gross output of Cut and Sew Apparel Manufacturing
In billions of U.S. dollars.

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. gross output	11.2	10.6	10.4	11.1	9.2	12.4
Nontariff-inclusive U.S. imports from China	20.7	24.4	25.0	22.5	13.3	17.2
U.S. imports from all other sources	41.7	51.8	55.3	58.5	48.3	61.2

Source: BEA, accessed September 29, 2022 (domestic gross output), USITC DataWeb/Census, accessed July 7, 2022 (imports), and calculations by USITC.
Note: Domestic gross output uses NAICS 315 because the BEA gross output does not break out NAICS 3152 separately.

Imports of Cut and Sew Apparel Manufacturing (3152) from China decreased from about $25 billion in 2018 to about $17 billion in 2021 (table 6.5).[367] Most of these tariffs on Cut and Sew Apparel Manufacturing went into effect with tranches 3 and 4, in September 2018 and 2019, respectively. Imports of these goods from China declined but imports from the rest of the world grew over the time period, with the exception of 2020. Production of apparel in the United States has stayed between about $9 billion and $12 billion since 2016.[368] The price of Cut and Sew Apparel Manufacturing imported from China declined by about 13.5 percent between 2016 and 2021 (table 6.6). The prices of domestic U.S. apparel and U.S. imports of Cut and Sew Apparel Manufacturing from the rest of the world rose in recent years by about 4–7 percent compared to 2016.

Table 6.6 U.S. normalized price levels of imports and domestic production of Cut and Sew Apparel Manufacturing

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. producer price index	100.0	100.9	101.7	103.5	103.9	104.3
Nontariff-inclusive price of U.S. imports from China	100.0	99.2	100.7	99.4	88.5	86.5
Price of U.S. imports from all other sources	100.0	101.3	103.5	106.0	104.7	106.8

Source: BLS (domestic U.S. producer price index) and USITC DataWeb/Census (import prices), accessed July 7, 2022, and June 29, 2022, and calculations by USITC.
Note: Price levels are normalized to be 100.0 in 2016.

[367] There are 2,035 HTS statistical reporting numbers associated with this industry group, including various types of trousers, shirts, and coats.
[368] As noted by table 6.5, the U.S. domestic production gross output described here is for the NAICS 3-digit subsector 315 rather than the NAICS 4-digit industry group 3152. This is due to data limitations.

During the Commission's hearing, several organizations testified about the impacts that section 301 tariffs have had on the apparel industry. The American Apparel & Footwear Association, U.S. Fashion Industry Association, and National Retail Federation all indicated that these tariffs have raised costs and made apparel items more expensive for consumers.[369] The organizations also noted the difficulty and slow speed with which sourcing can be shifted away from China, because alternative suppliers are not available in many cases, which hindered importers' ability to mitigate the costs of the tariffs.

Model Findings

Table 6.7 Estimated impact of section 301 tariffs on value of imports and production of Cut and Sew Apparel Manufacturing (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. gross output	—	—	0.0	1.9	6.2	6.3
Impact on U.S. imports from China	—	—	−0.2	−14.7	−39.9	−39.1
Impact on U.S. imports from all other sources	—	—	0.1	7.1	24.8	25.2

Source: USITC model estimates.
Note: Imports from China are tariff-inclusive estimates.

The model estimates a sizable decline in Cut and Sew Apparel Manufacturing imports from China of up to almost 40 percent in 2020 and 2021, resulting from section 301 tariffs (table 6.7). U.S. production is estimated to have increased by up to 6.3 percent in 2021 in response. The model estimates that U.S. imports of Cut and Sew Apparel Manufacturing shifted toward other sources, with an increase of up to 25.2 percent in 2021 in imports from the rest of the world. This substitutability of these products, and therefore the model-estimated shift in sources of U.S. imports, may be exaggerated for this sector as a result of the aggregated nature of the data—as noted above, industry representatives stated that some apparel from China did not have close substitutes from other sources.[370] These changes also result in increases in the price of imports from China and U.S.-produced apparel of about 15 and 3 percent, respectively, in 2020 and 2021 (table 6.8).

[369] USITC, hearing transcript, July 21, 2022, 510–18 (testimony of Jonathan Gold, National Retail Federation), 518–24 (testimony of Stephen Lamar, American Apparel & Footwear Association), 524–29 (testimony of Julie Hughes, U.S. Fashion Industry Association).
[370] The method used to estimate the substitutability between sources in the analysis for this sector and all other selected sectors is described in appendix G.

This page has been changed to reflect corrections to the original publication.

Table 6.8 Estimated impact of section 301 tariffs on prices of Cut and Sew Apparel Manufacturing (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. producer price index	—	—	0.0	0.9	3.1	3.1
Impact on price of U.S. imports from China	—	—	0.1	4.4	14.7	14.5

Source: USITC model estimates.
Note: Prices are tariff-inclusive estimates.

Semiconductors and Other Electronic Components

Trade, Production, and Price Trends

Table 6.9 U.S. nontariff-inclusive import value and domestic gross output of Semiconductors and Other Electronic Components
In billions of U.S. dollars.

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. gross output	107.1	110.3	116.7	117.7	122.1	130.9
Nontariff-inclusive U.S. imports from China	16.7	23.2	24.3	8.9	9.2	8.8
U.S. imports from all other sources	27.0	57.9	61.6	63.7	65.3	85.9

Source: USITC DataWeb/Census, accessed July 7, 2022 (imports); BEA, accessed September 29, 2022 (domestic gross output), and calculations by USITC.

Imports of Semiconductors and Other Electronic Components (3344) from China decreased significantly after 2018 (table 6.9).[371] This decline followed several years of annual growth. U.S. production and imports sourced from the rest of the world increased steadily between 2016 and 2021. U.S. production increased by about $24 billion between 2016 and 2021 (about a 22 percent increase during that time), but imports sourced from the rest of the world, other than China, tripled during that time period.

The prices of these products, relative to prices in 2016, have varied during this time period as well (table 6.10), which would have contributed to the fluctuations in the import value trends. As of 2021, the price of U.S.-produced products was about 45 percent lower than in 2016 while the price of imports from China was 8 percent higher and the price of imports from the rest of the world was more than 50 percent higher. The price of imports from China increased by up to 125 percent from 2016 to 2018. The rapid upward trend began in 2017.[372]

[371] There are 234 HTS statistical reporting numbers associated with NAICS industry group 3344, including semiconductor devices, circuit assemblies, and solar cells.
[372] Note that a global semiconductor shortage beginning in 2020 has also likely impacted U.S. trade, production, and prices in recent years. For more information, see Max, "Understanding the Current Global Semiconductor Shortage," August 19, 2022.

Table 6.10 U.S. normalized price levels of imports and domestic production of Semiconductors and Other Electronic Components

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. producer price index	100.0	56.8	56.0	55.3	54.8	54.6
Nontariff-inclusive price of U.S. imports from China	100.0	169.8	225.1	119.3	97.6	108.2
Price of U.S. imports from all other sources	100.0	128.0	151.0	136.6	144.4	156.2

Source: BLS (domestic Producer Price Index) and USITC DataWeb/Census (import prices), accessed July 7, 2022, and June 29, 2022; calculations by USITC.
Note: Price levels are normalized to be 100.0 in 2016.

Model Findings

Table 6.11 Estimated impact of section 301 tariffs on value of imports and production of Semiconductors and Other Electronic Components (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. gross output	—	—	1.2	5.9	7.8	6.4
Impact on U.S. imports from China	—	—	−15.4	−66.2	−70.6	−72.3
Impact on U.S. imports from all other sources	—	—	5.5	29.4	40.3	32.2

Source: USITC model estimates.
Note: Imports from China are tariff-inclusive estimates.

The model of Semiconductors and Other Electronic Components estimates a large decrease in imports from China as a result of section 301 tariffs, up to 72 percent in 2021 (table 6.11). U.S. production of these products is estimated to have increased by as much as 7.8 percent in 2020 in response. Imports from the rest of the world increased as well, ranging from almost 6 percent of all imports in 2018 to 30–40 percent in recent years. Prices inclusive of section 301 tariffs on imports from China were estimated to rise by as much as 25 percent in 2020 and 2021; prices of U.S.-produced products rose by about 3–4 percent (table 6.12).

Table 6.12 Estimated impact of section 301 tariffs on prices of Semiconductors and Other Electronic Components (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. producer price index	—	—	0.6	2.9	3.8	3.1
Impact on price of U.S. imports from China	—	—	3.2	21.1	25.0	25.0

Source: USITC model estimates.
Note: Prices are tariff-inclusive estimates.

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Computer Equipment

Trade, Production, and Price Trends

Table 6.13 U.S. nontariff-inclusive import value and domestic gross output of Computer Equipment
In billions of U.S. dollars.

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. gross output	36.1	33.4	36.2	34.2	35.8	39.0
Nontariff-inclusive U.S. imports from China	50.9	58.4	61.3	54.2	60.0	68.9
U.S. imports from all other sources	34.2	38.5	46.4	50.9	55.8	61.0

Source: USITC DataWeb/Census, accessed July 7, 2022 (imports); BEA, accessed September 29, 2022 (domestic gross output); calculations by USITC.

Imports of Computer Equipment (3341) from China mostly grew between 2016 and 2021 but exhibited a modest decline in 2019 that has since rebounded (table 6.13).[373] U.S. production of Computer Equipment has fluctuated between about $33 billion and $39 billion during that time period but has tended toward higher levels in recent years. Imports from the rest of the world have grown steadily since 2016 but remain lower than total imports from China. Prices of foreign imports have grown compared to 2016, but prices for U.S.-produced Computer Equipment have dropped during that time period (table 6.14).

Table 6.14 U.S. normalized price levels of imports and domestic production of Computer Equipment

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. producer price index	100.0	98.2	97.7	94.0	91.7	92.4
Nontariff-inclusive price of U.S. imports from China	100.0	108.8	113.8	103.0	108.2	110.9
Price of U.S. imports from all other sources	100.0	108.7	126.9	98.4	111.7	116.2

Source: BLS (domestic Producer Price Index) and USITC DataWeb/Census (import prices), accessed July 7, 2022, and June 29, 2022; calculations by USITC.
Note: Price levels are normalized to be 100.0 in 2016.

According to testimony from the Commission's hearing, many Computer Equipment products such as information and communication technology devices, some of which may be included in this NAICS industry group, have complex supply chains because of strict specification and prequalification requirements from purchasers, making it difficult to switch sourcing in response to section 301 tariffs. Consumer demand for Computer Equipment grew significantly during the COVID-19 pandemic. This

[373] There are 48 HTS statistical reporting numbers associated with this NAICS industry group, including printers, cash registers, disk drives, storage units, data processing units, automated teller machines, and other similar devices.

increase in demand further exacerbated supply chain challenges during that time, including—according to at least one industry representative—some challenges created by section 301 tariffs.[374]

Model Findings

Table 6.15 Estimated impact of section 301 tariffs on value of imports and production of Computer Equipment (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. gross output	—	—	0.3	1.3	1.5	1.2
Impact on U.S. imports from China	—	—	−1.3	−5.9	−6.7	−5.3
Impact on U.S. imports from all other sources	—	—	1.5	6.3	7.5	6.0

Source: USITC model estimates.
Note: Imports from China are tariff-inclusive estimates.

The model estimates a 5–7 percent decline in imports of Computer Equipment from China as a result of section 301 tariffs (table 6.15). Domestic production saw an increase of slightly more than 1 percent as a result of the tariffs. Imports from the rest of the world are estimated to have increased by about 6.0–7.5 percent between 2019 and 2021 in response to section 301 tariffs. Similar to the Apparel model, the level of U.S. imports that could have switched between China and other sources as a result of the aggregated level of the estimation is hard to identify. Prices for imports from China are estimated to have increased by about 1–2 percent, and prices of U.S.-produced equipment are estimated to have risen by less than 1 percent (table 6.16).

Table 6.16 Estimated impact of section 301 tariffs on prices of Computer Equipment (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. producer price index	—	—	0.2	0.6	0.8	0.6
Impact on price of U.S. imports from China	—	—	0.4	1.6	1.9	1.5

Source: USITC model estimates.
Note: Prices are tariff-inclusive estimates.

[374] USITC, hearing transcript, July 21, 2022, 821 (testimony of Naomi Wilson, Information Technology Industry Council).

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Household and Institutional Furniture and Kitchen Cabinets

Trade, Production, and Price Trends

Table 6.17 U.S. nontariff-inclusive import value and domestic gross output of Household and Institutional Furniture and Kitchen Cabinets
In billions of U.S. dollars.

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. gross output	39.1	39.0	40.7	38.5	39.9	44.7
Nontariff-inclusive U.S. imports from China	15.2	18.3	18.2	15.0	13.1	15.8
U.S. imports from all other sources	11.3	12.8	13.4	16.3	19.2	24.8

Source: USITC DataWeb/Census, accessed July 7, 2022 (imports); BEA, accessed September 29, 2022 (domestic gross output); calculations by USITC.

Imports of Household and Institutional Furniture and Kitchen Cabinets (3371) (hereafter “furniture”) from China declined in the years after 2018 by about $3–5 billion (table 6.17).[375] U.S. production of this furniture has remained steady at about $40 billion per year but experienced an increase in 2021 to $44.7 billion. Imports of furniture from the rest of the world have grown steadily from $11.3 billion in 2016 to $24.8 billion in 2021. Notably, this growth appears to have accelerated considerably since 2018. Prices for furniture from China, the United States, and the rest of the world have increased since 2016 and rose significantly from 2020 to 2021 (table 6.18). Although the highest price increase has been for imports from the rest of the world, Chinese and U.S. furniture experienced similar levels of increase in 2021.

Table 6.18 U.S. normalized price levels of imports and domestic production of Household and Institutional Furniture and Kitchen Cabinets

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. producer price index	100.0	101.1	102.9	105.5	107.0	114.1
Nontariff-inclusive price of U.S. imports from China	100.0	92.7	107.8	111.6	107.5	117.7
Price of U.S. imports from all other sources	100.0	101.3	115.2	116.2	108.0	130.1

Source: BLS (domestic Producer Price Index) and USITC DataWeb/Census (import prices), accessed July 7, 2022, and June 29, 2022; calculations by USITC.
Note: Price levels are normalized to be 100.0 in 2016.

According to one institutional furniture company at the hearing, section 301 tariffs have raised prices on imports, and sourcing outside of China can be more expensive. Purchasers of institutional furniture often budget years in advance, making it difficult for domestic sellers to raise prices in response to the

[375] There are 127 HTS statistical reporting numbers associated with this NAICS industry group, including beds, cribs, seats, and other furniture made out of wood, metal, or other materials.

additional costs incurred by the tariffs.[376] Industry analysts also note demand for home furnishings and office furniture for at-home uses increased significantly during the COVID-19 pandemic.[377]

Model Findings

Table 6.19 Estimated impact of section 301 tariffs on value of imports and production of Household and Institutional Furniture and Kitchen Cabinets (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. gross output	—	—	1.2	6.4	7.4	7.5
Impact on U.S. imports from China	—	—	−3.8	−19.7	−25.4	−25.4
Impact on U.S. imports from all other sources	—	—	2.4	13.9	16.2	16.3

Source: USITC model estimates.
Note: Imports from China are tariff-inclusive estimates.

The model estimates a decrease in furniture imports from China of about 25 percent in recent years as a result of section 301 tariffs (table 6.19). Also because of the tariffs, U.S. production is estimated to have increased by about 7.5 percent and imports from the rest of the world grew by about 16 percent, showing a shift from Chinese-sourced furniture to U.S. and other foreign sources. Prices of furniture from China are estimated to have increased by about 22 percent in response to the tariffs (table 6.20). The prices for U.S. produced furniture increased by a little less than 4 percent. Effects on the prices of imports from elsewhere are estimated to be not significant.

Table 6.20 Estimated impact of section 301 tariffs on prices of Household and Institutional Furniture and Kitchen Cabinets (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. producer price index	—	—	0.6	3.2	3.7	3.7
Impact on price of U.S. imports from China	—	—	2.9	17.3	22.4	22.4

Source: USITC model estimates.
Note: Prices are tariff-inclusive estimates.

[376] USITC, hearing transcript, July 21, 2022, 537–38 (testimony on Christian Curt, Home Furnishings Resource Group).
[377] Bhattarai, “Booming Furniture Sales Mean ‘Unprecedented’ Delays for Sofas and Desks,” March 8, 2021.

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Motor Vehicle Parts

Trade, Production, and Price Trends

Table 6.21 U.S. nontariff-inclusive import value and domestic gross output of Motor Vehicle Parts
In billions of U.S. dollars.

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. gross output	268.0	263.4	275.5	268.5	228.7	250.2
Nontariff-inclusive U.S. imports from China	12.8	13.2	15.2	12.2	9.5	12.3
U.S. imports from all other sources	95.0	93.5	101.0	100.8	86.0	104.9

Source: USITC DataWeb/Census, accessed July 7, 2022 (imports); BEA, accessed September 29, 2022 (domestic gross output); calculations by USITC.

Imports of Motor Vehicle Parts (3363) from China have dipped somewhat (about $3–5 billion) compared to 2018; however, import values in 2019 and 2021 are similar to those for 2016 and 2017 (table 6.21).[378] U.S production of vehicle parts has also declined in recent years from a high of $275.5 billion to $250.2 billion in 2021. Imports of vehicle parts from the rest of the world have grown slightly in recent years to $104.9 billion in 2021. Since 2016, prices of imports from China and the rest of the world have risen by about 34 percent and 25 percent, respectively (table 6.22). The price of U.S.-produced parts increased by a more modest 5 percent by 2021.

Table 6.22 U.S. normalized price levels of imports and domestic production of Motor Vehicle Parts

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. producer price index	100.0	99.9	101.2	101.5	101.8	105.2
Nontariff-inclusive price of U.S. imports from China	100.0	107.8	119.3	119.0	126.9	133.6
Price of U.S. imports from all other sources	100.0	106.4	109.0	111.8	118.4	125.1

Source: BLS (domestic Producer Price Index) and USITC DataWeb/Census (import prices), accessed July 7, 2022, and June 29, 2022; calculations by USITC.
Note: Price levels are normalized to be 100.0 in 2016.

Several Motor Vehicle Parts associations and manufacturers were represented at the Commission's public hearing. According to the Auto Care Association, many of its members—which work extensively with suppliers in China—have reported price increases of more than 25 percent and reduced profitability.[379] Webb Wheel Products, a manufacturer of motor vehicle parts, testified in support of section 301 tariffs, which they say contributed to increased demand for domestically produced parts and have led to increased profitability and capacity investments.[380] Aside from section 301 tariffs, reduced domestic production of motor vehicles between 2018 and 2020 may have led to decreased domestic

[378] There are 176 HTS statistical reporting numbers associated with this NAICS industry group, including engines, wheels, bodies, furniture, and other components for vehicles.
[379] USITC, hearing transcript, July 21, 2022, 444 (testimony of Bill Hanvey, Autocare Association).
[380] USITC, hearing transcript, July 21, 2022, 447–49 (testimony of Jonathon Capps, Webb Wheel Products).

output of parts during those years.[381] More recently, the semiconductor shortage has led to shortages in numerous automotive parts.[382] In addition, the United States-Mexico-Canada Agreement (USMCA) Automotive Rules of Origin (ROOs), established in 2019, increased regional value content requirements and also required 70 percent of vehicle manufacturers' steel and aluminum purchases to originate in North America. It is possible that these new rules led to a reduction in imports of motor vehicle parts from China. These rules were also expected to increase domestic production of automotive parts.[383] According to a recent USTR report on USMCA Automotive ROOs, the rules have been effective in incentivizing investment in domestic production.[384]

Model Findings

Table 6.23 Estimated impact of section 301 tariffs on value of imports and production of Motor Vehicle Parts (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. gross output	—	—	0.3	2.0	2.8	3.0
Impact on U.S. imports from China	—	—	−9.6	−42.5	−50.3	−50.1
Impact on U.S. imports from all other sources	—	—	0.8	5.7	8.0	8.5

Source: USITC model estimates.
Note: Imports from China are tariff-inclusive estimates.

The model estimates that section 301 tariffs had a large impact on imports of Motor Vehicle Parts from China, reducing values by more than 50 percent in 2020 and 2021 (table 6.23). The model also estimates that domestic production and imports from other sources rose by about 3 percent and 8 percent, respectively because of section 301 tariffs. Prices for Chinese parts were estimated to have increased by nearly 25 percent and those for U.S. parts to have increased by about 1.5 percent (table 6.24) because of the tariffs. The prices of other imports were not significantly affected by the tariffs according to model estimates.[385]

[381] OICA, "Motor Vehicle Production Statistics," accessed November 3, 2022.
[382] Coffin et al., "The Roadblocks of the COVID-19 Pandemic in the U.S. Automotive Industry," June 2022.
[383] USTR, "USMCA Fact Sheet: Automobiles and Automotive Parts," accessed November 7, 2022.
[384] USTR, "*Report to Congress on the Operation of the United States-Mexico-Canada Agreement with Respect to Trade in Automotive Goods*," July 1, 2022.
[385] Note that the model counterfactual estimates the impact of section 301 tariffs only. Section 232 tariffs are not explicitly considered in the model, but they factor into the baseline values and contributed to the estimation of model parameters. That is, the model results show the effect of removing section 301 tariffs and keeping applicable section 232 tariffs in place.

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Table 6.24 Estimated impact of section 301 tariffs on prices of Motor Vehicle Parts (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. producer price index	—	—	0.2	1.0	1.4	1.5
Impact on price of U.S. imports from China	—	—	3.1	18.8	24.5	24.5

Source: USITC model estimates.
Note: Prices are tariff-inclusive estimates.

Other Electrical Equipment and Components

Trade, Production, and Price Trends

Table 6.25 U.S. nontariff-inclusive import value and domestic gross output of Other Electrical Equipment and Components
In billions of U.S. dollars.

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. gross output	49.7	48.8	51.7	52.2	50.1	58.5
Nontariff-inclusive U.S. imports from China	10.2	12.7	15.1	11.9	11.0	14.5
U.S. imports from all other sources	17.0	22.4	25.9	30.0	32.4	40.5

Source: USITC DataWeb/Census, accessed July 7, 2022 (imports); BEA, accessed September 29, 2022 (domestic gross output); calculations by USITC.

Imports of Other Electrical Equipment and Components (3359) (hereafter "electrical equipment") from China grew steadily from 2016 to 2018, then dipped after 2018 (table 6.25).[386] However, imports from China largely rebounded in 2021 and were only slightly lower than the peak imports values of 2018. Domestic production of electrical equipment grew overall between 2016 and 2021, with small declines in 2017 and 2020. Imports from the rest of the world have grown steadily since 2016. Prices of Chinese- and U.S.-produced electrical equipment have increased since 2016, with especially large growth for both in 2021 (table 6.26). The prices of imports from the rest of the world have declined.

[386] There are 201 HTS statistical reporting numbers associated with this NAICS industry group, including batteries and other electrical equipment like conductors, resistors, terminals, power supplies, and some types of related electronics.

Table 6.26 U.S. normalized price levels of imports and domestic production of Other Electrical Equipment and Components

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. producer price index	100.0	101.9	108.6	110.3	109.9	122.9
Nontariff-inclusive price of U.S. imports from China	100.0	88.7	92.7	87.6	110.1	132.7
Price of U.S. imports from all other sources	100.0	94.7	98.5	104.5	101.7	91.5

Source: BLS (domestic Producer Price Index) and USITC DataWeb/Census (import prices), accessed July 7, 2022, and June 29, 2022; calculations by USITC.
Note: Price levels are normalized to be 100.0 in 2016.

Several associations and manufacturers of electrical equipment were represented at the Commission's public hearing. Many of these witnesses noted the ways in which section 301 tariffs have increased prices and complicated supply chains because of the inability to source many of these items in adequate numbers from other countries. In particular, they highlighted these impacts for batteries (in this NAICS industry group).[387]

Model Findings

Table 6.27 Estimated impact of section 301 tariffs on value of imports and production of Other Electrical Equipment and Components (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. gross output	—	—	1.4	5.7	7.0	7.0
Impact on U.S. imports from China	—	—	−9.4	−33.1	−39.4	−37.7
Impact on U.S. imports from all other sources	—	—	3.7	16.1	20.1	20.1

Source: USITC model estimates.
Note: Imports from China are tariff-inclusive estimates.

The Commission's model estimates a relatively large decline in imports of electrical equipment from China of up to nearly 40 percent in 2020 and 2021 (table 6.27) because of section 301 tariffs. U.S. production is estimated to have increased by about 7 percent, and imports from the rest of the world have increased by more than 20 percent because of the tariffs. Prices for imports from China and U.S.-produced electrical equipment increased by more than an estimated 22 percent and 3 percent, respectively, because of section 301 tariffs (table 6.28).

[387] USITC, hearing transcript, July 21, 2022, 438–43 (testimony of Patrick Tripple, Inventus). Although not in this NAICS industry group, the same impacts were highlighted for communications equipment. USITC, hearing transcript, July 22, 2022, 805–11 (testimony of Ed Brzytwa, Consumer Technology Association).

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Table 6.28 Estimated impact of section 301 tariffs on prices of Other Electrical Equipment and Components (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. producer price index	—	—	0.7	2.8	3.4	3.4
Impact on price of U.S. imports from China	—	—	4.0	17.5	22.2	21.2

Source: USITC model estimates.
Note: Prices are tariff-inclusive estimates.

Other Miscellaneous Manufacturing

Trade, Production, and Price Trends

Table 6.29 U.S. nontariff-inclusive import value and domestic gross output of Other Miscellaneous Manufacturing
In billions of U.S. dollars.

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. gross output	65.2	64.7	68.3	68.2	65.4	68.0
Nontariff-inclusive U.S. imports from China	34.1	35.8	37.8	36.3	34.8	48.4
U.S. imports from all other sources	47.5	47.6	50.4	48.5	42.0	63.5

Source: USITC DataWeb/Census, accessed July 7, 2022 (imports); BEA, accessed September 29, 2022 (domestic gross output); calculations by USITC.

Imports of Other Miscellaneous Manufacturing (3399) (hereafter manufactured commodities) from China have grown since 2016 but did experience a dip in 2019 and 2020 (table 6.29).[388] With the exception of 2020, U.S. production of these commodities has remained largely the same since 2018. Imports from the rest of the world exhibited trends similar to imports from China—steady growth except for a small decline in 2019 and 2020. Prices for imports from China declined by about 15 percent in 2020 and 2021 compared to 2016 (table 6.30). The price of U.S. manufactured commodities and U.S. imports from the rest of the world increased by about 12 percent and 26 percent, respectively, in 2021, relative to 2016. The high price of U.S. imports from the rest of the world corresponded to the high U.S. import value from the rest of the world in 2021.

[388] There are 541 HTS statistical reporting numbers associated with this NAICS industry group, including toys, balls and other sports equipment, pinball and arcade machines, instruments, lighters, pipes and pipe bowls, burial caskets of wood, diamonds and gemstones for various purposes, illuminated signs, and many other products.

Table 6.30 U.S. normalized price levels of imports and domestic production of Other Miscellaneous Manufacturing

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. producer price index	100.0	101.1	102.4	106.6	108.6	112.0
Nontariff-inclusive price of U.S. imports from China	100.0	96.9	100.6	100.0	86.2	83.0
Price of U.S. imports from all other sources	100.0	105.7	108.5	107.1	100.9	125.6

Source: BLS (domestic PPI) and USITC DataWeb/Census (import prices), accessed July 7, 2022, and June 29, 2022; calculations by USITC.
Note: Price levels are normalized to be 100.0 in 2016.

During the hearing, Vista Outdoor, a producer and retailer of sporting and outdoor goods, spoke about the ways in which section 301 tariffs have negatively affected its ability to import and sell bicycle helmets, sporting apparel, camping equipment, and multiple other products included in this manufacturing industry. As with others, it noted a lack of alternative producers outside of China.[389]

Model Findings

Table 6.31 Estimated impact of section 301 tariffs on value of imports and production of Other Miscellaneous Manufacturing (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. gross output	—	—	0.1	0.9	2.5	2.4
Impact on U.S. imports from China	—	—	−0.3	−5.1	−12.3	−11.7
Impact on U.S. imports from all other sources	—	—	0.2	3.0	9.0	8.7

Source: USITC model estimates.
Note: Imports from China are tariff-inclusive estimates.

The model estimates an approximately 12 percent reduction in imports of manufactured commodities from China in 2020 and 2021 as a result of section 301 tariffs (table 6.31). U.S. production is estimated to have increased by about 2.5 percent in response to the tariffs. Imports from the rest of the world have increased by about 9 percent because of section 301 tariffs. Prices of imports from China and U.S.-manufactured products are estimated to increase by a little more than 4 percent and 1 percent, respectively, from the imposition of section 301 tariffs (table 6.32).

[389] USITC, hearing transcript, July 22, 2022, 823–27 (testimony of Fred Ferguson, Vista Outdoor).

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Table 6.32 Estimated impact of section 301 tariffs on prices of Other Miscellaneous Manufacturing (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. producer price index	—	—	0.0	0.4	1.3	1.2
Impact on price of U.S. imports from China	—	—	0.1	1.7	4.5	4.3

Source: USITC model estimates.
Note: Prices are tariff-inclusive estimates.

Audio and Video Equipment

Trade, Production, and Price Trends

Table 6.33 U.S. nontariff-inclusive import value and domestic gross output of Audio and Video Equipment
In billions of U.S. dollars.

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. gross output	3.0	2.7	3.0	3.7	4.8	8.1
Nontariff-inclusive U.S. imports from China	11.4	12.6	13.6	12.8	12.0	12.2
U.S. imports from all other sources	19.1	19.1	17.5	19.1	21.8	29.4

Source: USITC DataWeb/Census, accessed July 7, 2022 (imports); BEA, accessed September 29, 2022 (domestic gross output); calculations by USITC.

Imports of Audio and Video Equipment (3343) from China declined in 2019–21 after a recent high of $13.6 billion in 2018 (table 6.33).[390] U.S. production and imports from the rest of the world have grown rapidly since 2018. Prices of imports from China were well above 2016 price levels in 2019 and later, ranging from 23 percent to 69 percent above 2016 prices. Prices of imports from the rest of the world mostly saw more modest increases until rising to 11 percent above 2016 prices in 2020 and jumping to almost 70 percent above 2016 prices in 2021 (table 6.34). Prices of domestically produced Audio and Video Equipment rose by less than 8 percent by 2021, which is less than the price increases for imports.

[390] There are 152 HTS statistical reporting numbers associated with this NAICS industry group, including microphones, speakers, headphones, sound and video recording equipment, music and video playing equipment, motor vehicle radios, video projectors, and video monitors and television parts.

Table 6.34 U.S. normalized price levels of imports and domestic production of Audio and Video Equipment

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. producer price index	100.0	100.0	99.5	100.8	103.4	107.5
Nontariff-inclusive price of U.S. imports from China	100.0	106.5	102.7	123.1	169.2	143.3
Price of U.S. imports from all other sources	100.0	102.4	100.3	97.9	111.2	169.5

Source: BLS (domestic Producer Price Index) and USITC DataWeb/Census (import prices), accessed July 7, 2022, and June 29, 2022; calculations by USITC.
Note: Price levels are normalized to be 100.0 in 2016.

During the Commission's hearing, U.S. liquid crystal display (LCD) television manufacturer Element Electronics spoke about the difficulties it has faced since the imposition of section 301 tariffs. Although supportive of efforts to reshore U.S. production of televisions, Element Electronics argued that section 301 tariffs as implemented were ineffective at doing so. In their current form, the tariffs raised the costs of important television components from China and made it more cost effective to import fully assembled televisions from other foreign sources, increasing competition.[391] Industry analysts also note that the semiconductor shortage has impacted production of audio and video equipment since 2020.[392]

Model Findings

Table 6.35 Estimated impact of section 301 tariffs on value of imports and production of Audio and Video Equipment (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. gross output	—	—	0.2	2.8	7.3	6.4
Impact on U.S. imports from China	—	—	−1.3	−15.8	−33.4	−37.8
Impact on U.S. imports from all other sources	—	—	1.0	14.4	40.7	35.4

Source: USITC model estimates.
Note: Imports from China are tariff-inclusive estimates.

The model estimates that section 301 tariffs reduced imports of Audio and Video Equipment from China by 30–40 percent in recent years (table 6.35). Imports from the rest of the world are estimated to have increased by roughly the same percentage as Chinese import declines because of section 301 tariffs. Domestic production is estimated to have increased by about 6–7 percent because of section 301 tariffs. The tariffs are estimated to have increased the price of imports from China by a little more than 10 percent and the price of U.S. equipment by 3–4 percent (table 6.36).

391 USITC, hearing transcript, July 22, 2022, 811–23 (testimony of David Baer, Element Electronics).
392 Schmidt, "How the Global Chip Shortage Is Affecting Audio Visual Industry," May 28, 2022.

This page has been changed to reflect corrections to the original publication.

Table 6.36 Estimated impact of section 301 tariffs on prices of Audio and Video Equipment (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. producer price index	—	—	0.1	1.4	3.6	3.2
Impact on price of U.S. imports from China	—	—	0.3	4.0	10.2	10.6

Source: USITC model estimates.
Note: Prices are tariff-inclusive estimates.

Other General Purpose Machinery

Trade, Production, and Price Trends

Table 6.37 U.S. nontariff-inclusive import value and domestic gross output of Other General Purpose Machinery
In billions of U.S. dollars

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. gross output	97.2	102.9	109.5	112.0	101.3	111.9
Nontariff-inclusive U.S. imports from China	9.3	11.1	12.5	10.9	10.9	12.7
U.S. imports from all other sources	33.3	39.7	43.9	43.5	41.2	50.7

Source: USITC DataWeb/Census, accessed July 7, 2022 (imports); BEA, accessed September 29, 2022 (domestic gross output); calculations by USITC.
Note: Domestic gross output in this table uses NAICS 3160 because the BEA gross output data do not break out NAICS 3162 separately.

Imports of Other General Purpose Machinery (3339) (hereafter other machinery) from China have generally grown since 2016 (table 6.37).[393] These imports experienced a dip in 2019 and 2020, but they rebounded in 2021. Imports from the rest of the world have grown as well but experienced a similar temporary decline in 2019 and 2020. The prices of imports from China and the rest of the world dipped in 2020 but have otherwise increased consistently since 2016, resulting in prices that were about 35 percent and 27 percent, respectively, above 2016 levels (table 6.38).

[393] There are 337 HTS statistical reporting numbers associated with this HTS industry group, including hydraulic motors and hydraulic pumps, vacuum pumps and air compressors, purification machines, machines for sealing and labeling, scales, jacks and hoists, machinery for welding and soldering, fork trucks and other work trucks, some types of hand tools, and some types of furnaces and ovens, as well as parts related to the listed types of machinery.

Table 6.38 U.S. normalized price levels of imports and domestic production of Other General Purpose Machinery

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. producer price index	100.0	101.6	104.6	107.2	108.7	114.5
Nontariff-inclusive price of U.S. imports from China	100.0	104.2	117.5	129.2	123.4	135.4
Price of U.S. imports from all other sources	100.0	118.6	122.7	127.1	117.2	127.4

Source: BLS (domestic Producer Price Index) and USITC DataWeb/Census (import prices), accessed July 7, 2022, and June 29, 2022; calculations by USITC.
Note: Price levels are normalized to be 100.0 in 2016.

Model Findings

Table 6.39 Estimated impact of section 301 tariffs on value of imports and production of Other General Purpose Machinery (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. gross output	—	—	1.3	3.9	5.4	5.3
Impact on U.S. imports from China	—	—	−19.3	−42.1	−47.1	−47.6
Impact on U.S. imports from all other sources	—	—	4.3	13.5	18.9	18.8

Source: USITC model estimates.
Note: Imports from China are tariff-inclusive estimates.

The model estimates that section 301 tariffs significantly reduced imports from China by about 42–48 percent per year (table 6.39). Imports from the rest of the world are estimated to have increased by up to about 19 percent in response to the tariffs. U.S. production of other machinery is estimated to have increased by a little more than 5 percent because of section 301 tariffs. The model estimates the tariffs also increased the price of machinery by 19 percent for Chinese other machinery and less than 3 percent for U.S. other machinery (table 6.40).

Table 6.40 Estimated impact of section 301 tariffs on prices of Other General Purpose Machinery (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. producer price index	—	—	0.6	1.9	2.6	2.6
Impact on price of U.S. imports from China	—	—	5.7	15.6	19.0	19.2

Source: USITC model estimates.
Note: Prices are tariff-inclusive estimates.

Plastics Products

Trade, Production, and Price Trends

Table 6.41 U.S. nontariff-inclusive import value and domestic gross output of Plastics Products
In billions of U.S. dollars.

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. gross output	189.7	194.1	206.6	206.2	199.3	207.0
Nontariff-inclusive U.S. imports from China	10.2	13.6	15.9	15.6	17.7	21.1
U.S. imports from all other sources	14.4	18.6	20.2	21.2	22.1	27.7

Source: USITC DataWeb/Census, accessed July 7, 2022 (imports); BEA, accessed September 29, 2022 (domestic gross output); calculations by USITC.

Imports of Plastics Products (3261) from China have grown fairly consistently since 2016 to a recent high of $21.1 billion in 2021 (table 6.41), although significant fluctuations in price during that time period greatly affected the import value (table 6.42).[394] Imports from the rest of the world have followed a smaller upward trend but with lesser fluctuations in price. U.S. production of Plastics Products has shown some growth, but a distinct upward trend is less clear because values have tended to fluctuate year over year, with the largest production value (2021) corresponding to the highest price level. The price of Chinese imports has grown substantially in recent years, rising by 81 percent in 2021 relative to 2016 (table 6.42). The prices of U.S. products and those from the rest of the world have increased too, but by more modest amounts—20 percent and 6 percent, respectively, compared to 2016.

Table 6.42 U.S. normalized price levels of imports and domestic production of Plastics Products

Item	2016	2017	2018	2019	2020	2021
Domestic U.S. producer price index	100.0	102.2	105.9	106.2	105.4	119.7
Nontariff-inclusive price of U.S. imports from China	100.0	97.3	121.7	90.7	148.3	181.2
Price of U.S. imports from all other sources	100.0	79.5	95.5	82.2	90.1	106.0

Source: BLS (domestic Producer Price Index) and USITC DataWeb/Census (import prices), accessed July 7, 2022, and June 29, 2022; calculations by USITC.
Note: Price levels are normalized to be 100.0 in 2016.

[394] There are 171 HTS statistical reporting numbers associated with this NAICS industry group, including floor coverings, doors and decking, crates and boxes, sacks and bags, dishes, disposable nonmedical gloves, buckets, trays, and other articles and materials made out of plastic.

Model Findings

Table 6.43 Estimated impact of section 301 tariffs on value of imports and production of Plastics Products (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. gross output	—	—	0.3	1.6	2.8	2.8
Impact on U.S. imports from China	—	—	−3.9	−19.6	−25.3	−23.7
Impact on U.S. imports from all other sources	—	—	0.6	4.1	6.9	6.9

Source: USITC model estimates.
Note: Imports from China are tariff-inclusive estimates.

The model estimates that section 301 tariffs decreased imports of Plastics Products from China by as much as 25 percent compared to the baseline (table 6.43). Domestic production and imports from the rest of the world were estimated to have increased by about 3 percent and 7 percent, respectively, in response to the tariffs. The tariffs are estimated to have increased the price of imports from China by up to about 13 percent (table 6.44). Prices of U.S.-produced products are estimated to have increased by more than 1 percent because of section 301 tariffs.

Table 6.44 Estimated impact of section 301 tariffs on prices of Plastics Products (difference between actual and counterfactual as percentage of counterfactual)
— (em dash) = not applicable.

Item	2016	2017	2018	2019	2020	2021
Impact on domestic U.S. producer price index	—	—	0.1	0.8	1.4	1.4
Impact on price of U.S. imports from China	—	—	1.6	9.3	13.2	12.4

Source: USITC model estimates.
Note: Prices are tariff-inclusive estimates.

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Additional Views of Commissioner Jason E. Kearns

This report paints an incomplete picture, in my view. As directed,[395] this report addresses the short-term impact of the section 232 and section 301 tariffs on trade, production, and prices in some of the most affected industries in the United States. It does not describe where we have been or where we are going in our trade relations with China. But understanding that history and future is critical as we assess the costs and the benefits of the section 232 and 301 tariffs.

The report estimates the economic impact of the section 232 and 301 tariffs; it does not describe or estimate the impact of China's unfair trade practices that led to the imposition of those tariffs, nor does it describe the serious and persistent efforts over many years to persuade China to act more responsibly as a trading partner, nor how those efforts yielded paltry results. It describes the price increases that result from the tariffs; it does not describe how the extraordinarily low "China price"[396] is based on massive Chinese government subsidies and other trade-distorting policies, exploitative labor practices, and environmental degradation that "have helped keep the ordinary forces of a market economy at bay."[397] Nor does it describe how those artificially depressed prices contributed to the "China trade shock"[398] in the United States that forced many U.S. businesses to close their doors and move their factories to China and other low-cost countries to survive, resulting in the loss of millions of American jobs with a range of dire economic and social consequences.[399] It describes how the tariffs reduced imports from China of products like semiconductors; it does not address the potential long-term strategic geopolitical, economic, and national security benefits of these actions—to move us toward more resilient supply chains for such critical materials, making us less dependent on an unreliable trading partner with principles, values, and interests demonstrably different from our own.

In short, the report estimates some of the costs and benefits associated with the section 232 and 301 actions; it does not describe or estimate the considerable costs of inaction (in other words, the costs of

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[395] Pursuant to 19 U.S.C. § 1332(g), the Commission shall conduct investigations as requested by the President, the Committee on Ways and Means of the House of Representatives, the Committee on Finance of the Senate, or either branch of Congress. Pursuant to 19 U.S.C. § 1332(b), the Commission also has broad power to conduct investigations on its own motion, including on the "conditions, causes, and effects relating to competition of foreign industries with those of the United States."
[396] Alexandra Harney, *The China Price: The True Cost of Chinese Competitive Advantage* (2008).
[397] *Id.* at chapter 9.
[398] *See* David Autor, David Dorn, and Gordon H. Hanson, "The China Syndrome: Local Labor Market Effects of Import Competition in the United States," American Economic Review, vol. 103, 2121–68 (2013); *see also* Daron Acemoglu, David Autor, David Dorn, Gordon H. Hanson, and Brendan Price, "Import Competition and the Great US Employment Sag of the 2000s," Journal of Labor Economics, vol. 34, S141–S198 (2016) (estimating job losses in US manufacturing as a result of rising import competition from China during 1999–2011 in the range of 2.0–2.4 million).
[399] *See* Rana Foroohar, *Homecoming: The Path to Prosperity in a Post-Global World* (2022) at 125 ("The parts of the Midwest and the South that were most vulnerable to the China Shock were exactly where individuals took on the most debt. Unemployment rose, as did divorce and deaths of despair.").

failing to respond to China's trade-distorting policies and practices through such measures as the section 232 and 301 tariffs).

Concerns over China's trade policies and practices grew over time following its accession to the World Trade Organization (WTO) in 2001, but they reached a turning point as far back as 2005, when Deputy Secretary of State and former U.S. Trade Representative Robert B. Zoellick publicly urged China to start acting like a "responsible stakeholder" in the international system.[400] Shortly thereafter, in 2006, President George W. Bush and President Hu Jintao agreed to create a cabinet-level Strategic Economic Dialogue (SED), and the two sides held regular high-level meetings for the remainder of the Bush Administration.[401] After entering office in 2009, President Barack Obama and President Hu continued those high-level discussions, renaming the talks the U.S.-China Strategic and Economic Dialogue. (S&ED).[402] The discussions continued throughout President Obama's eight years in office. In 2017, President Donald Trump continued the dialogue, relabeled as the U.S.-China Comprehensive Economic Dialogue (CED).[403]

Those discussions attempted to address the issues that are the impetus for the section 232 tariffs (overcapacity) and the section 301 tariffs (intellectual property theft and forced technology transfers), as well as a wide range of many other serious trade and economic frictions.[404] Roughly 12 years (2006–18) of patient and persistent dialogue, however, failed to yield a satisfactory resolution of those issues.

I will spare the reader a full description of the long history of negotiations over each of the issues that provided the impetus for the section 232 and 301 actions. But a brief and partial history of the steel negotiations is illustrative.

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[400] Robert B. Zoellick, Deputy Secretary of State, "Remarks to National Committee on U.S.-China Relations," New York City (Sept. 21, 2005), https://2001-2009.state.gov/s/d/former/zoellick/rem/53682.htm
[401] 2018 USTR Report to Congress on China's WTO Compliance at 51, box 1, https://ustr.gov/sites/default/files/2018-USTR-Report-to-Congress-on-China%27s-WTO-Compliance.pdf
[402] *Id.*
[403] *Id.* at 50.
[404] *Id.* at 51 ("By May 2018, the United States had proposed specific structural changes that China needed to make to re-orient its state-led, mercantilist trade regime and become more open and market-oriented. These included actions not only in the area of forced technology transfer, but also in areas such as trade deficit reduction, tariffs, non-tariff barriers, intellectual property rights protection and enforcement, {. . .} among other areas."); *see also* Reuters, "U.S., China disagreed on how to reduce trade deficit – official," July 19, 2017, https://www.reuters.com/article/uk-usa-trade-china-disagreements/u-s-china-disagreed-on-how-to-reduce-u-s-trade-deficit-official-idUKKBN1A42R0 ("The official {. . .} said that the disagreement covered most areas important to the United States, including access to China's financial services markets, steel overcapacity, trade in autos, Chinese requirements for data localization and ownership caps for foreign firms.").

The Long History of Chinese Steel Overcapacity, in Brief

Excessive steel capacity was already a serious global problem[405] when the United States granted China "permanent normal trade relations" upon the latter's entry into the WTO in 2001.[406] China committed to adhere to market-based rules when it joined the WTO, but it failed to honor the letter and the spirit of those rules in the two decades that followed. Consequently, this behavior diminished the centrality of the WTO in the global trade regime.[407] As a WTO member, for example, China promised to not "influence, directly or indirectly, commercial decisions on the part of state-owned or state-invested enterprises, including on the quantity, value or country of origin of any goods purchased or sold."[408] China broke that promise; its government ownership, control, and influence over its steel industry and many other industries only *increased* in the years after it joined the WTO.[409]

[405] *See* Steel: Global Safeguard Investigation, Inv. No. TA-201-73, USITC Publication 3479 (December 2001); *see also Report to the President, Global Steel Trade: Structural Problems and Future* Solutions, U.S. Department of Commerce, International Trade Administration (July 2000); Joint Statement of NAFTA Governments: Commitment to Take Action to Address Practices that Distort Steel Markets (December 19, 2002), https://www.oecd.org/newsroom/2487056.pdf ("NAFTA Member Governments call on all steel-producing countries to constructively engage in the OECD High Level Process on Steel by beginning to take concrete steps to address the adverse effects of government intervention in the global steel industry").

[406] Normal Trade Relations for the People's Republic of China, Pub. L. 106-286, 114 Stat. 880 (October 10, 2000).

[407] *See* Mark Wu, "The 'China, Inc.' Challenge to Global Trade Governance," *Harvard Int'l Law Journal*, vol. 57, 261–324 (Spring 2016); *see also* 2018 USTR Report at 5 ("When China acceded to the WTO in 2001, it voluntarily agreed to embrace the WTO's open-market-oriented approach and embed it in its trading system and institutions. Through China's commitments and representations, WTO members understood that China intended to dismantle existing state-led, mercantilist policies and practices, and they expected China to continue on its then-existing path of economic reform and successfully complete a transformation to a market oriented economy and trade regime. This did not happen {. . .} Last year, we reported that the United States had erred in supporting China's entry into the WTO on terms that have proven to be ineffective in securing China's embrace of an open, market-oriented approach to the economy and trade. {. . .}. Indeed, it seems increasingly clear that China's actions have done severe harm to other WTO members and the multilateral trading system, which was never designed to deal with a non-market economy of China's size.").

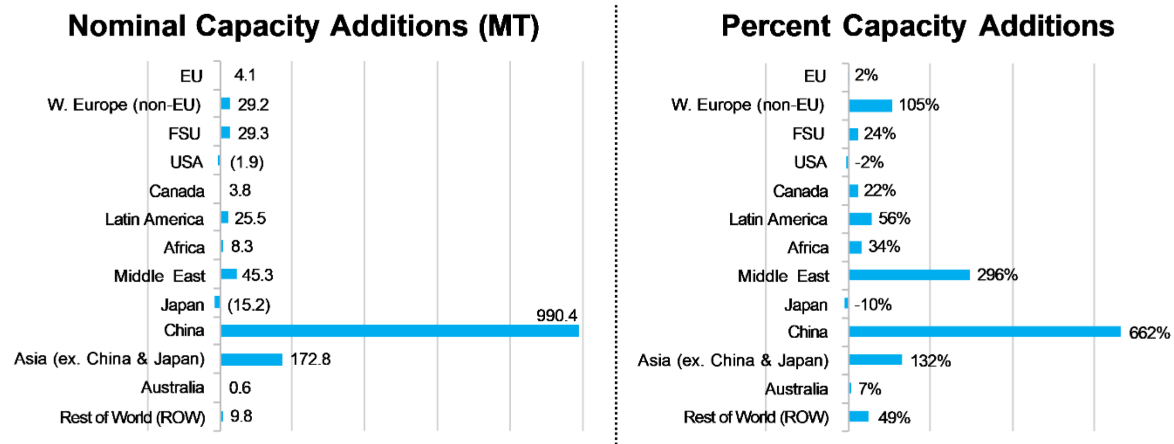
[408] Report of the Working Party on the Accession of China, World Trade Organization, WT/M1N(01) at par. 46 (November 10, 2001).

[409] *See* C. Fred Bergsten, Charles Freeman, Nicholas R. Lardy, and Derek J. Mitchell, *China's Rise: Challenges and Opportunities* (2009) at 9 ("We know we have to play the game your way now but in ten years we will set the rules!" Chinese ambassador to the WTO during China's negotiations to join the institution); *see also,* Richard McGregor, *The Party: The Secret World of China's Communist Rulers* (2010).

The result of China's massive market interventions—its model of "state capitalism"[410]—is that one country has dwarfed all others *combined* in its steelmaking capacity additions since 2000, accounting for more than 75 percent of those additions, as the chart below illustrates.[411]

Figure AV.1 Crude steel capacity additions by region, 2000–2014.

In metric tons (mt) and percentages. Underlying data for this figure can be found at the end of this chapter, in table AV.1.



Source: Duke CGGC, calculated from the German Steel Federation, *Statistische Jahrbuch der Stahlindustrie* (2015).

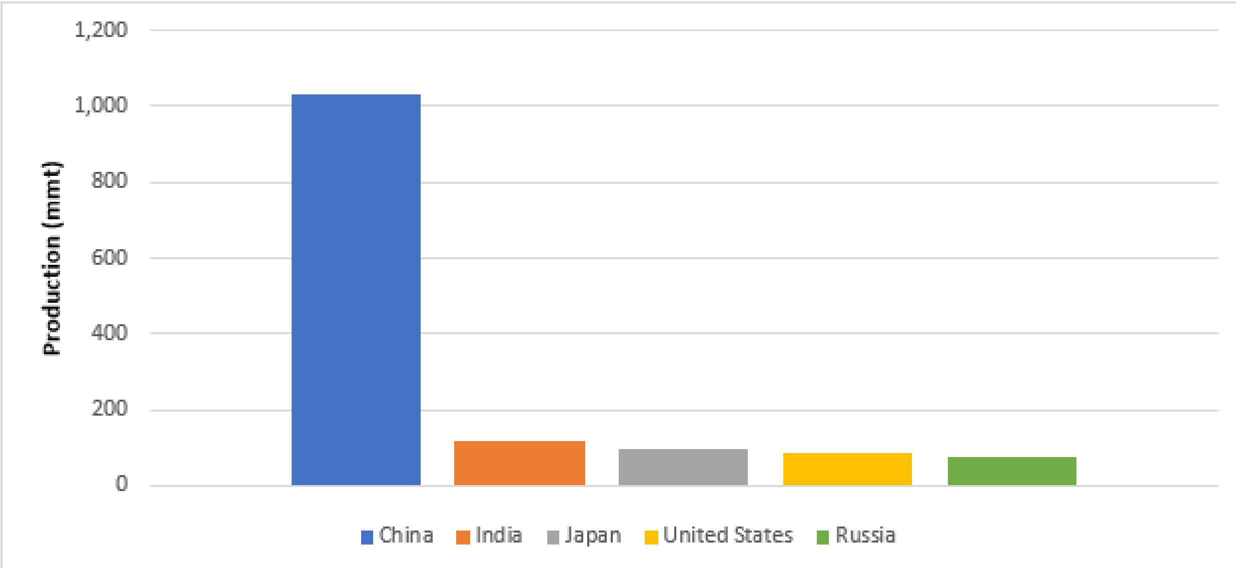
And, let us not forget there already was overcapacity in the global steel industry in 2000, before these additions were made. As a result of its steel overcapacity, China continued to be well ahead of the next four largest global producers of raw steel—India, Japan, the United States, and Russia—combined, in 2021:

[410] *See,* U.S. National Intelligence Council, "Global Trends 2025: A Transformed World," (2008) at 8–11 ("Today wealth is moving not just from West to East but is concentrating more under state control. . . . {T}he states that are beneficiaries of the massive shift of wealth—China, Russia, and Gulf states—are non-democratic and their economic policies blur distinctions between public and private. These states are not following the Western liberal model for self development but are using a different model—'state capitalism.'"); *see also* Ian Bremmer, *The End of the Free Market: Who Wins the War between States and Corporations?* (2010).

[411] Lukas Brun, "Overcapacity in Steel, China's Role in a Global Problem," Center on Globalization, Governance & Competitiveness, Duke University Global Value Chains Center (September 2016) at 11 (figure 3 reproduced above), https://www.americanmanufacturing.org/research/overcapacity-in-steel-chinas-role-in-a-global-problem/; *see also* Adam S. Hersh and Robert E. Scott, "Why Global Steel Surpluses Warrant U.S. Section 232 Import Measures," Economic Policy Institute, https://files.epi.org/pdf/218728.pdf.

Figure AV.2 Top five leading global producers of raw steel, by country, in 2021

In millions of metric tons (mmt). Underlying data for this figure can be found in appendix E, table E.8.



Source: World Steel Association, "World Steel in Figures 2022," 2022.

This overcapacity led to depressed global steel prices and job losses in the United States and other steel-producing countries. As a result, several Administrations engaged in bilateral and multilateral discussions to address the issue. At the Organisation for Economic Cooperation and Development (OECD), major steel-producing countries, including the United States and China, discussed the need to reduce or eliminate steel trade-distorting subsidies. Work progressed in mid-2004 on an advanced negotiating text for a steel agreement, but those negotiations were indefinitely paused without an agreement in 2005.[412]

That pause in OECD negotiations coincided with China's announcement, in July 2005, of a new Steel and Iron Industry Development Policy. That policy called for an *expansion in government control* in all aspects of the steel industry, including prescriptions for the number, size, location, and government financial support for its steel producers. As a U.S. Trade Representative (USTR) report later described it:

> China's 2005 steel policy is {} striking because of the extent to which it attempts to dictate industry outcomes and involve the government in making decisions that should be made by the marketplace. This high degree of government direction regarding the allocation of resources into and out of China's steel industry raises concerns not only because of the commitment that China made in its WTO accession agreement that the government would not influence, directly or indirectly, commercial decisions on the part of state-owned or state-invested enterprises, but also more generally because it represents another significant example of China reverting to a reliance on government management of market outcomes instead of moving toward a reliance

[412] *See, e.g.,* OECD Annual Report 2003, https://www.oecd.org/about/2506789.pdf; OECD Annual Report 2005, https://www.oecd.org/about/34711139.pdf; OECD Annual Report 2006 at 31, https://www.oecd-ilibrary.org/docserver/annrep-2006-en.pdf?expires=1675994706&id=id&accname=guest&checksum=E2ED70EE9CFC37F02A64392302C3437E ("participants in discussion on limiting subsidies agreed that it would be useful to pause the negotiations to provide participants with opportunities to explore the scope for narrowing differences").

> on market mechanisms. Indeed, it is precisely that type of regressive approach that is at the root of many of the WTO compliance concerns raised by U.S. industry.[413]

In 2006, to address these new, harmful measures, the United States and China began a new bilateral dialogue specific to the steel industry under the U.S.-China Joint Commission on Commerce and Trade (JCCT).[414] And, at the WTO, the United States expressed its concerns, including in the Committee on Import Licensing, the Trade-Related Investment Measures Committee, the Subsidies Committee, and the Council for Trade in Goods, with support from other members.[415]

These serious and continuing efforts led to new pledges by China to cut steel production and capacity through policy directives, including the 2009 Steel Adjustment and Revitalization Plan, the 2010 State Council Policy, and other industrial plans. Despite those pledges, China continued to target the steel industry for preferential government support, leading to further increases in overcapacity.[416]

Bilateral and multilateral negotiations to persuade China to reform continued for the following decade. (During that time, Chinese military hackers were indicted by the U.S. Department of Justice for economic espionage, stealing trade secrets of U.S. steel and other companies to give Chinese state-owned enterprises and other companies in China a competitive advantage.[417]) In 2016, President Obama launched the G-20 Global Forum on Steel Excess Capacity (GFSEC) in Hangzhou, China, recognizing a need for "steps to address excess capacity and encourage adjustments."[418] G-20 and OECD

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[413] 2009 USTR Report to Congress on China's WTO Compliance, at 69, https://ustr.gov/sites/default/files/2009%20China%20Report%20to%20Congress.pdf ("2009 USTR Report").
[414] *Id;* 2018 USTR Report at 51, box 1, https://ustr.gov/sites/default/files/2018-USTR-Report-to-Congress-on-China%27s-WTO-Compliance.pdf ("In 1983, the United States and China founded the JCCT. {. . .} From 2004 through 2016, the JCCT held annual plenary meetings, while numerous JCCT working groups and sub-dialogues met throughout the year in areas such as industrial policies, competitiveness, intellectual property rights, structural issues, steel. {. . .}")*; see also* "United States Welcomes Chinese Action on Key Trade Issues," Office of the U.S. Trade Representative (April 11, 2006), https://ustr.gov/archive/Document_Library/Press_Releases/2006/April/United_States_Welcomes_Chinese_Action_on_Key_Trade_Issues.html (China agreed to, *inter alia*, stepping up enforcement of intellectual property rights and launching a dialogue on the steel industry.).
[415] 2009 USTR Report at 69.
[416] *See* United Steelworkers, "Chinese Steel Overcapacity: A Legacy of Broken Promises" (April 2017), https://m.usw.org/testimony/OvercapacityReport_R1_review.pdf (Representing actual versus promised Chinese steel production: China pledged to cut output to 460 million tons, down from 521 million tons in 2008; instead, Chinese steel production increased to 577 million tons in 2009 and surpassed 700 million tons in 2011).
[417] U.S. Department of Justice press release "U.S. Charges Five Chinese Military Hackers for Cyber Espionage Against U.S. Corporations and a Labor Organization for Commercial Advantage: First Time Criminal Charges Are Filed Against Known State Actors for Hacking," (May 19, 2014), https://www.justice.gov/opa/pr/us-charges-five-chinese-military-hackers-cyber-espionage-against-us-corporations-and-labor.
[418] The White House, Office of the Secretary, "Fact Sheet: The 2016 G-20 Summit in Hangzhou, China," (September 5, 2016), https://obamawhitehouse.archives.gov/the-press-office/2016/09/05/fact-sheet-2016-g-20-summit-hangzhou-china.

negotiations continued, including at a meeting in Brussels of the G-20 member states and other members of the OECD, but without meaningful, concrete progress.[419]

In a report to Congress recounting China's lack of progress on these issues in 2017, USTR noted that China had announced new measures ostensibly "to reduce severe excess capacity in the steel and coal industries," but those measures did just the opposite, calling instead for "further state intervention and financial support, rather than a fuller embrace of market-based principles."[420]

That is the history that led the United States in 2018 to finally resort to section 232 tariffs on steel imports. (A similar history can be told with respect to section 232 tariffs on aluminum products[421] and to section 301 tariffs in connection with China's intellectual property and forced technology transfer policies.[422]) Although the section 232 tariffs initially applied to steel imports from all countries—before exceptions and exclusions were negotiated with some trading partners—USTR made clear that China was the root cause: "Because China had created a global crisis in steel, the United States was forced to adopt a global response, in the form of tariffs under Section 232 of the Tariff Expansion Act of 1962."[423]

In the G-20 GFSEC's last report, after China objected to an extension of the Forum's term and succeeded in forcing its expiration, the Chair's Report noted that excess steelmaking capacity, a global challenge that had become particularly acute in 2015, "depresses prices, undermines profitability, generates damaging trade distortions, jeopardizes the very existence of companies and branches across the world, creates regional imbalances, undermines the fight against environmental challenges and dangerously

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[419] *See* The European Commission, Press Release, "Steel: Commission welcomes new Global Forum to tackle root causes of overcapacity," (December 16, 2016), https://ec.europa.eu/commission/presscorner/detail/en/IP_16_4435; *see also* The U.S. Trade Representative, "USTR Statement on Meeting of the Global Forum on Steel Excess Capacity," USTR Press Releases, September 2018, https://ustr.gov/about-us/policy-offices/press-office/press-releases/2018/september/ustr-statement-meeting-global ("we have yet to see any concrete progress toward true market-based reform in the economies that have contributed most to the crisis of excess capacity in the steel sector").

[420] 2018 USTR Report at 21.

[421] *Id.* at 34. ("Similar {to steel}, primary aluminum production capacity in China increased by more than 50 percent between 2011 and 2015, despite a severe drop in global aluminum prices during that period. China's capacity has continued to grow in subsequent years. Large new facilities have been built with government support, and China's primary aluminum capacity now accounts for more than one-half of global capacity. As a consequence, China's capacity and production have contributed to imbalances and price distortions in global markets, harming U.S. plants and workers. Excess capacity in China – whether in the steel industry or other industries such as aluminum – hurts U.S. industries and workers not only because of direct exports from China to the United States, but also because its impact on global prices and supply make it difficult for even the most competitive producers to remain viable.").

[422] *Id.* at 21 ("In short, while China has sometimes shown a willingness to take modest steps to address isolated issues, it has consistently failed to follow through on significant commitments or to make fundamental changes to its trade regime. With these dialogues proving to be largely ineffective, in August 2017, in response to direction from President Trump, USTR initiated an investigation under Section 301 of the Trade Act of 1974 to address and limit the adverse effects of certain state-led, mercantilist and non-market policies and practices of the Chinese government. Specifically, this investigation was initiated to focus on policies and practices related to technology transfer, intellectual property and innovation.").

[423] *Id*.

destabilizes world trading relations," and "especially undermines income opportunities of employees."[424]

In my view, that history must be well understood as we try to assemble a complete picture of the costs and benefits of the section 232 and 301 tariffs—actions authorized by Congress, taken by one Administration and continued by another. It demonstrates that the United States could not have been more patient as it tried to persuade China to change course. But more concrete action was necessary to protect U.S. interests and possibly to achieve a mutually agreeable resolution somewhere down the road. Negotiations without much leverage were essentially going nowhere. Several witnesses appearing before the Commission described this history.[425]

Looking Ahead

An understanding of the future effects of these tariffs is equally critical. Following the supply chain disruptions caused by the COVID-19 pandemic, China's aggressive posture in the South China Sea and with Taiwan and Hong Kong, and Russia's war in Ukraine, the rapidly developing consensus among experts is that the United States needs more resilient and dependable supply chains that reduce our reliance on countries like China and Russia. It is not hyperbole to say that doing so will strengthen U.S. national security, in addition to providing a myriad of other important economic benefits, such as improving healthcare outcomes and avoiding volatile prices and supply shortages for U.S. consumers and businesses. All those benefits have tremendous value, and the section 232 and 301 tariffs provide an opportunity to help move our supply chains in that economic, social, and environmental direction.

At the hearings, I heard several witnesses speak to how U.S. industries, including steel and solar, benefitting from the section 232 and 301 tariffs are contributing to the United States' climate objectives by increasing investments in newer technologies. Specifically, this included testimony that the U.S. steel industry has the "lowest carbon intensity of the nine largest steel producing countries or regions" and that recent investments in the U.S. solar industry has created thousands of jobs for American workers in

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[424] Global Forum on Steel Excess Capacity, Chair's Report (October 26, 2019), https://www.meti.go.jp/english/press/2019/pdf/191026_001-2.pdf. Unsurprisingly, the report, presented as a draft Ministerial Report at the GFSEC Ministerial meeting held in Tokyo in 2019, "did not attract a full consensus."

[425] *See, e.g.,* Hearing Tr. Day 1 at 241 (Cloutier) ("{Y}our question reminded me that some 20 years ago I got sent over to the U.S. Embassy in Beijing and one of my 14 primary tasks was to get the Chinese government to agree to attend the OECD steel meetings in Paris . . . that's how long this has been going on, and there has been very little progress. So I'm not sure what else we can do at this point except use the big stick."); *Id.* at 243 (Brightbill) ("One on the cost of inaction that you talked about 20 years ago, I believe 20 years ago China's total steel capacity was about 100 million tons and today it's 1.1 billion tons, and in the meantime, NAFTA's steel capacity has remained about the same. So that's the cost of inaction. And you see it in industry after industry."); *see also* Hearing Tr. Day 2 (Dempsey) ("The unfortunate reality is that while there was a lot of discussion and analysis on the scope of the over-capacity problem and a lot of reports written, there was no work done that actually sought to address it. As the situation became increasingly dire, I think that is an important context for why by the time you got to 2017, the incoming Trump administration studying a problem that has been documented for years without any successful resolution looked to new tools, and by considering also the national security implications of an overall weakened steel industry, found it necessary to take the trade action. So there's a strong record of that in that OECD and global forum documentation.").

clean energy technologies, assisting in our energy transition.[426] I also learned that the section 301 tariffs led to a significant reduction in the volume of Chinese seafood in the U.S. market, resulting in benefits to both the domestic commercial fishing industry and consumers by curbing support for the harmful environmental, biological, and labor practices in the Chinese seafood industry.[427] Further, U.S. workers spoke to us about how building new steel mills brings not only thousands of new jobs and new labor agreements but also roads, railroads, and economic improvements to some of the most depressed and underserved regions of the United States.[428]

This report, however, is limited in focus. It does not ask or answer additional questions about the real costs and benefits of the actions that were posed by the witness testimony described above—namely, it does not estimate the longer-term effect of the actions on increasing investments in clean energy technologies, building supply chain resiliency, or creating jobs in underserved communities. For example, the report finds that in 2021, imports of semiconductors—a linchpin in the U.S. and global economies for the foreseeable future—from China have declined by 71 percent and domestic production has increased by 6 percent as a result of the section 301 tariffs. It does not, however, address the implications of that finding. The decline in semiconductor imports from China may result in short-term supply gaps and increases in prices for semiconductors, as the report estimates, but I suspect

[426] Hearing Tr. Day 2 at 331–32 (Bell) ("The Section 232 response advances U.S. climate objectives by ensuring that this cleaner domestic production is not replaced by dirty, higher emission foreign imports. The gains from the need to be sustained over the course of the business cycle if they are to be locked in for the long term. This is especially true as the crisis of global overcapacity remains acute and the industry anticipates increasing investment costs related to decarbonization."); *id.* at 413 (Brightbill) ("The Section 301 tariffs on solar cells and modules together with other trade remedies on Chinese solar products are essential to the continued growth and success of the solar manufacturing industry in America. {. . .} Recent investments in domestic solar manufacturing have created thousands of good jobs for American workers in clean energy technologies that are critical to advance our country's response to the climate crisis and our energy transition"). *See also* Summary of Views of Interested Parties, appendix D, (Nucor Corporation) ("Steel producers have invested approximately $22 billion since the Section 232 measures went into effect, resulting in an expected 22 million tons of additional production capacity. These investments represent state-of-the-art facilities that are among the cleanest in the world and that will further the domestic industry's climate advantage over carbon-intensive foreign sources").
[427] Summary of Views of Interested Parties, appendix D (Southern Shrimp Alliance) ("the decline in the presence of Chinese seafood in this market has reduced health risks to American consumers and has discouraged the proliferation of antimicrobial resistant pathogens. Beyond the use of antibiotics in aquaculture, a decline in demand for Chinese seafood also has reduced unintentional American consumer support of environmentally-harmful practices and of labor abuse in the Chinese seafood sector.").
[428] *See*, *e.g.,* Hearing Tr. Day 3 at 611–12 (Ferry) ("Implemented in early 2018, the 25 percent tariffs were the trigger for an unprecedented period of growth and investment in the U.S. industry. A broad-based wave of capital investment followed the tariffs as major steelmakers committed more than $10 billion to build new mills in Florida, Arkansas, Texas, Arizona, and elsewhere. The new mills began hiring hundreds more steelworkers, mostly in depressed or rural regions of the country. The building of mills, the growth of supporting companies to service them, and the new roads, railroads, and other improvements around those mills have brought numerous economic benefits to these regions."); *id.* at 623–34 (Trinidad) ("Our mill has seen three major upgrades since 2019 totaling over $300 million. These investments keep our facility producing high-quality steel, maintaining over 3,500 good jobs and positioning us to remain competitive in the future. Furthermore, our frontline essential employees went from taking pay cuts in order to help provide needed critical monies to continue safe production to the restructuring of labor agreements and receiving profit-sharing checks.").

it is a very good thing in the long run for the U.S. economy, as domestic capacity for semiconductor production is on the upswing.[429]

Congress established the Commission more than 100 years ago because it recognized the need for an independent and bipartisan agency with trade expertise to shed light on the challenging issues of the day. China has presented—and continues to present—possibly the biggest challenge U.S. trade policymakers have faced in a generation, and the costs and benefits of taking action under sections 232 and 301 to address that challenge need to be better understood. Further, even if in principle the benefits of those tariffs outweigh their costs, those tariffs can surely be calibrated and applied to better optimize the benefits and reduce the costs. I believe the Commission can help address these issues. And by doing so, I believe, we can provide policymakers a more complete picture of how to approach the generational challenge of China's model of state capitalism.

[429] *See* The White House, Briefing Room, "Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth," 100-Day Reviews Under Executive Order 14017 (June 2021) at 9, https://www.whitehouse.gov/wp-content/uploads/2021/06/100-day-supply-chain-review-report.pdf ("The U.S. share of global semiconductor production has dropped from 37 percent in 1990 to 12 percent today, and is projected to decline further without a comprehensive U.S. strategy to support the industry.").

Underlying Data for Figure AV.1

Table AV.1 Crude steel capacity additions by region, 2000–2014

Region	Nominal capacity additions (MT)	Percent capacity additions (%)
EU	4.1	2
W. Europe (non-EU)	29.2	150
FSU	29.3	24
USA	-1.9	-2
Canada	3.8	22
Latin America	25.5	56
Africa	8.3	34
Middle East	45.3	296
Japan	-15.2	-10
China	990.4	662
Asia (ex. China & Japan)	172.8	132
Australia	0.6	7
Rest of World (ROW)	9.8	49

Source: Duke CGGC, calculated from the German Steel Federation, *Statistische Jahrbuch der Stahlindustrie* (2015).

Appendix A
The Legislative Direction

See *Congressional Record*, page H1801, March 9, 2022:

> INTERNATIONAL TRADE COMMISSION SALARIES AND EXPENSES The agreement includes $110,000,000 for the International Trade Commission (ITC). Within the funds provided, the agreement supports an increase towards the ITC's information technology requirements. Trade Enforcement Analysis. — ITC is directed to conduct an investigation and retrospective economic analysis of any section 232 or 301 tariff that is active as of the date of enactment of this Act. Within a year of enactment of this Act, ITC shall provide a report to the Committees with detailed information, to the extent practicable, on U.S. trade, production, and prices in the industries directly and most affected by active tariffs under section 232 of the Trade Expansion Act of 1962 (19 U.S.C. 1862) and section 301 of the Trade Act of 1974 (19 U.S.C. 2232).

STAFF OF S. COMM. ON APPROPRIATIONS, 117TH CONG., EXPLANATORY STATEMENT FOR COMMERCE, JUSTICE, SCIENCE, AND RELATED AGENCIES APPROPRIATIONS BILL, 2023 (Comm. Print 2022).

> Analysis of the Impacts of Trade Enforcement Actions.—The Committee continues to be concerned about the impact of active tariffs under section 232 of the Trade Expansion Act of 1962 (19 U.S.C. § 1862) and section 301 of the Trade Act of 1974 (19 U.S.C. § 2232). The Committee looks forward to receiving the report on the effects of these tariffs, as directed by the joint explanatory statement accompanying Pub. L. 117–103 under the heading ‘‘Trade Enforcement Analysis.’’

Appendix B
Federal Register Notices

5:15 p.m., Wednesday, August 24, 2022. All written submissions must conform to the provisions of section 201.8 of the Commission's Rules of Practice and Procedure (19 CFR 201.8), as temporarily amended by 85 FR 15798 (March 19, 2020). Under that rule waiver, the Office of the Secretary will accept only electronic filings at this time. Filings must be made through the Commission's Electronic Document Information System (EDIS, *https://edis.usitc.gov*). No in-person paper-based filings or paper copies of any electronic filings will be accepted until further notice. Persons with questions regarding electronic filing should contact the Office of the Secretary, Docket Services Division (202–205–1802), or consult the Commission's Handbook on Filing Procedures.

Definitions of types of documents that may be filed; requirements: In addition to requests to appear at the hearing, this notice provides for the possible filing of four types of documents: prehearing briefs, oral hearing statements, post-hearing briefs, and other written submissions.

(1) Prehearing briefs refers to written materials relevant to the investigation and submitted in advance of the hearing, and includes written views on matters that are the subject of the investigation, supporting materials, and any other written materials that you consider will help the Commission in understanding your views. You should file a prehearing brief particularly if you plan to testify at the hearing on behalf of an industry group, company, or other organization, and wish to provide detailed views or information that will support or supplement your testimony.

(2) *Oral hearing statements (testimony)* refers to the actual oral statement that you intend to present at the public hearing. Do not include any confidential business information in that statement. If you plan to testify, you must file a copy of your oral statement by the date specified in this notice. This statement will allow Commissioners to understand your position in advance of the hearing and will also assist the court reporter in preparing an accurate transcript of the hearing (*e.g.,* names spelled correctly).

(3) *Post-hearing briefs* refers to submissions filed after the hearing by persons who appeared at the hearing. Such briefs: (a) Should be limited to matters that arose during the hearing, (b) should respond to any Commissioner and staff questions addressed to you at the hearing, (c) should clarify, amplify, or correct any statements you made at the hearing, and (d) may, at your option, address or rebut statements made by other participants in the hearing.

(4) *Other written submissions* refers to any other written submissions that interested persons wish to make, regardless of whether they appeared at the hearing, and may include new information or updates of information previously provided.

In accordance with the provisions of section 201.8 of the Commission's Rules of Practice and Procedure (19 CFR 201.8) the document must identify on its cover (1) the investigation number and title and the type of document filed (*i.e.,* prehearing brief, oral statement of (name), posthearing brief, or written submission), (2) the name and signature of the person filing it, (3) the name of the organization that the submission is filed on behalf of, and (4) whether it contains confidential business information (CBI). If it contains CBI, it must comply with the marking and other requirements set out below in this notice relating to CBI. Submitters of written documents (other than oral hearing statements) are encouraged to include a short summary of their position or interest at the beginning of the document, and a table of contents when the document addresses multiple issues.

Confidential business information: Any submissions that contain confidential business information must also conform to the requirements of section 201.6 of the Commission's Rules of Practice and Procedure (19 CFR 201.6). Section 201.6 of the rules requires that the cover of the document and the individual pages be clearly marked as to whether they are the "confidential" or "non-confidential" version, and that the confidential business information is clearly identified by means of brackets. All written submissions, except for confidential business information, will be made available for inspection by interested parties.

As requested by the Committees, the Commission will not include any confidential business information in its report. However, all information, including confidential business information, submitted in this investigation may be disclosed to and used: (i) By the Commission, its employees and Offices, and contract personnel (a) for developing or maintaining the records of this or a related proceeding, or (b) in internal investigations, audits, reviews, and evaluations relating to the programs, personnel, and operations of the Commission including under 5 U.S.C. Appendix 3; or (ii) by U.S. government employees and contract personnel for cybersecurity purposes. The Commission will not otherwise disclose any confidential business information in a way that would reveal the operations of the firm supplying the information.

Summaries of written submissions: Persons wishing to have a summary of their position included in the report should include a summary with their written submission on or before August 24, 2022, and should mark the summary as having been provided for that purpose. The summary should be clearly marked as "summary for inclusion in the report" at the top of the page. The summary may not exceed 500 words and should not include any confidential business information. The summary will be published as provided if it meets these requirements and is germane to the subject matter of the investigation. The Commission will list the name of the organization furnishing the summary and will include a link to the Commission's Electronic Document Information System (EDIS) where the written submission can be found.

By order of the Commission.

Issued: May 5, 2022.

William Bishop,

Supervisory Hearings and Information Officer.

[FR Doc. 2022–10021 Filed 5–9–22; 8:45 am]

BILLING CODE 7020–02–P

INTERNATIONAL TRADE COMMISSION

[Investigation No. 337–TA–1258]

Certain Smart Thermostat Systems, Smart HVAC Systems, Smart HVAC Control Systems, and Components Thereof; Notice of Request for Submissions on the Public Interest

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that on April 4, 2022, the presiding administrative law judge ("ALJ") issued a Final Initial Determination on Violation of Section 337. The ALJ also issued a Recommended Determination on remedy and bonding should a violation be found in the above-captioned investigation. The Commission is soliciting submissions on public interest issues raised by the recommended relief should the Commission find a violation. This notice is soliciting comments from the public only.

FOR FURTHER INFORMATION CONTACT: Houda Morad, Esq., Office of the General Counsel, U.S. International

Federal Register / Vol. 87, No. 90 / Tuesday, May 10, 2022 / Notices 28035

KENTUCKY

Fulton County

Fulton Downtown Historic District, Part of Carr, Commercial, Lake, Main, and Walnut Sts., Fulton, AD03000710

RHODE ISLAND

Providence County

Woonsocket Company Mill Complex (Additional Documentation), 100–115 Front St., Woonsocket, AD73000005

UTAH

Summit County

Shields, John, House (Additional Documentation) (Mining Boom Era Houses TR), 416 Park Ave., Park City, AD84003997

(Authority: Section 60.13 of 36 CFR part 60)

Dated: May 4, 2022.

Sherry A. Frear,

Chief, National Register of Historic Places/ National Historic Landmarks Program.

[FR Doc. 2022–09967 Filed 5–9–22; 8:45 am]

BILLING CODE 4312–52–P

INTERNATIONAL TRADE COMMISSION

[Investigation No. 332–591]

Economic Impact of Section 232 and 301 Tariffs on U.S. Industries

ACTION: Notice of investigation and scheduling of a public hearing.

SUMMARY: As directed by an explanatory statement related that accompanied the Consolidated Appropriations Act, 2022, enacted on March 15, 2022, the U.S. International Trade Commission (Commission) instituted Investigation No. 332–591, *Economic Impact of Section 232 and 301 Tariffs on U.S. Industries.* In the explanatory statement, the House and Senate Committees on Appropriations (Committees) directed that the Commission conduct a retrospective investigation and provide a report on the impacts in the U.S. industries most affected by the Section 232 and 301 tariffs that were active as of March 15, 2022.

DATES:

July 6, 2022: Deadline for filing requests to appear at the public hearing.

July 8, 2022: Deadline for filing prehearing briefs and statements.

July 14, 2022: Deadline for filing electronic copies of oral hearing statements.

July 21, 2022: Public hearing.

August 12, 2022: Deadline for filing posthearing briefs and statements.

August 24, 2022: Deadline for filing all other written submissions.

March 15, 2023: Transmittal of Commission report to Committees.

ADDRESSES: All Commission offices are in the U.S. International Trade Commission Building, 500 E Street SW, Washington, DC. Due to the COVID–19 pandemic, the Commission's building is currently closed to the public. Once the building reopens, persons with mobility impairments who will need special assistance in gaining access to the Commission should contact the Office of the Secretary at 202–205–2000.

FOR FURTHER INFORMATION CONTACT: Project Leader Peter Herman (*Peter.Herman@usitc.gov* or 202–205–3186) or Deputy Project Leader Kelsi Van Veen (*Kelsi.VanVeen@usitc.gov* or 202–205–3086) for information specific to this investigation. For information on the legal aspects of this investigation, contact William Gearhart of the Commission's Office of the General Counsel (*William.Gearhart@usitc.gov* or 202–205–3091). The media should contact Jennifer Andberg, Office of External Relations (*Jennifer.Andberg@usitc.gov* or 202–205–1819).

The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at *https://edis.usitc.gov.* General information concerning the Commission may also be obtained by accessing its website (*https://www.usitc.gov*). Hearing-impaired individuals may obtain information on this matter by contacting the Commission's TDD terminal at 202–205–1810.

SUPPLEMENTARY INFORMATION: As requested by the Committees, the Commission will include in its report detailed information on U.S. trade, production, and prices in the industries directly and most affected by active tariffs under section 232 of the Trade Expansion Act of 1962 (19 U.S.C. 1862) and section 301 of the Trade Act of 1974 (19 U.S.C. 2232). The Commission has instituted the investigation under section 332(g) of the Tariff Act of 1930 (19 U.S.C. 1332(g)) to facilitate the receipt of public comments and for the purpose of including the Commission's report in an existing series of reports.

The tariffs covered in the report will be the additional tariffs on U.S. imports imposed under section 232 of the Trade Expansion Act of 1962 (19 U.S.C. 1862) and imposed under section 301 of the Trade Act of 1974 (19 U.S.C. 2411 *et seq.*) that were in effect as of March 15, 2022—as reflected in the 2022 Harmonized Tariff Schedule of the United States, Revision 2, USITC Pub. 5293. Additional information on the section 232 actions can be found under HTS numbers 9903.80.01 through 9903.81.80 and 9903.85.01 through 9903.85.44. Additional information on the section 301 actions can be found under HTS numbers 9903.88.01, 9903.88.02, 9903.88.03, 9903.88.04, and 9903.88.15.

The Committees requested that the Commission transmit its report no later than 12 months following the enactment of the Consolidated Appropriations Act. The Commission's report will be made available to the public.

Public hearing: A public hearing in connection with this investigation will be held beginning at 9:30 a.m. Eastern Time on Thursday July 21, 2022. Information about the place and form of the hearing, including about how to participate in and/or view the hearing, will be posted on the Commission's website at (*https://usitc.gov/research_and_analysis/what_we_are_working_on.htm*). Once on that web page, scroll down to Investigation No. 332–591, *Economic Impact of Section 232 and 301 Tariffs on U.S. Industries,* and click on the link to "Hearing Instructions." Interested parties should check the Commission's website periodically for updates.

Requests to appear at the public hearing should be filed with the Secretary to the Commission no later than 5:15 p.m., Wednesday, July 6, 2022, in accordance with the requirements in the "Written Submissions" section below. All prehearing briefs and statements should be filed not later than 5:15 p.m., Friday, July 8, 2022. To facilitate the hearing, including the preparation of an accurate written transcript of the hearing, oral testimony to be presented at the hearing must be submitted to the Commission electronically no later than noon on Thursday, July 14, 2022. All post-hearing briefs and statements should be filed no later than 5:15 p.m., Friday, August 12, 2022. Post-hearing briefs and statements should address matters raised at the hearing. For a description of the different types of written briefs and statements, see the "Definitions" section below.

In the event that, as of the close of business on July 6, 2022, no witnesses are scheduled to appear at the hearing, the hearing will be canceled. Any person interested in attending the hearing as an observer or nonparticipant should check the Commission website two paragraphs above for information concerning whether the hearing will be held.

Written submissions: In lieu of or in addition to participating in the hearing, interested parties are invited to file written submissions concerning this investigation. All written submissions should be addressed to the Secretary and should be received not later than

The Commission vote for this determination took place on July 13, 2022.

The authority for the Commission's determination is contained in section 337 of the Tariff Act of 1930, as amended (19 U.S.C. 1337), and in Part 210 of the Commission's Rules of Practice and Procedure (19 CFR part 210).

By order of the Commission.

Issued: July 13, 2022.

William Bishop,

Supervisory Hearings and Information Officer.

[FR Doc. 2022–15325 Filed 7–18–22; 8:45 am]

BILLING CODE 7020–02–P

INTERNATIONAL TRADE COMMISSION

[Investigation No. 337–TA–1312]

Certain Mobile Electronic Devices; Notice of Commission Decision Not To Review an Initial Determination Granting in Part a Motion To Amend the Complaint and Notice of Investigation

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined not to review an initial determination ("ID") (Order No. 5) of the presiding administrative law judge ("ALJ") granting in part a motion to amend the complaint and notice of investigation.

FOR FURTHER INFORMATION CONTACT: Houda Morad, Office of the General Counsel, U.S. International Trade Commission, 500 E Street SW, Washington, DC 20436, telephone (202) 708–4716. Copies of non-confidential documents filed in connection with this investigation may be viewed on the Commission's electronic docket (EDIS) at *https://edis.usitc.gov.* For help accessing EDIS, please email *EDIS3Help@usitc.gov.* General information concerning the Commission may also be obtained by accessing its internet server at *https://www.usitc.gov.* Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on (202) 205–1810.

SUPPLEMENTARY INFORMATION: On May 4, 2022, the Commission instituted this investigation under section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. 1337 ("section 337"), based on a complaint filed by Maxell, Ltd. of Kyoto, Japan ("Complainant"). *See* 87 FR 26373–74 (May 4, 2022). The complaint, as supplemented, alleges a violation of section 337 based upon the importation into the United States, the sale for importation, and the sale within the United States after importation of certain mobile electronic devices by reason of infringement of certain claims of U.S. Patent Nos. 7,199,821; 7,324,487; 8,170,394; 8,982,086; 10,129,590; and 10,244,284. The notice of investigation names Lenovo Group Ltd. of Beijing, China; Lenovo (United States) Inc. ("Lenovo US") of Morrisville, North Carolina; and Motorola Mobility LLC of Libertyville, Illinois (collectively, "Respondents"), as respondents in the investigation. *See id.* The Office of Unfair Import Investigations is also a party to the investigation. *See id.*

On May 6, 2022, Complainant filed a motion to amend the complaint and notice of investigation to: (1) remove domestic industry allegations based on the domestic activities of its licensee Apple Inc. ("Apple"); (2) add domestic industry allegations based on the domestic activities of respondent Lenovo US; and (3) amend the plain language description of accused products to include Lenovo-branded smartphones. On May 18, 2022, Respondents filed a response opposing in part Complainant's motion to amend. Specifically, while Respondents do not oppose the withdrawal of domestic industry allegations based on Apple's domestic activities, they oppose Complainant's motion to amend in all other respects. On May 23, 2022, Complainant filed a reply in support of its motion to amend.

On June 14, 2022, the ALJ issued the subject ID (Order No. 5) pursuant to Commission Rule 210.14(b) (19 CFR 210.14(b)), granting in part Complainant's motion to amend the complaint and notice of investigation. *See* ID at 2. Specifically, the ID grants Complainant's request to amend the complaint and notice of investigation to include Lenovo-branded smartphones in the plain-language description of the accused products. *See id.* at 11.

Order No. 5 also grants the motion with respect to Complainant's request to withdraw the assertions in the complaint regarding Complainant's reliance on Apple's domestic activities to satisfy the domestic industry requirement. *See id.* at 9. Order No. 5 also denies Complainant's request to amend the complaint to rely upon Lenovo US's domestic activities. *See id.* at 8–9. These aspects of Order No. 5 do not constitute an initial determination that is subject to review at this time and are therefore not currently before the Commission. 19 CFR 210.14(b); 19 CFR 210.42(c)(1).

No petition for review of the subject ID was filed.

The Commission has determined not to review the subject ID. In particular, the plain language description of the accused products in the complaint and notice of investigation is amended to recite "certain mobile electronic devices, *i.e., Lenovo-branded and* Motorola-branded smartphones."

The Commission's vote for this determination took place on July 14, 2022.

The authority for the Commission's determination is contained in section 337 of the Tariff Act of 1930, as amended (19 U.S.C. 1337), and in part 210 of the Commission's Rules of Practice and Procedure (19 CFR part 210).

By order of the Commission.

Issued: July 14, 2022.

William Bishop,

Supervisory Hearings and Information Officer.

[FR Doc. 2022–15380 Filed 7–18–22; 8:45 am]

BILLING CODE 7020–02–P

INTERNATIONAL TRADE COMMISSION

[Investigation No. 332–591]

Economic Impact of Section 232 and 301 Tariffs on U.S. Industries

ACTION: Notice; addition of two days for public hearing.

SUMMARY: Due to the large number of requests to appear at the Commission's public hearing in this investigation, the U.S. International Trade Commission (Commission) has added two additional days to the public hearing, July 20, 2022, and July 22, 2022. The public hearing originally was scheduled for one day, July 21, 2022. As rescheduled, it will be held on July 20–22, 2022. The Commission will post a schedule for the hearing on its website as soon as one is available at *https://usitc.gov/research_and_analysis/what_we_are_working_on.htm* (see Commission Investigation No. 332–591, *Economic Impact of Section 232 and 301 Tariffs on U.S. Industries*).

DATES:

July 6, 2022: Deadline for filing requests to appear at the public hearing.

July 8, 2022: Deadline for filing prehearing briefs and statements.

July 14, 2022: Deadline for filing electronic copies of oral hearing statements.

July 20–22, 2022: Public hearing.

August 12, 2022: Deadline for filing posthearing briefs and statements.

August 24, 2022: Deadline for filing all other written submissions.

March 15, 2023: Transmittal of Commission report to Appropriations Committees.

ADDRESSES: All Commission offices are in the U.S. International Trade Commission Building, 500 E Street SW, Washington, DC. Due to the COVID–19 pandemic, the Commission's building is currently closed to the public. Once the building reopens, persons with mobility impairments who will need special assistance in gaining access to the Commission should contact the Office of the Secretary at 202–205–2000.

FOR FURTHER INFORMATION CONTACT: Project Leader Peter Herman (*Peter.Herman@usitc.gov* or 202–205–3186) or Deputy Project Leader Kelsi Van Veen (*Kelsi.VanVeen@usitc.gov* or 202–205–3086) for information specific to this investigation. For information on the legal aspects of this investigation, contact William Gearhart of the Commission's Office of the General Counsel (*William.Gearhart@usitc.gov* or 202–205–3091). The media should contact Jennifer Andberg, Office of External Relations (*Jennifer.Andberg@usitc.gov* or 202–205–1819).

The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at *https://edis.usitc.gov.* General information concerning the Commission may also be obtained by accessing its website (*https://www.usitc.gov*). Hearing-impaired individuals may obtain information on this matter by contacting the Commission's TDD terminal at 202–205–1810.

SUPPLEMENTARY INFORMATION: The initial notice of institution of this investigation and scheduling of a public hearing was published in the **Federal Register** on May 10, 2022 (87 FR 28035). Except for the addition of two days for the public hearing, all other information included in that notice remains the same. Additional information about how to participate in and/or view the hearing, will be posted on the Commission's website at *https://usitc.gov/research_and_analysis/what_we_are_working_on.htm.* Once on that web page, scroll down to Investigation No. 332–591, *Economic Impact of Section 232 and 301 Tariffs on U.S. Industries,* and click on the link to "Hearing Information." Interested parties should check the Commission's website periodically for updates.

By order of the Commission.

Issued: July 13, 2022.

William Bishop,

Supervisory Hearings and Information Officer.

[FR Doc. 2022–15323 Filed 7–18–22; 8:45 am]

BILLING CODE 7020–02–P

INTERNATIONAL TRADE COMMISSION

[Investigation Nos. 701–TA–560–561 and 731–TA–1317–1328 (Review)]

Carbon and Alloy Steel Cut-To-Length Plate From Austria, Belgium, Brazil, China, France, Germany, Italy, Japan, South Africa, South Korea, Taiwan, and Turkey; Scheduling of Full Five-Year Reviews

AGENCY: United States International Trade Commission.

ACTION: Notice.

SUMMARY: The Commission hereby gives notice of the scheduling of full reviews pursuant to the Tariff Act of 1930 ("the Act") to determine whether revocation of the countervailing duty orders on carbon and alloy steel cut-to-length plate ("CTL plate") from China and South Korea and the antidumping duty orders on CTL plate from Austria, Belgium, Brazil, China, France, Germany, Italy, Japan, South Africa, South Korea, Taiwan, and Turkey would be likely to lead to continuation or recurrence of material injury within a reasonably foreseeable time. The Commission has determined to exercise its authority to extend the review period by up to 90 days.

DATES: July 8, 2022.

FOR FURTHER INFORMATION CONTACT: Nayana Kollanthara (202–205–2043), Office of Investigations, U.S. International Trade Commission, 500 E Street SW, Washington, DC 20436. Hearing-impaired persons can obtain information on this matter by contacting the Commission's TDD terminal on 202–205–1810. Persons with mobility impairments who will need special assistance in gaining access to the Commission should contact the Office of the Secretary at 202–205–2000. General information concerning the Commission may also be obtained by accessing its internet server (*https://www.usitc.gov*). The public record for these reviews may be viewed on the Commission's electronic docket (EDIS) at *https://edis.usitc.gov.*

SUPPLEMENTARY INFORMATION:

Background.—On March 7, 2022, the Commission determined that responses to its notice of institution of the subject five-year reviews were such that full reviews should proceed (87 FR 19121, April 1, 2022); accordingly, full reviews are being scheduled pursuant to section 751(c)(5) of the Tariff Act of 1930 (19 U.S.C. 1675(c)(5)). A record of the Commissioners' votes, the Commission's statement on adequacy, and any individual Commissioner's statements are available from the Office of the Secretary and at the Commission's website.

Participation in the reviews and public service list.—Persons, including industrial users of the subject merchandise and, if the merchandise is sold at the retail level, representative consumer organizations, wishing to participate in these reviews as parties must file an entry of appearance with the Secretary to the Commission, as provided in section 201.11 of the Commission's rules, by 45 days after publication of this notice. A party that filed a notice of appearance following publication of the Commission's notice of institution of the reviews need not file an additional notice of appearance. The Secretary will maintain a public service list containing the names and addresses of all persons, or their representatives, who are parties to the reviews.

For further information concerning the conduct of these reviews and rules of general application, consult the Commission's Rules of Practice and Procedure, part 201, subparts A and B (19 CFR part 201), and part 207, subparts A, D, E, and F (19 CFR part 207).

Please note the Secretary's Office will accept only electronic filings during this time. Filings must be made through the Commission's Electronic Document Information System (EDIS, *https://edis.usitc.gov.*) No in-person paper-based filings or paper copies of any electronic filings will be accepted until further notice.

Limited disclosure of business proprietary information (BPI) under an administrative protective order (APO) and BPI service list.—Pursuant to section 207.7(a) of the Commission's rules, the Secretary will make BPI gathered in these reviews available to authorized applicants under the APO issued in the reviews, provided that the application is made by 45 days after publication of this notice. Authorized applicants must represent interested parties, as defined by 19 U.S.C. 1677(9), who are parties to the reviews. A party granted access to BPI following publication of the Commission's notice of institution of the reviews need not reapply for such access. A separate service list will be maintained by the

Appendix C
Calendar of Hearing Witnesses

CALENDAR OF PUBLIC HEARING

Those listed below appeared in the United States International Trade Commission's hearing via videoconference:

Subject: Economic Impact of Section 232 and 301 Tariffs on U.S. Industries

Inv. No.: 332-591

Date and Time: July 20, 2022 - 9:30 a.m. (*Day 1)*

PANEL 1:

ORGANIZATION AND WITNESSES:

Wiley Rein LLP
Washington, DC
on behalf of

Century Aluminum Company ("Century")

Matt Aboud, Senior Vice President, Strategy and Business Development, Century Aluminum Company

Robert E. DeFrancesco III) – OF COUNSEL

The Aluminum Association
Arlington, VA

Charles Johnson, President and Chief Executive Officer

Lloyd ("Buddy") Stemple, Chief Executive Officer, Constellium Rolled Products Ravenswood, LLC; and Chair of Board of Directors, The Aluminum Association

Henry Gordinier, President and Chief Executive Officer, Tri-Arrows Aluminum Inc.; and Vice Chair of Board of Directors, The Aluminum Association

Aluminum Extruders Council ("AEC")
Wauconda, IL

Jeffrey S. Henderson, President

Beer Institute
Washington, DC

Mary Jane Saunders, Vice President and General Counsel

PANEL 2:

ORGANIZATION AND WITNESSES:

Bracewell LLP
Washington, DC
on behalf of

Precision Metalforming Association (“PMA”)

David Klotz, President, Precision Metalforming Association

Paul Nathanson) – OF COUNSEL

Franklin Partnership, LLP
Washington, DC
on behalf of

Precision Machined Products Association (“PMPA”)

Miles Free, Director of Industry Affairs, PMPA

Omar Nashashibi, Partner, Franklin Partnership, LLP

Franklin Partnership, LLP
Washington, DC
on behalf of

Smith & Richardson Inc.

William Richard Hoster III, President, Smith & Richardson Inc.

Omar Nashashibi, Partner, Franklin Partnership, LLP

Franklin Partnership, LLP
Washington, DC

on behalf of

Vaughn Manufacturing Company

Mark Vaughn, President, Vaughn Manufacturing Company

Omar Nashashibi, Partner, Franklin Partnership, LLP

Haas Automation, Inc.
Oxnard, California

Peter Zierhut, Vice President

Franklin Partnership, LLP
Washington, DC
on behalf of

Precise Tooling Solutions

Don Dumoulin, Chief Executive Officer and Owner,
Precise Tooling Solutions

Omar Nashashibi, Partner, Franklin Partnership, LLP

Industrial Fasteners Institute
Independence, OH

Dan Walker, Managing Director

Laurin Baker, Washington Representative

Bracewell LLP
Washington, DC
on behalf of

Tennsco LLC

Stuart Speyer, President, Tennsco LLC

Paul Nathanson) – OF COUNSEL

Bracewell LLP
Washington, DC
on behalf of

B. Walter & Co.

Scott Buehrer, President, B. Walter & Co.

Paul Nathanson) – OF COUNSEL

Panel 3:

ORGANIZATION AND WITNESSES:

American Concrete Pipe Association ("ACPA")
Irving, TX

Steven R. Hawkins, Sr., President

Wiley Rein LLP
Washington, DC
on behalf of

American Line Pipe Producers Association Trade Committee

Timothy C. Brightbill) – OF COUNSEL

Schagrin Associates
Washington, DC
on behalf of

ArcelorMittal Tubular; Bristol Metals; Bull Moose Tube; California Steel and Tube;
EXLTUBE; Felker Brothers Corporation; Maruichi American Corporation;
Nucor Tubular Products; Primus Pipe & Tube; PTC Liberty Tubulars;
Searing Industries; Vest, Inc.; Vallourec Star, LP; Welded Tube USA;
Welspun Tubular USA; and Zekelman Industries

Tom Modrowski, Chief Executive Officer, Bull Moose Industries

Tom Muth, Executive Vice President and Chief Operating Officer,
Zekelman Industries

Christopher T. Cloutier) – OF COUNSEL

Franklin Partnership, LLP

Washington, DC
on behalf of

Forging Industry Association (“FIA”)

James R. Warren, President and Chief Executive Officer, FIA

Omar Nashashibi, Partner, Franklin Partnership, LLP

Morris, Manning & Martin LLP
Washington, DC
on behalf of

American Metals Supply Chain Institute (“AMSCI”)

Richard Chriss, President, AMSCI

Donald B. Cameron)
) – OF COUNSEL
R. Will Planert)

Coalition of American Metal Manufacturers and Users (“CAMMU”)
Washington, DC

Paul Nathanson, Executive Director

Franklin Partnership, LLP
Washington, DC
on behalf of

Trenton Forging

Chelsea Lantto, President, Trenton Forging

Omar Nashashibi, Partner, Franklin Partnership, LLP

-END (Day 1)-
CALENDAR OF PUBLIC HEARING

Those listed below appeared in the United States International Trade Commission’s hearing via videoconference:

Subject: Economic Impact of Section 232 and 301 Tariffs on U.S. Industries

Inv. No.: 332-591

Date and Time: July 21, 2022 - 9:30 a.m. *(Day 2)*

CONGRESSIONAL APPEARANCE:

The Honorable Frank J. Mrvan, U.S. Representative, 1st District, Indiana

FOREIGN GOVERNMENT WITNESS:

The Republic of Turkey
Ministry of Trade

Burak Güreşci, Head of Department, Directorate General for Imports

PANEL 4:

ORGANIZATION AND WITNESSES:

Wiley Rein LLP
Washington, DC
on behalf of

Gerdau

Adam Parr, Director, Communications and Public Affairs, Gerdau

John R. Shane) – OF COUNSEL

Wiley Rein LLP
Washington, DC
on behalf of

Nucor Corporation ("Nucor")

Christopher J. Bedell, General Manager, Corporate Legal Affairs, Nucor

Alan H. Price) – OF COUNSEL

AMS Trade LLP
Washington, DC
on behalf of

Outokumpu Stainless USA, LLC ("Outokumpu")

Tamara Weinert, President and Chief Executive Office,
Outokumpu BA Americas

Stuart Holmes, Senior Vice President, Finance and Procurement
and Chief Financial Officer, Outokumpu BA Americas

Deanna Tanner Okun) – OF COUNSEL

Specialty Steel Industry of North America ("SSINA")
Washington, DC

Tracy Rudolph, President and Chief Operating Officer, Electralloy

American Iron and Steel Institute
Washington, DC

Kevin M. Dempsey, President and Chief Executive Officer

United States Steel Corporation ("U.S. Steel")
Washington, DC

Benjamin Blase Caryl, Associate General Counsel,
International Trade & Public Policy, U.S. Steel

King and Spalding LLP
Washington, DC
on behalf of

Cleveland-Cliffs Inc.

Patrick M. Bloom, Vice President, Government Relations,
Cleveland-Cliffs Inc.

Stephen P. Vaughn) – OF COUNSEL

Steel Manufacturers Association ("SMA")

Washington, DC

Philip K. Bell, President

ArentFox Schiff LLP
Washington, DC
on behalf of

Çelik İhracatçıları Birliği – Turkish Steel Exporters' Association

Jessica R. DiPietro) – OF COUNSEL

Sandler, Travis & Rosenberg, P.A.
Washington, DC
on behalf of

Magellan Corporation

Nicole Bivens-Collinson, President, International Trade
Government Relations, Sandler, Travis & Rosenberg, P.A.

Wiley Rein LLP
Washington, DC
on behalf of

Rebar Trade Action Coalition ("RTAC")
Commercial Metals Company ("CMC")

Billy Milligan, Vice President, Sustainability & Government
Affairs, CMC

John R. Shane) – OF COUNSEL

PANEL 5:

ORGANIZATION AND WITNESSES:

Wiley Rein LLP
Washington, DC
on behalf of

American Alliance for Solar Manufacturing (“the Alliance”)

Timothy C. Brightbill)
) – OF COUNSEL
Laura El-Sabaawi)

Alliance for American Manufacturing (“AAM”)
Washington, DC

Scott N. Paul, President

Barnes & Thornburg LLP
Washington, DC
on behalf of

North American Association of Food Equipment Manufacturers

Charlie Souhrada, Vice President, Regulatory & Technical Affairs,
North American Association of Food Equipment Manufacturers

Christine J. Sohar Henter) – OF COUNSEL

California Manufacturing and Engineering Co. (“MEC'”)
Kerman, CA

Deanne Hix, Vice President of Sales Operations & Strategic Planning

Wiley Rein LLP
Washington, DC
on behalf of

Inventus Power (“Inventus”)

Patrick Trippel, President and Chief Executive Officer, Inventus

Chris Turner, Chief Technical Officer, Inventus

Maureen E. Thorson) – OF COUNSEL

Auto Care Association
Bethesda, MD

Bill Hanvey, President and Chief Executive Officer

Webb Wheel Products, Inc. (“Webb”)
Cullman, Alabama

Johnathon Capps, Vice President

Wiley Rein LLP
Washington, DC
on behalf of

JLG Industries, Inc. (“JLG”)

Jeffrey Ford, Director of Global Strategy and Business Development, JLG

Timothy C. Brightbill	)
	) – OF COUNSEL
Laura El-Sabaawi	)

Motor & Equipment Manufacturers Association (“MEMA”)
Washington, DC

Bill Frymoyer, Vice President, Public Policy

PANEL 6:

ORGANIZATION AND WITNESSES:

Retail Industry Leaders Association (“RILA”)
Washington, DC

Blake Harden, Vice President, International Trade

National Retail Federation
Washington, DC

Jonathan Gold, Vice President, Supply Chain and Customs Policy

American Apparel & Footwear Association (“AAFA”)
Washington, DC

Stephen Lamar, President and Chief Executive Officer

Barnes & Thornburg LLP
Washington, DC
on behalf of

U.S. Fashion Industry Association

Julie Hughes, President, U.S. Fashion Industry Association

David M. Spooner) – OF COUNSEL

Holiday Ornament Holiday Occasion Coalition (“HoHo Coalition”)
New York, NY

Cliff Adler, President, Kurt S. Adler, Inc.

The Mooney Law Firm, LLC
Tallahassee, FL
on behalf of

Home Furnishings Resource Group, Inc. (“HFRG”)

Curt Christian, Chief Executive Officer, HFRG

Shannon Liang) – OF COUNSEL

Travel Goods Association
Princeton. NJ

Nate Herman, Director of Government Relations

JOANN Inc. and Subsidiaries (including Jo-Ann Stores, LLC)
(collectively “JOANN”)
Hudson, OH

Edward Weinstein, Vice President, Tax and Government Affairs

American Chemistry Council (“ACC”)
Washington, DC

Jason Bernstein, Director, Global Affairs

-END (Day 2)-
CALENDAR OF PUBLIC HEARING

Those listed below appeared in the United States International Trade Commission's hearing via videoconference:

Subject: Economic Impact of Section 232 and 301 Tariffs on U.S. Industries

Inv. No.: 332-591

Date and Time: July 22, 2022 - 9:30 a.m. *(Day 3)*

PANEL 7:

ORGANIZATION AND WITNESSES:

Coalition for a Prosperous America
Washington, DC

Jeff Ferry, Chief Economist

Amanda Mayoral, Economist

AFL-CIO Industrial Union Council ("IUC")
Washington, DC

Brad Markell, Executive Director

United Steelworkers ("USW")
Washington, DC

Roxanne D. Brown, International Vice President At-Large

Pete Trinidad, Sr., President, USW Local 6787, Cleveland-Cliffs, Inc's. Steelmaking Facility in Burns Harbor, IN

Mark D. Lash, President, USW Local 1066, U.S. Steel Corporation's Steelmaking Facility in Gary, IN

Donneta Williams, President, USW Local 1025, Corning Inc.'s Optical Fiber Manufacturing Plant, Wilmington, NC

Housing Affordability Coalition for Trade

Washington, DC

Harlan Stone, Founding Member

PANEL 8:

ORGANIZATION AND WITNESSES:

Wiley Rein LLP
Washington, DC
on behalf of

Coalition for Fair Trade in Hardwood Plywood
and its individual members: Columbia Forest Products;
Commonwealth Plywood Inc.; States Industries Inc.; and
Timber Products Company
(collectively, "the Coalition")

Greg Pray, Chief Executive Officer and President,
Columbia Forest Products Company; and Chairman,
Coalition for Fair Trade in Hardwood Plywood

Timothy C. Brightbill)
Tessa V. Capeloto) – OF COUNSEL
Stephanie M. Bell)

Wiley Rein LLP
Washington, DC
on behalf of

American Manufacturers of Multilayered Wood Flooring
and its individual members: AHF Products, LLC; Mohawk Industries, Inc.;
Cahaba Veneer & Plywood; and Mullican Flooring, L.P.
(collectively, "AMMWF")

Neil Poland, President, Mullican Flooring, L.P.

Don Finkell, Vice President, AHF Products, LLC

Timothy C. Brightbill)
) – OF COUNSEL

Stephanie M. Bell)

Franklin Partnership, LLP
Washington, DC
on behalf of

American Mold Builders Association ("AMBA")

Kym Conis, Managing Director, AMBA

Omar Nashashibi, Partner, Franklin Partnership, LLP

Wiley Rein LLP
Washington, DC
on behalf of

American Vinyl Flooring Manufacturers Coalition (the "Coalition")

Jennifer Zimmerman, Chief Commercial Officer, AHF Products, LLC

Timothy C. Brightbill)
) – OF COUNSEL
Stephanie M. Bell)

Clark Hill, PLLC
Washington, DC
on behalf of

Cali Bamboo, LLC ("Cali")

Frank Carvajal, Vice President of Sales & Operations Planning

Matthew Goldstein) – OF COUNSEL

Barnes & Thornburg LLP
Washington, DC
on behalf of

Tile Council of North America ("TCNA")

Eric Astrachan, Executive Director, TCNA

David M. Spooner) – OF COUNSEL

The Mooney Law Firm, LLC
Tallahassee, FL
on behalf of

Life Saver Pool Fence Systems, Inc. (“Life Saver”)

Eric Lupton, President, Life Saver

Shannon Liang) – OF COUNSEL

Wiley Rein LLP
Washington, DC
on behalf of

Metal Grating Coalition (“the Coalition”)

Timothy C. Brightbill)
) – OF COUNSEL
Laura El-Sabaawi)

Wiley Rein LLP
Washington, DC
on behalf of

Coalition of American Millwork Producers (“CAMP”)

Greg Easton, Vice President, Woodgrain, Inc.

Timothy C. Brightbill)
) – OF COUNSEL
Laura El-Sabaawi)

PANEL 9:

ORGANIZATION AND WITNESSES:

The Mooney Law Firm, LLC
Tallahassee, FL
on behalf of

J.M. Wechter & Associates, Inc. (“JM Wechter”)

Maggie Walsh, Sr. Vice President, Production, JM Wechter

Shannon Liang) – OF COUNSEL

Schagrin Associates
Washington, DC
on behalf of

Novus International, Inc. (“Novus”)

Dan Meagher, President and Chief Executive Officer,
Novus International, Inc.

Christopher T. Cloutier) – OF COUNSEL

Wiley Rein LLP
Washington, DC
on behalf of

Molycop USA

Jim Anderson, Chief Executive Officer, Molycop USA

Alan H. Price) – OF COUNSEL

Consumer Technology Association (“CTA”)
Arlington, VA

Ed Brzytwa, Vice President of International Trade

Element Electronics
Winnsboro, South Carolina

David Baer, Chief Operating Officer and General Counsel

Information Technology Industry Council (“ITI”)
Washington, DC

Naomi Wilson, Vice President for Policy, Asia

Vista Outdoor Inc.
Anoka, Minnesota

Fred C. Ferguson, Vice President, Public Affairs and Communications

Outdoor Industry Association (“OIA”)

Washington, DC

Richard W. Harper, Jr., Director of Government Affairs

Stein Shostak Pollack & O'Hara, LLP
Los Angeles, CA
on behalf of

Pedego, Inc.

Don DiCostanzo, Chief Executive Officer, Pedego, Inc.

Kayla Owens) – OF COUNSEL

Medline Industries (“Medline”)
Northfield, IL

Rob Calia, Vice President

National Fisheries Institute (“NFI”)
McLean, VA

Robert A. DeHaan, Vice President for Government Relations

-END (Day 3)-

Appendix D
Summary of Views of Interested Parties

This appendix includes summaries of written submissions prepared by interested parties, provided that they met certain requirements set out in the notice of investigation, and the names of interested parties who filed written submissions in the investigation but did not file a written summary. The Commission has not edited the written summaries. A full copy of each written submission is available in the Commission's Electronic Document Information System (EDIS) (https://edis.usitc.gov). A public hearing was held for the investigation on July 20–22, 2022. Appendix C contains the calendar of the public hearing, which includes names of the persons who testified. The transcript of the hearing is available on EDIS.

Alcoa Corporation

No written summary. Please see EDIS for full submission.

Alliance for American Manufacturing

No written summary. Please see EDIS for full submission.

Aluminium Association of Canada

Recommendation: Should the United States revisit imposition of the 232 tariffs, Canadian aluminium must remain exempt of any 232 tariffs, because of its strategic role within North America's integrated industrial value chain.

> Canada has always been a trustworthy supplier of responsibly produced low CO2 aluminium, with stable supply of product to the U.S. while exposed to the ups and downs of the market. Canada's production capacity has remained the same over the past 15 years.

> China's subsidization of high-carbon aluminium has impacted the nature of the global aluminium market, leading to a downward pressure on global prices, discouraging new private investment and threatening the long-term viability of current production.

> As China increases its overwhelming share of aluminium production, by adding new capacity in primary and secondary, upstream and downstream, enabled by state subsidies of all forms, it progressively destroys existing privately owned competition in the rest of the world, while inhibiting market-driven expansion outside the country. This erosion is already weakening established domestic capacity around the world – most notable in NATO countries, the U.S., Canada and Europe – threatening our shared capacity to step up in times of special needs to supply our national security requirements.

> Responsible production should be brought into consideration in addition to the notion of carbon footprint, as we work towards reshoring industrial capacity around shared values coming out of a succession of supply chain shocks.

> We believe that the preservation and growth of the aluminium value chain should be grounded on responsible production and low carbon parameters, within existing trade agreements (ie USMCA).

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> Using our recently renegotiated USMCA trade agreement to reference acceptable standards of responsible production and carbon pricing could provide an initial platform for treating incoming imports of aluminium in accordance with our trading ecosystem's values and expectations.

Aluminum Extruders Council

The Aluminum Extruders Council (AEC) consists of more than 120 member companies, representing aluminum extruders operating hundreds of extrusion presses in hundreds of plants in 35 states in the United States, employing more than 60,000 people directly and another 125,000 indirectly. AEC members include U.S. manufacturers of aluminum extrusion products, including critical products for automobiles; renewable energy production; defense, including fighter jets and armored vehicles; and critical infrastructure, such as for bridge and infrastructure projects, train bodies and rail cars, aviation, and vessels. Aluminum extrusions are used in the construction of commercial facilities, government facilities and critical manufacturing, as well as in emergency services and nuclear facilities. Despite some initial relief for the domestic extrusions industry that resulted from the Aluminum 232 and its original application to aluminum extrusions, the structure of the exclusions process later developed by the U.S. Department of Commerce (Commerce), including the adoption of General Approved Exclusions (GAEs) that do not require product-specific objections, has effectively gutted any relief for U.S. extrusion producers from imports of extrusions that the Aluminum 232 regime initially provided. As a result, despite the Aluminum 232, the domestic aluminum extrusion industry is once again at a severe competitive disadvantage compared to imported aluminum extrusions due to higher primary metal costs from the Section 232 tariffs, but with **no protection from imports of extrusions**. This competitive disadvantage our industry faces against imports of aluminum extrusions contributes to, and threatens to, worsen the supply chain crisis in many sectors of the economy, including the automobile and renewable energy sectors and other critical manufacturing sectors. In addition, this dynamic is encouraging domestic manufacturers to mover production facilities overseas – resulting in a loss of American jobs.

As the Commission looks at the impact of the Aluminum 232 on American companies and American workers, we respectfully request that the Commission recognize in its report that the current structure of the Aluminum 232 tariffs (incorporating the GAE), has put the AEC and its members in an untenable situation. Our foreign competitors can compete with us for domestic customers without having to pay the Aluminum 232 tariffs, while also not being subject to any Aluminum 232 on their raw material billets. Put simply, the structure of the existing Section 232 exclusion process is fundamentally flawed with respect to the unique nature of aluminum extrusions.

Therefore, the AEC respectfully requests that the Commission's report should:

- Recommend that Commerce revoke the GAEs;
- Recommend that Commerce fundamentally restructure the exclusion process for aluminum extrusions to one that reflects the commercial realities of the aluminum extrusions industry, granting U.S. extrusion producers the ability to participate in the process in a meaningful way; and
- Recommend that Commerce allow the AEC to file objections.

The current structure of the Aluminum 232 and its exclusion process (including the GAE), has put the AEC's members at a severe competitive disadvantage vis-a-vis our foreign competitors, and thus must be modified (including the revocation of the aluminum extrusion GAE).

American Alliance for Solar Manufacturing

The American Alliance for Solar Manufacturing supports and has benefited significantly from the Section 301 tariffs on Chinese solar imports. Together with existing antidumping and countervailing duty orders and Section 201 safeguard measures, these tariffs have had a positive economic impact on U.S. solar manufacturers by helping to discipline unfairly traded Chinese imports. From 2018 (when the Section 301 tariffs were imposed) to 2020, U.S. solar production grew by 370 percent, and capacity utilization increased by more than 15 percent.[1] Recent new investments in domestic solar manufacturing have created good jobs in clean energy technologies that are critical to advance our response to the climate crisis and our energy transition. These include major investments by Q CELLS, First Solar, Heliene and other U.S. solar producers. While challenges persist and the threat from unfairly traded imports has not disappeared, the United States is experiencing promising growth in solar manufacturing.

While the Section 301 tariffs have had a positive economic impact on U.S. solar producers, they have not contributed meaningfully to recent inflation levels (as shown by their timing, inflation's global impact and numerous economist reports). In fact, average solar prices have not changed meaningfully since their imposition.

Without the positive economic impact from disciplines like the Section 301 tariffs, large quantities of unfairly priced Chinese solar imports would likely result in U.S facility closures and the loss of thousands of U.S. manufacturing and related jobs, as they did in prior periods. As the Commission recently concluded, "there is enormous and growing cell and module production capacity in China and substantial unused capacity," and Chinese solar producers are "highly export-oriented."[2] Looking forward, the Chinese solar industry "will have increasing production capacity and reduced home market demand, which will create a significant incentive to increase export{s}."[3] Without the Section 301 tariffs and other measures, Chinese solar producers would intensify their targeting of the U.S. market, to the severe detriment of the domestic industry.

The continued imposition of the Section 301 tariffs is crucial to the continuation and further expansion of solar manufacturing, which ultimately will benefit the entire U.S. economy and the environment. Robust American solar manufacturing will decrease U.S. dependence on foreign energy supplies, substantially improving energy security. The United States cannot be beholden to China — with its unfair trade, highly polluting manufacturing practices, and state control — for its clean energy future. The Section 301 tariffs, in addition to other important trade measures like antidumping and countervailing duty orders, are helping significantly in the effort to grow U.S. solar manufacturing capabilities, and their continuation is essential to the future of the American solar industry.

[1] Prehearing Report, *Crystalline Silicon Photovoltaic Cells, Whether or Not Partially or Fully Assembled Into Other Products*, Inv. No. TA-201-075 (Extension) (Oct. 20, 2021) at III-15.
[2] *Crystalline Silicon Photovoltaic Cells and Modules from China*, Inv. Nos. 701-TA-481 and 731-TA-1190, USITC Pub. 4874 (Mar. 2019) (Review) at 24.
[3] Id. At 25.

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American Apparel & Footwear Association

Section 301 tariffs are taxes paid by U.S. importers. The process by which they were imposed and maintained was and is rife with problems. Section 301 tariffs on consumer products hold no strategic advantage for the U.S. China trade relationship and only make basic goods like clothes, shoes, and back to school backpacks more expensive. Their regressive nature means they hurt those American families hardest who can least afford them. Conversely, removing these tariffs – something President Biden can do rapidly, echoing the speed at which they were imposed – would be a targeted, effective, and quick way to reduce inflationary pressures for American families on products they need.

American Beverage Association

No written summary. Please see EDIS for full submission.

American Chemistry Council

No written summary. Please see EDIS for full submission.

American Feed Industry Association

Because animal feed ingredients, such as Vitamin B12 (HTS 2309.90.7000), Vitamin D3 (HTS 2309.90.9500), Inositol (HTS 2906.13.1000), Vitamin K (HTS 2914.79.4000) and Taurine (HTS 2921.19.6190), are primarily sourced from China with no alternative domestic suppliers, the U.S. animal food industry has been left with taking on the burden of paying more to import these vital ingredients and increases the cost of manufacturing feed in the U.S. Lifting the Section 301 tariffs from these products from China is paramount for U.S. animal food and animal producers to continue to meet the growing consumer demands without the threat of increased costs to the consumer.

American Iron and Steel Institute

The American steel industry serves as the backbone of the U.S. manufacturing sector and is essential to America's national and economic security, as both U.S. military programs and our critical infrastructure are dependent on U.S.-produced steel products. Furthermore, the steel industry in the United States has the lowest carbon dioxide emissions intensity among the world's largest steel-producing nations. In 2017, following repeated surges in imports fueled by global overcapacity in steel, the Secretary of Commerce undertook an investigation under Section 232 that found that steel imports threaten to impair U.S. national security and concluded that imports must be reduced to a level that would allow American steel mills to operate at 80 percent of their production capacity. Based on this report, the President in 2018 implemented a program of tariffs and quotas to limit steel imports.

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The Section 232 measures, in combination with a number of trade remedy orders, reduced both the volume of steel imports and the share of the market taken by imports. As steel imports fell, domestic steelmaking capacity utilization increased. The Section 232 program also incentivized new capital spending by domestic steelmakers, with announced investments of nearly $22 billion in new, expanded or restarted production since March 2018, and approximately 22 million net tons of steelmaking capacity have come on-line or been announced since that time. While the Section 232 measures had positive impacts on the steel industry, there has been no significant broad negative impact to the economy as a whole. The Economic Policy Institute examined the relationship between steel prices and the prices of steel containing goods and found that the Section 232 measures had no meaningful impact on prices of steel-consuming products.

However, the relief under Section 232 is discretionary and has been modified over time to allow more imports to enter the U.S. market free of tariffs. In 2019, the United States lifted the Section 232 tariffs on all steel imports from Canada and Mexico, which are among the largest exporters of steel to the U.S. More recently, the United States agreed to replace the Section 232 tariffs with tariff-rate quotas on steel imports from the EU, Japan and the United Kingdom, which permit a significant volume of steel to enter the U.S. duty-free. Significant volumes of steel products also have been excluded from the Section 232 tariffs through product-specific exclusions.

As demand recovered following the COVID-19 recession, steel imports significantly increased in 2021 and have continued to do so in 2022, taking the largest share of the U.S. market since the Section 232 measures were first implemented in 2018.Moreover, the global steel overcapacity crisis continues, with excess capacity estimated to be 544 million metric tons in 2021, more than six times total steel production in the United States. Many countries continue to increase significantly their steel capacity, including through Chinese cross-border investments into Southeast Asia. Given these developments, AISI believes the Section 232 program remains critically important for our national security.

American Line Pipe Producers Association Trade Committee

The members of the American Line Pipe Producers Association Trade Committee, an association of U.S. line pipe and structural pipe manufacturers, support and have benefited significantly from the Section 301 tariffs on Chinese imports. Together with existing antidumping and countervailing duty orders and the Section 232 measures, these tariffs have had a positive economic impact on U.S. pipe manufacturers by helping to discipline unfairly traded imports of Chinese steel pipe. Prior to the tariffs, Chinese imports of large diameter steel pipe ranged from approximately 21,000 to 52,000 short tons per year.[1] Once the Section 232 tariffs, Section 301 tariffs and antidumping and countervailing duty orders were imposed,

[1] *Large Diameter Welded Pipe from China and India*, Inv. Nos. 701-TA-593-594 and 731-TA-1402 and 1404, USITC Pub. 4859 (January 2019) (Final) ("USITC Pub. 4859") at IV-5 (Table IV-2).

Chinese pipe imports dropped considerably. In 2019, there were no imports of Chinese large diameter welded steel pipe, and they have remained at negligible levels since.[1]

While the Section 301 tariffs have had a positive economic impact on U.S. pipe producers, neither they nor the Section 232 measures have contributed meaningfully to recent inflation levels (as shown by their timing, inflation's global impact and numerous economist reports) or caused raw material availability concerns for manufacturers, which have multiple available sources for their raw material needs.

Without the positive economic impact from disciplines like the Section 301 tariffs, large quantities of unfairly priced Chinese imports of steel pipe would be likely to result in U.S facility closures and the loss of thousands of U.S. manufacturing and related jobs. In the recent trade cases, the Commission estimated that "mills in China accounted for approximately 70 percent of all global welded tube production in 2015."[2] Without the Section 301 tariffs and other measures, Chinese pipe producers would again target the U.S. market, to the severe detriment of the domestic industry. This would be especially damaging given the already extremely difficult market conditions faced by U.S. large diameter welded pipe producers, particularly line pipe producers, rendering them particularly vulnerable to the negative effects of a renewed surge in imports, were the tariffs to be lifted. Indeed, while the U.S. industry added jobs and production immediately after the Section 301 tariffs and trade remedy orders were put in place, these gains unfortunately eroded quickly in 2021 due to the cancellation of several major pipeline projects and a substantial decline in the market, particularly line pipe.

Steel pipe is essential to the building and maintenance of American infrastructure, including energy infrastructure, making it critical that domestic manufacturing capabilities for pipe are maintained. The Section 301 tariffs, in addition to other important measures like antidumping and countervailing duty orders, are helping significantly in the effort to maintain such capabilities, and their continuation is essential to the future of the American large diameter welded pipe industry.

American Manufacturers of Multilayered Wood Flooring

The Section 301 tariffs have had a significant positive economic impact on the domestic multilayered wood flooring ("MLWF") industry. In combination with the antidumping and countervailing ("AD/CVD") duty measures, the Section 301 tariffs have benefitted the U.S. MLWF industry and the U.S. economy as a whole by redressing unfair imports from China. In 2019, the first full year after the Section 301 duties went into effect, imports of Chinese MLWF decreased by more than half. While Chinese MLWF is still present in the U.S. market in significant volumes, the combination of the Section 301 and AD/CVD duties has given U.S. MLWF manufactures more stability to develop new product lines and bring additional

[1] Based on official U.S. import statistics from DataWeb for HTS statistical reporting numbers 7305.11.1030, 7305.11.1060,
7305.11.5000, 7305.12.1030, 7305.12.1060, 7305.12.5000, 7305.19.1030, 7305.19.1060, 7305.19.5000, and 7305.31.4000.

[2] USITC Pub. 4859 at II-6.

production capacity online. These investments, in turn, create good paying jobs across the United States.

U.S. trade measures are crucial to combating unfair and anticompetitive Chinese trade practices. The Chinese government continues to promote forced technology transfer and pursue other unfair practices that led the United States to impose Section 301 tariffs in the first place. The Government of China has identified the wood and wood products industry as fundamental to its national economy and taken measures to accelerate its development. This includes widespread subsidization in the form of direct government investment, reduction or elimination of certain fees, and low-interest loans, among others. These policies encourage the development of production that results in large volumes of dumped and subsidized products being sold in the U.S. market. While AD/CVD duties play a critical role in creating a level playing field, the Section 301 duties have an important and independent role. Section 301 duties apply consistently and comprehensively to Chinese wood flooring products, whereas AD and CVD duties vary year-byyear and producer-by-producer and fail to cover all Chinese imports. Section 301 duties also provide the domestic industry forward-looking and consistent duties that the retroactive AD/CVD duties do not.

Together with the AD/CVD orders, Section 301 tariffs have spurred the expansion of domestic production of MLWF. For example, Section 301 tariffs were a contributing factor to AHF's ability to acquire a new facility in Tennessee and expand an existing facility in Pennsylvania. Likewise, U.S. producer Mullican has made large capital investments based in part on sales projections that incorporate the continued effect of the Section 301 tariffs. These investments benefit the individuals working at these facilities, as well as the communities where these facilities are located. However, without the combined disciplines of the Section 301 tariffs and AD/CVD orders, these investments would be undermined, and U.S. facilities would be closed, resulting in the loss of thousands of U.S. manufacturing jobs. As such, continuation of the Section 301 tariffs is crucial to the future of the American wood flooring industry.

American Vinyl Flooring Manufacturers Coalition

The members of the American Vinyl Flooring Manufacturers Coalition support and have benefited from the Section 301 tariffs on imports of vinyl flooring products from China. The vinyl flooring industry supports more than 5,000 American jobs, including more than 350 individuals at the facilities of AVFMC's members. Since the Section 301 tariffs were imposed, numerous companies have made or announced investments in new vinyl flooring manufacturing facilities or expansions of existing facilities in the United States. These investments have created hundreds of U.S. jobs and will lead to even more jobs in the coming years.

Vinyl flooring is a resilient and dynamic flooring product that is increasingly popular in residential and commercial buildings. Demand for vinyl flooring has been growing substantially for the past ten years. However, U.S. producers have largely been shut out from benefiting from this increased demand because of highly export-oriented Chinese producers that are selling high volumes of vinyl flooring products at below the cost of U.S. production. Imports of Chinese vinyl flooring products increased 90%

from 2016 to 2018. This dramatic increase began to level off when Section 301 tariffs were put into place.

While imports from China remain at historic levels, the Section 301 tariffs have created the first step towards parity. Since the Section 301tariffs were put into place, at least eight new U.S. manufacturing facilities have been announced. For example, AHF Products has established new partnerships with domestic producers and acquired three new facilities, bringing its total to ten U.S. vinyl flooring production facilities. Textile Management Associates has embarked on an expansion project that will add significant new jobs. These investments strengthen communities all across America.

Notably, Section 301's economic benefits to the domestic industry and the U.S. economy have not contributed to overall inflation or significantly increased housing prices. Overall inflation, housing prices, and the price of residential construction inputs was relatively flat between 2018 (when the Section 301 duties were imposed) and early 2020 (when COVID disrupted the global economy and supply chain disruptions occurred worldwide).

Section 301 tariffs play a critical role in the continuation of the domestic vinyl flooring industry. Depending on market conditions, domestic vinyl flooring producers should be well-positioned to compete for growing demand with new investments and acquisitions. The stability of the Section 301 tariffs contributed significantly to decisions to take these actions. However, removing Section 301 tariffs would rapidly undermine recent and planned investments in domestic vinyl flooring production. The Section 301 tariffs greatly benefit U.S. vinyl flooring producers.

American Wire Producers Association

No written summary. Please see EDIS for full submission.

Americans for Free Trade

No written summary. Please see EDIS for full submission.

ArcelorMittal Tubular; Bristol Metals; Bull Moose Tube; California Steel and Tube; EXLTUBE; Felker Brothers Corporation; Maruichi American Corporation; Nucor Tubular Products; Primus Pipe & Tube; PTC Liberty Tubulars; Searing Industries; Vest, Inc.; Vallourec Star, LP; Welded Tube USA; Welspun Tubular USA; and Zekelman Industries

No written summary. Please see EDIS for full submission.

Archroma U.S., Inc.

There is limited sourcing of raw materials and inputs for U.S. producers', including Archroma's, OBA and paper dyes/chemicals business, with most of the inputs sourced from China and India. As such, the continuation of tariffs on inputs and feedstock places Archroma and other U.S. producers of OBA, dyes and chemicals for paper on an unlevel playing field with import competition from China, India and Taiwan. The OBA, dyes and chemicals producers in China, India and Taiwan are vertically integrated, have no tariff issues on their inputs or feedstock, and compete for market share within the U.S. This is the world in which U.S. paper OBA, dye and chemicals producers must compete. Therefore, every "tool in the toolbox" is absolutely necessary to maintain low production costs to remain globally and domestically competitive, and retain U.S. production, sales, revenue and the U.S. workforce. Tariffs have had detrimental impacts to the industry and exacerbated the need for a level playing field.

The current 301 Tariff policy does not consider the state of the paper OBA, and if it continues, this policy will allow foreign competitors from India, Taiwan, Indonesia, and China to replace domestic producers and U.S. workers for OBA for paper and dyes and chemicals production.[1] These negative effects are inconsistent with any Administration's, Congresses' goals and the purpose of U.S. trade policy in re-shoring and supporting U.S. industry, economic growth and manufacturing jobs.

Association of American Publishers

No written summary. Please see EDIS for full submission.

[1] The only other U.S. OBA producer is 3D located in Georgetown, South Carolina.

Association of Home Appliance Manufacturers

No written summary. Please see EDIS for full submission.

Auto Care Association

No written summary. Please see EDIS for full submission.

Ball Corporation

No written summary. Please see EDIS for full submission.

Beer Institute

No written summary. Please see EDIS for full submission.

Blue Sky the Color of Imagination, LLC

No written summary. Please see EDIS for full submission.

Boco Gear, LLC

No written summary. Please see EDIS for full submission.

BorgWarner Inc

No written summary. Please see EDIS for full submission.

Cali Bamboo, LLC

No written summary. Please see EDIS for full submission.

California Manufacturing and Engineering Co.

California Manufacturing and Engineering Co. (MEC), founded over 45 years ago and based in the rural, underserved community of Kerman, California is the fourth-largest domestic manufacturer of Mobile Elevating Work Platforms (MEWP) in the United States. As a small manufacturer in a space overwhelmingly dominated by large, publicly-traded corporations (i.e., JLG and Genie), MEC is forced to rely on global partnerships for subassemblies and unfinished, base models for some of our products in order to compete against the industry behemoths. Base models that we import (from China and elsewhere) are specially designed to exact specifications established by our highly-skilled, MEC engineers in Kerman, produced by our verified manufacturing partners, and then imported and finished in Kerman, to add our proprietary, patented, and patent pending, innovative solutions.

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The 301 tariffs imposed on imported lifts and parts from China impact all of the base models and subassemblies that MEC imports. These high tariff rates on the MEWP components and lifts manufactured at MEC's Kerman facility severely affect our financial position and our ability to invest capital for further growth of our business, our workers, and our rural community.

The significant negative impacts to MEC's business from the Section 301 tariffs directly translate to a loss of local jobs, putting hundreds of hardworking U.S. employees and their families at risk. Despite a prior finding that the lack of an exclusion would cause harm to an American company, the current Administration has not restored the lapsed exclusion, despite repeated participation by MEC in the exclusion request process. Thus, these Section 301 tariffs actually threaten the very population of underserved and rural communities that the Biden Administration recognizes is the focus of its worker-centric trade policy. In light of the significant economic impacts on our domestic operations, hard-working employees, and community, the Biden Administration should end the Section 301 tariffs applicable to MEWP products.

Indeed, MEC submits:

- Even if the 301 tariffs were effective in changing the Chinese government's behavior (which they have not been), the 301 tariffs are too blunt of an instrument, and are causing disproportionate harm to American manufacturing companies like MEC;
- The two largest domestic producers of MEWP (JLG and Genie) have advocated for the continuation of the 301 tariffs, claiming they have assisted their U.S. manufacturing operations. However, in fact neither has meaningfully expanding its U.S. operations, but instead continue to move a net negative number of manufacturing jobs out of the United States, while without tariffs MEC could have invested in triple the manufacturing operations; and
- That the China 301 tariffs overall have not resulted in any meaningful change in the Chinese government's behavior, and thus an alternative should be found like using tariff funds for re-investment in U.S. manufacturing.

If these tariffs are repealed, MEC will have the opportunity to grow rapidly through lower manufacturing costs and thus reverse the negative impact on inflation and the overall economy, just as we were doing before the tariffs were imposed.

Can Manufacturers Institute

No written summary. Please see EDIS for full submission.

Century Aluminum Company

Century Aluminum Company is a domestic producer of standard grade and value-added primary aluminum products, as well as high-purity aluminum. Century has smelters in Sebree, Kentucky; Hawesville, Kentucky; and Mt. Holly, South Carolina. Century accounts for a majority of U.S. primary aluminum production and possesses the last remaining commercial high-purity aluminum smelter in the United States, and the only one in a NATO country.

The import measures on aluminum imposed in 2018 pursuant to Section 232 of the Trade Expansion Act of 1962, as amended, saved what was left of the U.S. primary aluminum industry from total collapse and has allowed it to begin to stabilize. The tariffs allowed U.S. primary aluminum prices to return to levels that allowed the industry to operate profitably and begin to reinvest. The tariffs have achieved the goal of the program – leading to increased production, investment, and employment. As the primary industry has recovered, there has been growth in the semi-finished aluminum industries. The tariffs have not harmed downstream industries or demand.

The domestic industry is only beginning its recovery. The relatively low duty rate is also limiting the extent of the industry's recovery, especially in light of the current energy crisis. Whether through a tariff or a tariff rate quota, the measures must remain in place to control imports to maintain the price effect that has allowed the industry to begin to recover. The root cause of the problem–heavily subsidized excess production around the world–also remains unresolved. China is one of many countries providing significant subsidies to support their aluminum industries. These subsidies continue to support what would otherwise be uneconomic capacity and production that weighs on the global market price. The LME cash price (forming the base price for all primary aluminum globally) reflects total global supply and demand, regardless of where the aluminum is produced, sold, or stored. Addressing only Chinese imports will not address the depressive effect that global excess production both inside and outside of China has on the LME price.

The excess capacity in primary aluminum also forces itself downstream. There needs to be relief on the entire value chain. When the Commerce Department adopted General Approved Exclusions ("GAEs") removing products like alloyed slabs and aluminum extrusions, it negatively impacted those products and as a result downstream demand for the primary aluminum needed to produce them. Century supports eliminating the GAEs and reimposing tariffs on all products up and down the value chain, including alloyed slabs and aluminum extrusions.

The domestic industry's recovery has also been interrupted by the recent spike in energy prices caused by Russia's war in Ukraine. Century was forced to temporarily idle its Hawesville smelter. Without the program, the industry will not be able to continue its recovery. The recent improvements will be reversed, and the industry will again be in danger of disappearing. This would leave the United States completely dependent on unstable and insecure import sources to supply the aluminum necessary to defend itself and build its critical infrastructure.

Chemtrade Chemicals US LLC

No written summary. Please see EDIS for full submission.

Cleveland-Cliffs Inc.

No written summary. Please see EDIS for full submission.

Coalition for Fair Trade in Hardwood Plywood

The Coalition for Fair Trade in Hardwood Plywood ("Coalition") supports and has benefitted from the Section 301 tariffs on imports of Chinese plywood products. In combination with the antidumping and countervailing duty measures, the Section 301 tariffs provide positive benefit to the U.S. hardwood plywood ("HWPW") industry and the U.S. economy as a whole by redressing unfair imports from China. In 2019, the first full year after the Section 301 tariffs went into effect, imports of Chinese HWPW halved. While Chinese HWPW is still present in the U.S. market in significant volumes, the combination of the Section 301 tariffs and antidumping and countervailing ("AD/CVD") duties have given U.S. HWPW manufactures more stability to grow and maintain their facilities and workforces.

U.S. trade measures are crucial to combating unfair and anticompetitive Chinese trade practices. The Chinese government continues to promote forced technology transfer and pursue other unfair practices that led the United States to impose Section 301 tariffs in the first place. The Government of China has identified the wood and wood products industry as fundamental to its national economy and taken measures to accelerate its development. This includes widespread subsidization in the form of direct government investment, reduction or elimination of certain fees, and low-interest loans, among others. These policies encourage the development of production that results in large volumes of dumped and subsidized products being sold in the U.S. market.

While AD/CVD duties play a critical role in creating a level playing field, the Section 301 duties have an important and independent role. Section 301 duties apply consistently year-over-year and provide the domestic industry forward-looking duties that the retroactive AD/CVD duties do not. Section 301 duties also cover a broader range of products, which is critical as Chinese producers attempt to slightly rework their products to avoid AD/CVD duties.

The AD/CVD orders and Section 301 tariffs have together spurred investments in domestic production. For example, domestic HWPW producer Columbia Forest Products has doubled its capital investment to nearly $24 million partially due to the effects of the Section 301 tariffs. These investments benefit the individuals working at these facilities, as well as the communities where these facilities are located. However, without the combined disciplines of the Section 301 tariffs and AD/CVD orders, these investments would be undermined, and U.S. facilities would be closed, resulting in the loss of thousands of U.S. manufacturing jobs. As such, the Section 301's continuation is crucial to the future of the American HWPW industry.

Coalition of American Metal Manufacturers and Users

No written summary. Please see EDIS for full submission.

Coalition of American Millwork Producers

The members of the Coalition of American Millwork Producers (“CAMP”) support and have benefited significantly from the Section 301 tariffs on Chinese imports of wood mouldings and millwork products.

Together with recent antidumping and countervailing duty orders, these tariffs have had a positive economic impact on U.S. manufacturers by helping to discipline unfairly traded Chinese imports. From 2017 (the year prior to the imposition of the Section 301 tariffs) to 2021, U.S. imports of Chinese mouldings and millwork products decreased by 47 percent.[1] In fact, in the Commission's antidumping and countervailing duty investigation, U.S. importers specifically identified the Section 301 tariffs as a reason they had decreased their purchases of Chinese wood mouldings and millwork products.

This disciplining of unfair Chinese imports has allowed U.S. producers to hire additional workers, add new manufacturing equipment and increase production substantially. For example, last year, CAMP member Woodgrain Millwork announced a $17 million investment into the expansion of capacity at its Marion, Virginia facility and the purchase and expansion of the former Independence Sawmill in Grayson County, Virginia, in addition to $3 million investment in 2019 in its Fruitland, Idaho facility to add capacity. As another example, from 2018 until the most recent 12-month period, CAMP member Endura grew its wood processing business by 44 percent, added 140 employees, and made more than $8 million in capital expenditures.

While the Section 301 tariffs have had a positive economic impact on U.S. solar producers, they have not contributed meaningfully to recent inflation levels (as shown by their timing, inflation's global impact and economist reports). In fact, average wood mouldings prices did not increase as a result of the Section 301 tariffs.

Without the positive economic impact from disciplines like the Section 301 tariffs, large quantities of unfairly priced Chinese wood mouldings imports would likely result in U.S facility closures and the loss of thousands of U.S. manufacturing and related jobs, as they did in prior periods. Before the imposition of the antidumping and countervailing duty orders, the vast majority of Chinese wood mouldings producers' shipments were exported, and they primarily targeted the United States. Without the Section 301 tariffs and other measures, Chinese wood mouldings producers would intensify their targeting of the U.S. market, to the severe detriment of the domestic industry.

In sum, with their significant beneficial economic impacts for U.S. producers, the Section 301 tariffs on Chinese wood mouldings and millwork product imports are critical to ensuring the continued growth and strength of American wood product manufacturing. Wood products, like mouldings and millwork, are essential to the building and maintenance of American infrastructure, making it critical that domestic manufacturing capabilities are maintained. The Section 301 tariffs, in addition to the antidumping and countervailing duty orders, help significantly in the effort to maintain such capabilities, and their continuation is essential to the future growth and health of the American wood mouldings and millwork products industry.

Commercial Metals Company, Rebar Trade Action Coalition

No written summary. Please see EDIS for full submission.

[1] Based on U.S. import statistics for HTS 4409.10.4010, 4409.10.4090, 4409.10.4500, 4409.10.5000, 4409.22.4000, 4409.22.5000, 4409.29.4000, 4409.29.4100, 4409.29.5000, and 4409.29.5100.

Consumer Technology Association

No written summary. Please see EDIS for full submission.

DCL Corporation (BP), LLC

No written summary. Please see EDIS for full submission.

Domestic Carbon and Alloy Steel Wire Rod Industry

The Domestic Wire Rod Industry, consisting of Charter Steel, Commercial Metals Company, Liberty Steel USA, Nucor Corporation, and Optimus Steel, LLC, has benefitted from the imposition of the Section 232 tariffs on imports of steel wire rod and, accordingly, supports the continuation of the tariffs.

The long-term success of the domestic industry producing steel wire rod is essential because wire rod is critical to numerous end uses that contribute to U.S. infrastructure and industrial bases, including the construction, automotive, and aviation sectors. U.S. wire rod producers, however, have been plagued for decades by global excess steel capacity and surges of wire rod imports from numerous foreign countries. While the Domestic Wire Rod Industry has sought and obtained antidumping and countervailing duty (AD/CVD) orders on unfairly-traded imports, the industry also welcomed the imposition of the Section 232 tariffs in March 2018 as critical relief from the high volume of wire rod imports from around the world.

The Section 232 program has benefitted U.S. wire rod producers by allowing them to rebuild and expand capacity, increase production, and invest in creating more skilled U.S. manufacturing jobs and higher wages for those workers. For example, Optimus Steel has invested in expanding operations at its Beaumont, TX facility through capital projects totaling approximately $200 million. In 2018, Liberty acquired, reopened, and invested $10 million in the former ArcelorMittal USA wire rod mill in Georgetown, SC. Liberty also acquired the Keystone Consolidated Industries mill in Peoria, IL, in December 2018, where it has invested more than $20 million in capital projects in 2022, with nearly $100 million more slated for projects over the next three years to further expand production. After acquiring the former Gerdau steel mill in Jacksonville, FL, in March 2018, CMC reached an agreement with the city of Jacksonville to invest $30 million at the mill over five years. Since 2018, Nucor has expanded its rubber reinforcement wire rod product offerings, and in August 2022, Nucor announced an $100 million investment in its Kingman, AZ wire rod mill. And in 2019, Charter Steel opened a new special bar quality (SBQ) bar manufacturing line at its Cuyahoga Heights, OH facility after a $150 million investment.

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A stable domestic supply of wire rod is essential for many key downstream industries that make up the U.S. manufacturing base and is critical to supporting the rebuilding of U.S. infrastructure. The orders addressing unfairly traded imports and the Section 232 tariffs have allowed the Domestic Wire Rod Industry to reinvest in the long-term growth of domestic wire rod manufacturing and the workers the industry employs, as intended when the tariffs were imposed. The continuation of the Section 232 tariffs on imports of wire rod is, therefore, imperative. The global oversupply of wire rod, driven by China, continues to direct wire rod imports, especially from multiple sources not subject to trade orders, to the United States. Removal of the Section 232 tariffs on wire rod imports would be devastating to the long-term health of U.S. wire rod manufacturing.

Economic Policy Institute

No written summary. Please see EDIS for full submission.

Element Electronics

No written summary. Please see EDIS for full submission.

European Aluminium

European Aluminium represents over 600 industrial operations in 30 European countries, covering all aspects of the aluminium value chain. Our more than 100 members include alumina refiners and primary aluminium producers, downstream manufacturers of extruded, rolled and cast aluminium, aluminium recyclers and national aluminium associations.

With over 15 multinationals operating in both the EU and US territory, European Aluminium is well positioned to take a holistic view on the impact of Section 232 on the global aluminium industry.

Farmers for Free Trade

U.S. agriculture has been caught in the crossfire of the trade wars beginning in 2018. As the U.S. imposed section 232 and section 301 tariffs on products from other countries, many of those countries retaliated with tariffs against U.S. food and agriculture products. Because of this, American farmers, ranchers, and food processors have witnessed the loss of critical export markets as our competitors have replaced us in markets that took us decades to build. In addition to limiting export opportunities for U.S. food and agriculture, tariffs raise the cost of imported farm inputs including products made from steel and aluminum (grain bins, tractors, fencing), tractor and equipment parts, and many farm chemicals.

The United States has historically led the world in food and agriculture exports, routinely running a trade surplus. American farmers, ranchers and consumers are the economic lifeblood of rural America and benefit greatly from free trade. Many states derive a large percentage of their total exports from agriculture. The food we export and agricultural products that we ship to other countries directly support over 1,000,000 U.S. jobs. Fully 20 percent of American farm revenue comes from our exports.

The long-term ramifications for the nation's agricultural economy are immense. Agriculture's financial health is deeply dependent on exports. Section 232 and 301 tariffs and concomitant retaliatory tariffs constrain American productivity – they are raising the cost of production and making it more difficult for American farmers, ranchers, and agriculture exporters to compete overseas. Nationally, direct U.S. agricultural export losses due to retaliatory tariffs totaled more than $27 billion during 2018 through the end of 2019. The elimination of Section 232 and 301 tariffs will increase access for U.S. food and agriculture exports and reduce costs for critical agriculture inputs. The sustainability of America's agricultural economy depends on it.

Footwear Distributors & Retailers of America

No written summary. Please see EDIS for full submission.

Forging Industry Association

No written summary. Please see EDIS for full submission.

Ganz

No written summary. Please see EDIS for full submission.

Gerdau Long Steel North America

The Section 232 duties and Section 301 duties affecting steel goods have had broad and significant benefits for the U.S. national security and the country's economy. The duties have allowed the U.S. steel industry, the backbone of the country's manufacturing sector, to increase production, capacity utilization, employment and profitability. The duties have greatly ameliorated the harms caused by global excess steelmaking capacity and unfair foreign trade practices. While the U.S. steel industry has also benefitted significantly over the past four years from trade remedy orders on imported steel goods, such orders are by their nature time-limited, and cover only narrowly-scoped products from individual foreign countries. The Section 232 duties and Section 301 duties on steel goods, by contrast, form a broader bulwark against imports that otherwise threaten the national security and that result from unfair foreign trade practices.

The duties have not only benefitted the U.S. steel industry, but the U.S. economy as a whole. The U.S. steel industry does not only support itself and its own workers; it provides crucial inputs into critical infrastructure sectors ranging from construction to transportation, power generation and supply, water systems, and the mining and processing of essential ores and minerals. Since the Section 232 duties and 301 duties on steel-intensive goods were imposed, U.S. steel companies have announced nearly $22 billion in new, expanded, or restarted production. As a result, downstream steel users now have access to a greater supply base than ever. Increased profits and investment in downstream industries such as construction, automotive production, fabricated metals, and machinery production demonstrate the benefits of the tariffs.

Importantly, the duties do not cut off any purchaser's access to imported steel. They simply adjust the cost-calculus involved in purchasing decisions. They have not contributed to inflation, which first manifested years after the tariffs were imposed, and resulted most concretely from the post-COVID-19 economic bounce-back, as complicated by Russia's invasion of Ukraine.

Haas Automation

Thank you for the opportunity to testify on July 20th, regarding the impact of section 301 tariffs on CNC machine tool manufacturing. To recap my testimony, American manufacturer Haas Automation pays $15 million per year in part 301 tariffs on iron castings, putting Haas at a competitive disadvantage against foreign CNC machine producers.

Haas Automation advocates for immediate reimplementation of an exclusion process for tariffs on iron castings. Our reasoning is as follows.

1. Haas consumes 105 million pounds of cast iron each year and US suppliers meet less than 10% of our requirements, a limitation based on the lack of iron foundries that remain in the US.

2. The World Foundry Organization reported in May that China produces half the iron castings available worldwide and is increasing that capacity at the rate of 6% per year. Furthermore, foundries in all other major countries are declining in capacity and, in many cases, captive to only one specific customer.

3. A tariff exclusion process was previously made available to Haas for a 14-month period ending August 7, 2020. That exclusion was subsequently cancelled with no explanation. The exclusion process was specifically designed for cases such as Haas Automation's, in which little or no supply exists outside of China and additional time is required to develop new sources.

It's important to note that during testimony on July 20th, Haas was placed on a panel along with eight other manufacturers or associations, all speaking on steel and aluminum tariffs. I want to make it clear that we're focusing solely on cast iron, a commodity that has little supply in the US, especially for the large, complex shapes and high material quality standards required by Haas.

Thank you for your attention to this matter. We realize that the final report from USITC to the White House is not due until March 2023, but our hope is that we can succeed in securing badly needed exclusions sooner. Please let me know if there are any questions we can answer or additional information we can provide.

Holiday Ornament Holiday Occasion Coalition

No written summary. Please see EDIS for full submission.

Home Furnishings Resource Group, Inc.

Curt Christian, CEO of Home Furnishings Resource Group, Inc. ("HFRG"), testified before the U.S. International Trade Commission ("USITC") on July 21, 2022, regarding the deleterious effect the Section 301 tariffs have had on HFRG. On behalf of Mr. Christan and HFRG, we appreciate the opportunity to submit this posthearing statement to address Mr. Christian's remarks in response to Commissioner Kearns's question regarding competition from Chinese companies.

Following the testimonies of the members of Panel 6, Commissioner Kearns asked Mr. Christian what it was like to face competition from China back when he was manufacturing his products in the United States. Mr. Christian responded that his company was unable to compete with the Chinese products, even when he lowered his prices to compete with the prices of the Chinese products. Commissioner Kearns then asked whether Mr. Christian thought the United States should have implemented tariffs 17 or 18 years ago instead of only implementing them recently. Mr. Christian responded in the affirmative.

Although Mr. Christian answered that the United States should have taken action on China much earlier, his answer should not be construed to indicate that he supports the tariffs presently imposed. Mr. Christian strongly objects to the current tariffs primarily because they do not fulfill their purpose. More egregiously, they impose an undue burden on American companies and consumers.

In 2005, when Mr. Christian was forced to shut down his business, including his manufacturing operation in Los Angeles, he had a state-of-the-art plant and millions of dollars' worth of manufacturing equipment. Had tariffs been implemented at that time, he would have been able to survive, and likely thrive, by continuing to manufacture domestically. The same cannot be said about HFRG's situation today. The conditions are drastically different, not only for HFRG, but for many other American businesses that found themselves forced to turn to Chinese manufacturing. There is quite simply no domestic manufacturing alternative available currently, even after four (4) years of tariffs. Moreover, not for lack of effort, HFRG has yet to find another country that is capable of manufacturing its products with the same quality, efficiency, cost, and scale as China.

On behalf of HFRG, we thank the USITC for its consideration of this statement and for providing HFRG the opportunity to testify at the July 21, 2022, hearing.

Hydro Aluminum

No written summary. Please see EDIS for full submission.

ICL Specialty Products Inc.

No written summary. Please see EDIS for full submission.

Industrial Fasteners Institute

The Industrial Fasteners Institute (IFI) is a trade association which represents approximately 85% of fastener production capacity in North America. The U.S. fastener industry employs approximately 42,000 people working at roughly 850 different manufacturing facilities. Individual companies range in size, but many of them are family-owned, small to mid-sized businesses. Raw material costs are 50 to 60% of the cost of a fastener.

The fastener industry is critical to all segments of the U.S. manufacturing industrial base. Not a single military or commercial aircraft or their power plants can be assembled without metals like steel and aluminum and geometrically sophisticated fastener components. All automotive vehicles require many fasteners in their power train, structural assembly, steering, braking and control mechanisms, including electronics. Bridges, buildings, appliances, heavy trucks, off-road vehicles, consumer and military electronics, power generation, electrical grid, water and sewer infrastructure, oil and gas exploration and production, mining, rail, shipbuilding, medical products or almost any other segment you can name – all use fasteners, and lots of them.

The Section 232 tariffs caused severe negative economic impacts on the U.S. fastener industry when they were imposed in March 2018. There is a long history of the U.S. government placing restrictions, whether tariffs or quotas, on imports of basic raw materials such as steel in an effort to help U.S. metals producers. In every case, while the tariffs or quotas may have provided some short-term relief for metals producers, they did so at the expense of the downstream consumers of those metals.

Since 2018, IFI members have reported that the 232 tariffs caused significant increases in domestic raw material prices, while pushing out lead times substantially, and they were losing business as a result. The fastener business is highly competitive and price sensitive. U.S. fastener manufacturers are often pitted against global producers of fasteners and must constantly compete to gain or retain business. When U.S. steel prices are 40 to 50 percent higher than the global average, U.S. fastener manufacturers struggle to remain competitive. Customers do not have to accept price increases from domestic fastener manufacturers when they can buy fasteners from a foreign source that can purchase steel at global prices. These customer relationships took years to develop, and once business is lost overseas, it rarely comes back.

A report on the economic impact of the 232 tariffs is not complete without acknowledgement of the negative economic consequences of the broken 232 exclusion process. This process is supposed to allow companies to obtain exclusions to the tariffs if the product they need is not available in the U.S. in the quantities, quality or form needed in a “reasonably available” time. However, the process is lengthy and cumbersome and favors domestic steel producers over steel consumers regardless of whether they actually produce the product in question.

IFI appreciates the opportunity to participate in the Commission’s work on this report.

Information Technology Industry Council

No written summary. Please see EDIS for full submission.

International Imaging Technology Council

The International Imaging Technology Council (I-ITC) is pleased to submit comments to the U.S. International Trade Commission (USITC) as part of Investigation No. 332-591: Economic Impact of Section 232 and 301 Tariffs on U.S. Industries. The I-ITC supports the Section 301 China tariffs on Chinese compatible printer cartridges included in HTS Subheading 8443.99.20 because the cartridges harm the U.S. environment, domestic industry, and U.S. consumers.

The I-ITC is a § 501 (c) (6) trade organization that represents the North American companies in the industry that make their living remanufacturing imaging supplies, sometimes referred to as the aftermarket imaging supplies industry. The twenty-five-year-old nonprofit association represents its members' common business objectives, particularly the right to conduct business freely and fairly.

With the exception of Chinese aftermarket compatible cartridges, toner and ink jet cartridges can be given a useful life after their first use through remanufacturing, which includes restoring or replacing worn or exhausted parts so the final product performs like the original new one. The Section 301 tariffs on Chinese compatible printer cartridges help level the playing field for U.S. remanufacturers while protecting the U.S. environment and consumers.

Chinese compatible printer cartridges are imported under the HTS Codes 8443.99.2010 (Ink cartridges) and 8443.99.2050 (Other). These products are currently on List 1 and subject to an additional 25 percent tariff. The Section 301 tariffs should remain on Chinese compatible printer cartridges.

International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (“UAW”)

On behalf of the more than one million active and retired members of the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America (UAW), I thank you for the opportunity to comment on the United States International Trade Commission’s investigation of the economic impacts of Section 232 and Section 301 tariffs.

We urge extreme caution when considering removal of tariffs or other trade remedies. Corporate driven “free trade agreements” pursued by past Administrations from both parties failed working people as promises of higher wages and more jobs produced the opposite result. Much lauded labor chapters in our trade agreements have proved toothless until very recently. In fact, prior to the Biden Administration, no Administration had ever utilized the labor provisions from a trade agreement to hold companies accountable for their employment practices.

It is important to examine this critical matter of trade enforcement in proper context. To be clear, global inflation primarily stems from the worse global pandemic in over a century. The COVID-19 pandemic contributed mightily to supply chain disruptions that harm auto workers to this day and their removal will undermine our domestic supply chain.[1] We wholly reject the notion lifting or easing tariffs will stimulate the economy, address the global supply chain issues, or bring down inflation. The COVID-19 pandemic and these supply chain issues created a perfect storm that further empowered predatory governments such as China to play by another set of rules. Lifting tariffs on critical goods such as rare earths minerals is a direct contradiction of the historical trade issues we have had with China.

Section 232 and 301 tariffs were imposed as a remedy for global unfair trading practices. Anti-dumping and countervailing duty (AD/CVD) cases have proven the pervasiveness of illegal dumping and subsidization into the U.S. market. U.S. manufacturers and workers are directly impacted by this illegal theft of market share. China represents 222 trade enforcement cases, just over a third of the 640 orders in place currently.[2]

Bad trade deals, currency manipulation and granting China's Permanent Normal Trade Relations status has severely disadvantaged American made goods – specifically automobiles and auto parts. These imbalances have led to massive U.S. job losses. Over 900,000 people work in the auto and auto parts manufacturing sectors.[3] Of course, the economic impact of the auto industry reaches far beyond the workers employed at the plants and their families. According to the Center for Automotive Research, when jobs from other linked industries are considered, the auto industry is responsible for over 7.25 million jobs nationwide.[4] China's policies continue to disregard any accountability to global standards. Their disruptions of the supply chain have impacted all sectors globally. Yet as countries across the world are squeezed by these supply chain disruptions, China continues to report surges in their trade surplus.[5]

Domestically, American workers have been acutely impacted by China's increasing dominance in the global economy. From 2001-2018 the U.S. trade deficit with China eliminated 3.7 million American jobs. The manufacturing industry took the biggest hit; with 2.8 million jobs lost.[6] Since 2021, U.S. auto production has decreased by an estimated 1.7 million vehicles because of the supply chain issues. The lost production has resulted in employment disruptions for more than 750,000 workers in motor vehicle and parts manufacturing.[7]

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[1] Tariff increases did not cause inflation, and their removal would undermine domestic supply chains. Economic Policy Institute. (January 19, 2022). Retrieved August 23, 2022, from https://www.epi.org/blog/tariff-increases-did-not-cause-inflation-and-their-removal-would-undermine-domestic-supply-chains/
[2] ADCVD proceedings. International Trade Administration | Trade.gov. (n.d.). Retrieved August 24, 2022, from https://www.trade.gov/data-visualization/adcvd-proceedings
[3] Bureau of Labor Statistics, "Automotive Industry: Employment, Earnings, and Hours", https://www.bls.gov/iag/tgs/iagauto.htm
[4] Hill, Kim, Deb Menk, Joshua Cregger, and Michael Schultz. "Contribution of the Automotive Industry to the Economies of All Fifty States and the United States." Center for Automotive Research. January 2015.
[5] Associated Press News. 1/13/2022. "China's trade surplus surges to record $676.4B in 2021": https://apnews.com/article/coronavirus-pandemic-health-business-global-trade-united-states-24da5cc5c27b824a9fc55adf9d4900dc
[6] Economic Policy Institute. 1/30/2020. "Growing China trade deficit cost 3.7 million American jobs between 2001 and 2018: Jobs Lost in every U.S. state and Congressional District": https://www.epi.org/publication/growing-china-trade-deficits-costs-us-jobs/
[7] IHS Markit Automotive, July 2022

Inventus Power

Inventus Power ("Inventus") is a Chicago-based producer and distributor of lithium-ion batteries, chargers, and power supplies. The company maintains manufacturing sites in multiple countries, including the United States and Mexico, where it assembles batteries for medical and defense applications. Like other North American battery assemblers, Inventus has been impacted by Section 301 tariffs on Chinese-origin products. These tariffs cover both finished lithium-ion batteries and lithium-ion battery cells, a principal input into finished lithium-ion batteries.

The tariff provision applicable to lithium-ion battery cells (8507.90.8000) is subject to a 25% Section 301 duty, while the provision for finished lithium-ion batteries not used for electric vehicles (8507.60.0020) is subject to a much lower, 7.5% Section 301 duty. China accounts for 75%-80% of global production capacity for lithium-ion battery cells. Cell production outside of China is captively consumed or, increasingly, has been retooled to focus on the electric vehicle market. These factors make supply outside of China increasingly tight for the smaller, commodity-type cells used outside of electric vehicle applications.

Although the 7.5% Section 301 tariffs on finished Chinese-origin batteries raise the prices of those batteries relative to where they would otherwise be, the relatively low level of these tariffs has proven insufficient to slow shipments by Inventus's Chinese competitors. Indeed, U.S. import statistics demonstrate that, since the Section 301 tariffs were first imposed, imports of complete lithium-ion batteries from China have skyrocketed. Meanwhile, American assemblers have little choice but to rely on Chinese cells, given the increasingly tight supply of cells made outside of China. But with Chinese-origin cells dutiable at a higher rate than fully Chinese-origin complete batteries, the tariffs' net effect as been to discourage North American battery assembly, while encouraging operations in China.

The tariffs also discourage near-shoring. U.S. Customs & Border Protection ("CBP") treats batteries assembled Canada and Mexico using Chinese cells as Chinese in origin, even if the value added in North America excuses the products from standard import tariffs under the United States-Mexico-Canada Agreement. This treatment discourages companies like Inventus from nearshoring assembly operations, because it is difficult to remain price-competitive against lithiumion batteries fully manufactured in China while paying the 7.5% Section 301 tariffs applicable to Chinese-origin batteries. Inventus accordingly supports CBP's 2021 proposal to simplify its origin treatment for goods imported from Canada and Mexico, at least until North America develops its own production capacity for lithium-ion cells for non-vehicle applications.

To meaningfully impact Chinese batteries that compete with U.S.-assembled batteries, Inventus believes that the tariff applied to such batteries will likely need to be increased to 25 or higher. In the meantime, the 25% Section 301 tariffs imposed on Chinese lithium-ion battery cells increase the costs for U.S. assemblers to obtain input cells, while encouraging further entrenchment of the global supply chain for lithium-ion batteries in China. To mitigate these issues, Inventus supports correction of the current tariff inversion, as well as other proposals that would benefit U.S. and nearshore assembly operations.

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J.M. Wechter & Assoc. Inc.

No written summary. Please see EDIS for full submission.

JLG Industries, Inc.

JLG Industries, Inc., an U.S. manufacturer of mobile access equipment, supports and have benefited significantly from the Section 301 tariffs on Chinese imports. Together with recent antidumping and countervailing duty orders, these tariffs have had a positive economic impact on JLG by helping to discipline unfairly traded imports of Chinese mobile access equipment, including scissor lifts, boom lifts and telehandlers. The year after the Section 301 tariffs were imposed, imports of Chinese mobile access equipment into the United States decreased by 29 percent.[1] This disciplining of unfair Chinese imports, now with the additional discipline provided by antidumping and countervailing duties, has allowed U.S. producers to hire additional workers, add new manufacturing equipment and increase production substantially. For example, this March, JLG announced a major expansion of its manufacturing footprint with a 60,000-square foot facility in Jefferson City, Tennessee. JLG has also added new manufacturing lines at its Bedford and McConnellsburg, Pennsylvania-based plants to support the increased production of mobile access equipment, and other U.S. mobile access equipment manufacturers are expanding as well.

While the Section 301 tariffs have had a positive economic impact on U.S. pipe producers, neither they nor the Section 232 measures have contributed meaningfully to recent inflation levels (as shown by their timing, inflation's global impact and numerous economist reports) or caused raw material availability concerns for manufacturers, which have multiple available sources for their raw material needs.

Without the positive economic impact from disciplines like the Section 301 tariffs, large quantities of unfairly priced Chinese imports of mobile access equipment would be likely to result in U.S facility closures and the loss of thousands of U.S. manufacturing and related jobs. In the recent trade cases, the Commission found that "the Chinese {mobile access equipment} industry is large and growing substantially and this growth is likely to foster substantial exports to the United States in the imminent future."[2] In fact, Chinese mobile access equipment producers' capacity, as reported in the trade cases, more than doubled from 2018 to 2020.[3] Without the Section 301 tariffs and antidumping and countervailing duty orders, acting in conjunction, Chinese mobile access equipment producers would again target the U.S. market, to the severe detriment of the domestic industry.

In sum, with their significant beneficial economic impacts for U.S. producers, the Section 301 tariffs on Chinese mobile access equipment imports are critical to ensuring the continued growth and strength of American manufacturing. The Section 301 tariffs, in addition to other important measures like antidumping and countervailing duty orders, are helping significantly in the effort to maintain and

[1] *Certain Mobile Access Equipment and Subassemblies Thereof from China*, Inv. No. 701-TA-665, USITC Pub. 5242 (Dec. 2021) (Final) at 44 ("USITC Pub. 5242").
[2] *Id.*
[3] *Id.*

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expand U.S. manufacturing capabilities, and their continuation is essential to the future of the American mobile access equipment industry.

JOANN Inc.

JOANN Inc. and affiliates (collectively referred to as "JOANN or the "Company") represent a 79-year-old thriving and growing American business, employing American workers and serving middle income Americans by supplying well-priced sewing and crafting project component parts which enable them to create needed items for their families and their homes, their businesses and for charitable donations. These significant contributions to the U.S. economy, previously a regular and routine part of JOANN's day-to-day business, became far more challenging once the Trump Administration enacted the Section 301 tariffs, starting in 2018. JOANN, perhaps more than many other retailers of its size, has been hit especially hard by the Section 301 tariffs. These significant annual tariff charges represent a serious threat to the company's profitability and long-term viability.

Like other U.S. retailers which must import their goods based on limited availability within the U.S. marketplace, JOANN has had no choice but to pass on portions of the tariffs to consumers given that narrow retail margins preclude absorption of the tariff costs to the bottom line. These higher prices lead directly to inflation and the resulting stagnation of the U.S. economy. Additionally, JOANN and other importers have been forced to make difficult decisions -- limiting planned investments in its employees, stores and distribution centers and business infrastructure, including technology upgrades. In order to make sure that the strength of the U.S. economy is restored, the International Trade Commission (the "ITC") must, after completing its investigation, advise the President that the Section 301 tariffs on imports from China should be removed, in their entirety, immediately so that their inflationary impact is no longer a challenge for JOANN, other U.S. businesses and the economy as a whole. As an alternative, the ITC should recommend that a fully transparent product and tariff code exclusion process is established which includes granting of the specific requests (to be made by JOANN) broadly outlined in the brief.

Juvenile Products Manufacturers Association

No written summary. Please see EDIS for full submission.

KIK Consumer Products

No written summary. Please see EDIS for full submission.

Kurt S. Adler, Inc.

No written summary. Please see EDIS for full submission.

LIFE SAVER POOL FENCE SYSTEMS, INC.

No written summary. Please see EDIS for full submission.

Master's Lumber & Hardware, LLC and Orion Group, LLC

No written summary. Please see EDIS for full submission.

Medline Industries, LP

No written summary. Please see EDIS for full submission.

Meiko Electronics America

No written summary. Please see EDIS for full submission.

Metal Grating Coalition

No written summary. Please see EDIS for full submission.

Molycop USA

Molycop USA is the largest U.S. producer of steel grinding balls and other grinding media. Molycop USA represents approximately 50 percent of U.S. production capacity. We produce steel grinding balls at our facility in Kansas City, Missouri, which provides and supports critical manufacturing jobs in the U.S. steel sector. Steel grinding balls are an essential input to the U.S. mining industry. They are used in the copper, gold, iron ore, and other mining industries to breakup ore extracted from the ground to help liberate the constituent minerals. Molycop USA manufactures almost all its steel grinding balls from domestically produced high carbon, alloy steel bars for maximum abrasion resistance and hardness.

The Section 301 tariffs have provided necessary economic relief to the steel grinding media industry, including Molycop USA, by allowing it to increase production, capacity utilization, and regain market share lost to unfairly priced Chinese imports. Since the imposition of the Section 301 tariffs, Chinese imports of steel grinding balls have declined significantly, plummeting 86 percent from their peak in 2017. The Section 301 tariffs have also fostered an environment where Molycop USA has been able to invest more than $10 million in its Kansas City, Missouri plant, including investments targeted at reducing electrical power consumption and improving Molycop USA's carbon footprint. Moreover, since the imposition of the 301 tariffs, Molycop USA has continued to support the broader community as employment at the Missouri plant has increased more than 80 percent and workers are earning higher wages.

The Section 301 actions have been effective at redressing China's unfair acts, policies, and practices related to technology transfer, intellectual property, and innovation. Molycop USA has reason to believe

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that Chinese steel grinding ball producers acquired information on Molycop USA's business proprietary production processes, which allowed Chinese producers to quickly increase the quality of their grinding balls, achieving capabilities in a few years that took Molycop USA decades to develop. For example, a U.S. mine hired a Chinese national to manage the procurement of Chinese steel grinding balls as well as work with Chinese producers to improve their quality. The Chinese national subsequently hired a consultant with knowledge of Molycop USA's technology to gain technological know-how and provided such information to Chinese companies to help improve the quality of their steel grinding ball production. By 2010, Chinese steel grinding ball production technology was comparable with Molycop USA's technology, and imports of Chinese steel grinding balls grew rapidly in multiple countries and in the United States until USTR implemented the Section 301 tariffs.

In addition, China has significant production overcapacity for steel grinding balls. Molycop USA estimates that China now contains about 50 percent of global grinding media capacity and could meet about 90 percent of global demand for grinding media. Accordingly, the Section 301 tariffs have benefitted Molycop USA and the domestic industry by helping to level the playing field and furthering the United States' goal of combating China's unfair acts, policies, and practices related to technology transfer, intellectual property, and innovation.

Motor & Equipment Manufacturers Association

The Motor & Equipment Manufacturers Association (MEMA) represents more than 900 manufacturers of motor vehicle components and welcomes this opportunity to provide input on the impacts on American motor vehicle part companies and their workers of Section 301 China tariffs and Section 232 steel and aluminum tariffs.

Since first imposed in 2018, both sets of have generated significant adverse economic impacts for MEMA members and other U.S. manufacturers. MEMA commends the progress that the Biden Administration made in the past year when it placed tariff rate quotas on the Section 232 tariffs on key allies: the European Union (EU), Japan, and the United Kingdom. The next logical step would be a full phaseout of all steel and aluminum tariffs imposed on these and other allies.

Unfortunately, Section 301 on Chinese tariffs remain fully in place with no viable exclusion process. These tariffs increase costs for manufacturers and consumers alike. Given the increasingly enhanced U.S. competitive position, MEMA urges the U.S. to establish a robust Section 301 exclusion process, to phase out Section 301 tariffs, and to conclude the Section 232 process.

Since 2021, the Biden Administration and the U.S. Congress have successfully passed and signed legislation to restore the international competitive viability of the United States. Actions include:

• The bipartisan CHIPS and Science Act provides $52.7 billion in grants and loans to enable construction of FABS and research and development for U.S. semiconductor chip production;

• The Inflation Reduction Act (IRA) providing $369 billion in energy efficiency provisions to combat climate change including funding for manufacturing conversion and retooling for EV and for EV tax credits to consumers; and

• A bipartisan bill providing $1 trillion over five years in funding for critical infrastructure.

These initiatives underscore the need to move beyond using tariffs as a tool to promote U.S. competitiveness. Ending both sets of tariffs would allow the U.S. to reassume its role as a leader of global free trade. Additionally, economic tensions with other nations across the globe could be defused in the process. Participation with our key allies in agreements like the Indo-Pacific Economic Framework (IPEF) is a more proactive multilateral approach, particularly if market opening incentives can be included.

China's WTO-inconsistent and non-market approach to trade is a challenge to the global trading system and needs to be corrected. However, a broader, more transparent, and fairer China 301 exclusion process does not threaten these objectives. Reducing and eliminating 301 tariffs on imports from China and 232 steel and aluminum tariffs on allies further restores rational data-driven policy that is coordinated with U.S. allies. Progress on ending both sets of tariffs will restore multilateral efforts to pressure China toward a greater market orientation. That action will also eliminate competitive disadvantages in China that the U.S. faces with its allies.

MEMA represents vehicle suppliers that develop innovative technologies and manufacture original equipment (OE) and aftermarket components and systems for use in passenger cars and commercial trucks.[1] Vehicle suppliers operate in all 50 states, directly employ over 907,000 Americans, and represent the largest sector of manufacturing jobs in the United States. Direct, indirect, and induced vehicle supplier employment accounts for over 4.8 million U.S. jobs and contributes 2.5 percent to U.S. GDP.[2]

Thank you for this opportunity to share our views on this important issue. Please contact Bill Frymoyer, Vice President, Public Policy at 202-309-0888 or bfrymoyer@mema.org if you have any questions.

NAFEM

No written summary. Please see EDIS for full submission.

National Association of Chemical Distributors

No written summary. Please see EDIS for full submission.

National Association of Music Merchants and Members of the Musical Instrument Legal Alliance (National Association of Music Merchants, Members of the Musical Instrument Legal Alliance, Yamaha Guitar

[1] MEMA represents its member companies through its four divisions: Automotive Aftermarket Suppliers Association (AASA); Heavy Duty Manufacturers Association (HDMA); MERA - The Association for Sustainable Manufacturing; and Original Equipment Suppliers Association (OESA).
[2] U.S. Labor and Economic Impact of Vehicle Supplier Industry, MEMA and IHS Markit. February 2021.

Group, Cordoba Music Group, John Cruz Custom Guitars, Moog Music Inc., Paul Reed Smith Guitars Limited Partnership)

On behalf of the National Association of Music Merchants (NAMM) and several members of the Musical Instrument Legal Alliance (MILA), we submit this summary to include in the public record. NAMM is the not-for-profit trade association with the mission to strengthen the $17 billion music products industry. NAMM has more than 7,000 member companies in the U.S. and represents all segments of the music products industry, including manufacturers, distributors and retailers. MILA is comprised of legal and compliance officers from U.S. musical instrument manufacturing companies.
MILA's members are members of NAMM, and the organizations work together to expand the music products market and music education opportunities.

Section 301 Tariffs – Impact on Musical Products Industry, Consumers
The tariffs impact businesses of all sizes, including product manufacturers, retailers, accessories and consumer technology products. The tariffs are an arbitrary tax on music products and consumers. Extra costs often fall to customers - musicians, orchestras, students, teachers, schools and others.
Most instruments and accessories subject to tariffs are on List 4A, including guitars, pianos, woodwinds, drums, music stands, strings, and bows. Although the 15% rate was reduced to 7.5%, the tariffs remain substantial. Tariffs also apply to music-related consumer technology products (i.e., amplifiers, synthesizers, digital mixers, recording interfaces, special effects pedals) and instrument cases. Musical instrument manufacturers report:

- Production cost increases ranging 5% to 30%. Companies are compelled to absorb these costs or increase product prices.
- Revenue losses from tariffs range 5% to 30%. Lower revenue and reduced profitability compel workforce reductions, hiring delays, and suspending salary increases, hurting retention.
- Significant price increases for consumer electronics. For example, the retail price for a brand name amplifier increased by 42%. These amplifiers, like many technology products, are subject to a 25% tariff.
- Tariffs impeding the ability to compete, invest in research and innovation, and creating disincentives to manufacture in the U.S.
- Administrative burdens to identify products not sourced in China, causing shipping delays and exacerbating supply chain problems.

Unintended Consequences - 301 Tariffs Reduce Music Education Resources
The tariffs have adverse consequences for school music programs. With higher instrument costs, resources will be spread thin and music education offerings may be reduced. Students – primarily in public schools – will have less access to music education and families will be unable to afford instruments. Higher costs have caused some manufacturers to reduce discounts and incentives for music educators, students, and school districts.
Reduced access to music education has implications for learning and a prepared workforce. Research studies demonstrate music education leads to greater academic, social, and emotional achievement for students. Moreover, studies show a lack of music education resources disproportionately impacts school districts with students of color, immigrants, and low-income communities.
Conclusion

The musical instrument manufacturing industry faces uncertainty due to the COVID-19 pandemic, supply chain disruptions, inflation and Section 301 tariffs. Extension of the tariffs will continue to inflict economic harm on the industry, music retailers, and aspiring musicians of all ages.

National Council of Textile Organizations

No written summary. Please see EDIS for full submission.

National Electrical Manufacturers Association

The Section 301 tariffs on imports from China and the Section 232 tariffs on steel and aluminum negatively impact strategically important U.S. industries. The electroindustry has a robust domestic manufacturing base and supports the fundamental goal of creating high-paying American jobs and shoring up domestic supply chains. However, these sustained tariffs unreasonably burden U.S. manufacturers as they endeavor to support domestic manufacturing and resilient supply chains.

Many products subject to Sec. 232 and 301 tariffs are used in manufacturing in the U.S. after being imported. Products such as printed circuit assemblies, cable assemblies for healthcare facility call systems, motor end shields made from stainless steel castings, and stainless steel conduit boxes are imported then used to manufacture critical healthcare, industrial, utility, transportation, and lighting equipment. The tariffs are raising the costs of components and materials used in domestic manufacturing, making U.S. manufactured goods less competitive in the global marketplace and putting domestic jobs at risk.

Further, NEMA members are directly or indirectly involved in one-third of the Bipartisan Infrastructure Law (BIL) funding. To meet the accelerated timelines outlined in the BIL, demand for critical electrical products is rising quickly. The tariffs raise the costs of components and materials electrical equipment manufacturers require as they enable the country's infrastructure improvement, potentially diluting the funding for critical infrastructure projects.

U.S. Customs and Border Protection has assessed over $162 billion in duties from the Sec. 232 and 301 tariffs over the past four years, during this time inflation has risen to historic levels. The 25% tariffs being paid on billions of dollars of products further exacerbate inflationary pressures U.S. consumers and businesses are facing.

Presently, there is no open process to apply for exclusions from the Sec. 301 tariffs on imports from China. An exclusions process was in place from 2018 to 2020 as well as a subsequent window to request exclusions for a narrow list of products in 2021. However, the exclusions process was not transparent, and the U.S. Trade Representative's office did not properly document its decision making procedures, according to a 2021 Government Accountability Office report. Manufactures found the exclusions process to be capricious and difficult to navigate. A new, fair, and transparent exclusions process for the Sec. 301 tariffs is needed to provide tariff relief, especially for components and materials used in domestic manufacturing.

The continuation of the Section 232 and 301 tariffs create significant challenges, costs, and uncertainty for U.S. businesses. Providing relief from these tariffs will assist companies as they reorient supply chains, manage inflationary pressures, and aid in the nation's infrastructure improvement.

National Fisheries Institute

The Section 301 tariffs aimed at China-sourced goods have harmed U.S. commercial seafood businesses in multiple ways.

First, the tariffs have raised costs for companies utilizing a variety of seafood species from China and from third countries, making it more difficult for those producers to provide an essential protein to U.S. consumers. These companies – the vast majority of them small businesses – have paid nearly $725 million (and counting) in Section 301 tariffs. The duties have made U.S. seafood processing and distribution workers less competitive and have punished lower- and middle-income families seeking affordable seafood options at a time of rampant food inflation. Second, because much U.S.-caught seafood is substantially processed in China and then shipped back to the U.S. for consumption, the Section 301 tariff applies to U.S.-harvested fish. Although USTR has excluded some such products at certain times, the mere fact that the tariff applies to a product caught by Americans in U.S. waters aboard U.S.-flagged vessels has created uncertainty and dampened demand in connection with a proceeding that is supposed to be about punishing the People's Republic of China, not American fishermen. Third, China's predictable retaliation against U.S. seafood exports in response to the U.S. duties has deprived American producers of competitive access to the world's largest seafood market, driving a decline in U.S. seafood exports not seen since 2011.

Abandoning China sourcing appears to be the easy solution but in fact is not. Shifting supply chains away from China was never the stated goal of the Section 301 tariff as applied to "List 3" consumer goods and in any event is easier said than done. Pandemic and lockdowns of course made such adjustments impossible for several years and still hamper global travel and coordination today, especially as compared to supply chains that took decades to establish and refine. Moreover, some species are found only in one or two countries, China among them, and therefore either must be sourced via existing supply chains or abandoned to other customers. Recent USTR proceedings aimed at other trade partners and potentially including seafood demonstrate that decoupling from China supply chains does not remove the Section 301 tariff threat.

Nor has imposition of these tariffs on seafood done anything to discipline China for the violations of U.S. and international trade law USTR identified in its March 2018 report. NFI is unaware of any evidence that semi-permanent application of a punitive, 25 percent tariff to food has persuaded responsible public and private sector actors in China to address allegations of illegal subsidies, cybertechnology crimes, forced technology transfers, or intellectual property theft. Proponents of the Section 301 tariff aimed at China offer nothing but conclusory assertions that the tariffs as applied to List 3 goods have worked to change China's conduct. There can be no doubt that this argument is as untrue as it is unsubstantiated, and that the Section 301 tariffs have harmed seafood companies and American seafood workers who should have been left out of the entire dispute in the first place.

National Foreign Trade Council

Between March 23, 2018, and August 3, 2022, U.S. Customs and Border Protection ("CBP) collected over $162 billion in duties assessed under Sections 232 and 301. The Section 232 and 301 tariffs have distorted the market for products subject to the tariffs and increased the price of goods for consumers in the U.S. The price of goods produced in the U.S. and third markets has risen as well. Higher prices from the 232 and 301 tariffs are making U.S.-produced goods less competitive than products from other markets. Coalition members noted lost sales to third markets because of higher materials costs in the U.S. The 232 and 301 tariffs are distorting the market and picking winners and losers. While primary metals producers may be enjoying higher prices under the 232 tariffs, this increase is coming at the expense of downstream industries and U.S. consumers.

In addition to price increases and competitiveness challenges, the 232 and 301 tariffs have had a range of other impacts that adversely affect Coalition members, including creating difficulty obtaining a consistent supply of products subject to the tariffs. Changing suppliers when materials are not available is not easy. For products that are highly regulated, the supplier is routinely specified in the contract based on testing performed to the customer's requirements. During the term of a contract, raw material suppliers typically cannot be changed without agreement from the customer and any potential new supplier must undergo a qualification testing and approval process that can take 12-18 months.

While some Chinese-origin inputs may be available from other countries, the total cost (price, quantity, quality) often is higher than the price available in China, even when the 301 tariff is added to the Chinese good. Goods subject to safety approvals like UL standards would be subject to retesting and relisting at great expense if the country of origin changed. As a result, a number of U.S. companies decided to pay the 301 tariffs, especially during the pandemic, rather than face the higher costs and uncertainty of realigning their supply chains. Several countries imposed retaliatory tariffs ranging from four to 70 percent on many U.S. exports in response to the Section 232 and 301 tariffs. In the agriculture sector alone, the retaliatory tariffs led to a reduction in U.S. agricultural exports to retaliating partners of more than $27 billion.

There is virtually no evidence that the Section 232 or 301 tariffs are having any effect on the problems they were intended to address. Rather, the burden of these tariffs is falling on US businesses and their customers who are being punished for problems they did not create and cannot solve. Neither the 232 nor 301 tariffs have been effective and the President should eliminate them. Eliminating the tariffs could also help the Administration in their effort to reduce inflation, with one study showing that trade liberalization could deliver a one-time reduction in consumer price index (CPI) inflation of around 1.3 percentage points amounting to $797 per US household.

National Presto Industries, Inc.

National Presto Industries, Inc. ("NPI") is writing to the U.S. International Trade Commission (USTIC) to express its deep concern with the impact of tariffs on U.S. imports under section 301 of the Trade Act of 1974 (19 U.S.C. 2232). The stated goal of implementing these tariffs was to punish China for policies harming American intellectual property rights, innovation or technology. Unfortunately, the USTR has implemented tariffs on numerous goods that have no correlation with protecting American intellectual

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property from the Chinese. Worse yet, the USTR has granted, without any explanation, specific exclusions from these overly broad tariffs for certain products that have resulted in a significant competitive disadvantage in the marketplace.

NPI has been in existence since 1905 and has manufactured pressure cookers and canners for over one hundred years. There is absolutely no link between imposing a tariff on parts for pressure cookers and canners and protecting American intellectual property from the Chinese. Yet the USTR has implemented tariffs on pressure gauges, relief valves, pressure regulators, air vents, vent pipes and gaskets. These parts are critical to the safe operation of pressure cookers and canners. The Chinese are not stealing any intellectual property or technological innovations relating to these parts because the technology is dated. There are simply no innovations or technology to be stolen. Implementing tariffs on these critical safety parts does not punish China. Instead the tariffs punish the American consumer by raising the cost of these replacement parts, thereby creating a disincentive to consumers to appropriately maintain their cookers and canners.

In addition to the USTR enacting unnecessarily broad tariffs on critical safety component parts, the USTR has granted haphazard exclusions that create a competitive disadvantage in the marketplace for products that compete with each other. One such field is with space heaters. Like pressure cookers, new technology is not an issue. The applicable technology has been in the public domain for literally decades. The USTR, without explanation, granted an exclusion to the 25% tariff applicable to space heaters with fans (HTSUS 8516.29.0030) but denied all exclusion requests for radiant space heaters (HTSUS 8516.29.0060). Prior to the tariffs, the fan operated and radiant space heaters competed head to head at near identical prices. The exclusion granted by the USTR for fan-operated space heaters has resulted in NPI and other U.S. marketers of radiant space heaters being placed at a significant competitive disadvantage as the fan-operated heaters now sell at a lower price. Given the state of the economy with respect to rising inflation, consumers look closely at prices when make their purchasing decision. The exclusions granted by the USTR have created an uneven competitive playing field that results in lopsided pricing that favors one type of space heater over the other.

The rationale used by the USTR to justify the tariffs was that they would target Chinese companies who were stealing U.S. technology and innovation and put an end to these unfair competitive practices. Unfortunately, the tariffs the USTR implemented largely fail to achieve that goal because they focus on products with technology that is in the public domain. Instead, they punish the U.S. consumers who wish to buy these products and the U.S. businesses that supply them. To avoid further harm to these consumers and businesses, the section 301 tariffs should be ended now.

National Retail Federation

NRF members have been on the front lines of having to manage the higher costs triggered by the Section 301 tariffs assessed on imports from China. The tariffs impact a wider range of consumer goods sold by retailers and have been universally disruptive to our businesses and our customers. They add directly to the cost of goods imported from China. In addition, a host of other indirect costs that the tariffs have imposed on U.S. importers add to their burden and have affected trade and prices. The tariffs moved much supply out of China to other countries largely in Asia, or Mexico, and only very small amounts to the United States. Higher costs were in many cases initially absorbed by importers and

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retailers; however, today more and more of that additional cost burden associated with the tariffs is being passed on to the prices paid by final consumers — American families.

North American Die Casting Association

No written summary. Please see EDIS for full submission.

Novus International, Inc.

No written summary. Please see EDIS for full submission.

Nucor Corporation

The economic impact of the Section 232 and Section 301 measures has been overwhelmingly positive. As a necessary complement to antidumping and countervailing duty orders, the Section 232 program has helped to return the domestic steel industry to a more sustainable trajectory after years of pressure from global overcapacity and repeated surges of low priced imports. When the Section 232 investigation was initiated, low-priced, excess import supply had taken significant U.S. market share from domestic producers, preventing the industry's recovery from the global financial crisis. Because of persistent import competition, the domestic industry was operating unprofitably, shedding production and production capacity, and forgoing the critical investments needed for long-term sustainability.

Following a series of successful antidumping and countervailing duty cases, the Section 232 program created a comprehensive response to the global overcapacity crisis that frequently blunted the beneficial impact of trade remedy orders. With this combination of measures in place, the steel industry has recaptured market share, returned to more consistent profitability, ramped up existing production capacity, and made significant investments in new, improved, and expanded facilities. Steel producers have invested approximately $22 billion since the Section 232 measures went into effect, resulting in an expected 22 million tons of additional production capacity. These investments represent state-of-the-art facilities that are among the cleanest in the world and that will further the domestic industry's climate advantage over carbon-intensive foreign sources.

The Section 232 program has contributed to the domestic steel industry's recovery without causing harm to downstream industries or the broader economy. After the program went into effect, domestic producers quickly ramped up production, while supply chains adjusted. By 2019, domestic steel prices had returned to pre-Section 232 levels. Any recent supply disruptions or inflationary pressures are the result of the COVID-19 pandemic and Russia's invasion of Ukraine. There is simply no correlation between inflation, which is a global phenomenon, and any U.S. trade action, including the Section 232 program.

Steel accounts for a modest share of total costs in significant steel consuming downstream industries. Recent econometric analysis confirms that any increase in steel prices due to the Section 232 program had little if any impact on the strong performance of downstream producers.

The Section 301 measures have likewise had beneficial effects on the U.S. economy. In the steel industry, China, while not alone, is at the heart of the global overcapacity crisis. Key to its industrial

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policy initiatives has been channeling low-priced steel inputs into downstream value added manufacturing of both steel products and steel-intensive products like machinery and equipment. This has threatened U.S. value chains both in the steel industry and in key steel consuming industries. The Section 301 measures have encouraged reshoring of these industries to the United States and the return of robust and resilient manufacturing supply chains.

These measures should remain in place until the economic distortions they were designed to address have been resolved. Removing them prematurely would reverse the gains discussed above and would have detrimental effects, both economically and environmentally.

Occidental Chemical Corporation

No written summary. Please see EDIS for full submission.

Ohio Coatings Company

The imposition of trade remedies on steel imports under Section 232 of the Trade Expansion Act of 1962 has played a critical role in preserving and revitalizing America's steelmaking capabilities. However, the imposition of those trade remedies to restrict the import of tin mill blackplate -- when domestic tin mill blackplate is undeniably in short supply -- is contrary to both the spirit and letter of Section 232; and it has had the unintended consequence of actually reducing the American steel industry's tin plate market share.

During 2017, the year prior to imposition of Section 232 trade protection, the three domestic tinplate producers (U. S. Steel, ArcelorMittal, USA and OCC) supplied 60% of the America's tinplate needs. The remaining 40% of the domestic tinplate market was split between several foreign producers. In 2022, U. S. Steel, Cleveland Cliffs and OCC will account for less than 40% of the American tin plate market. That precipitous loss of domestic market share is attributable in significant measure to the impact of the misapplication of Section 232 tariffs and quotas to imported blackplate, and the consequent reduction in OCC's ability to fully participate in domestic tinplate production.

Old World Christmas

No written summary. Please see EDIS for full submission.

Optimus Steel, LLC

No written summary. Please see EDIS for full submission.

Outokumpu Stainless USA, LLC

Outokumpu Stainless USA (Outokumpu) welcomes the opportunity to expand upon its testimony to the Commission regarding the economic impact of the section 232 steel tariffs on its business as part of the U.S. International Trade Commission’s (ITC) retrospective investigation of the economic impacts in the

U.S. industries most affected by the section 232 tariffs.[1] Outokumpu Stainless USA is the second-largest stainless steel producer in the United States and a strong supporter of the section 232 steel duties, which have allowed the company to achieve its first profitable year in 2021 since beginning U.S. production over a decade ago. In addition, with the support of the section 232 and other trade remedy actions, Outokumpu has since 2017:

- increased its base prices;
- improved its capacity utilization by 6 percent;
- improved production efficiency, supporting a 7 percent increase in production capacity even without any physical capacity expansions; and
- most importantly, increased its domestic shipment volume by 34 percent.

Despite these substantial gains, the ITC heard from downstream steel producers that the steel section 232 actions were, alternately and hypocritically, either having no appreciable impact on domestic stainless steel producers or causing substantial detrimental impacts on the price and availability of stainless steel. As discussed below, Outokumpu and other stainless steel producers have responsibly raised base prices, increased and reoriented production to the U.S. market, and reinvested the profits further increasing production capacity. The ITC must reject downstream users' attempts to attributed market factors such as increasing raw materials and freight costs and pandemic supply chain impacts to the section 232 actions and find that the section 232 steel duties have strengthened the industry most affected by the section 232 actions: the U.S. steel industry.

Pedego, LLC

Until the implementation of the Section 301 tariffs, there was no duty on electric bicycles. As Don Di Costanzo, CEO of Pedego, explained during the public hearing for this investigation, when the 301 tariffs went into effect, U.S. owned and operated companies like Pedego were put at a competitive disadvantage with Chinese companies for two reasons:

1. De Minimis Exemption

If the total value of the imported goods equals $800 or less (known as the De Minimis/321 exemption), the goods are not subject to duty or taxes, including the 301 tariffs. Most electric bikes cost less than $800 to manufacture so companies in China are selling e-bikes for $799 direct to U.S. consumers. As a result, they pay no duty, no Section 301 tariffs, no sales tax, and no income tax in the United States. Pedego, like most other companies operating in the U.S., must pay these taxes, with the increased financial burden of the Section 301 tariffs. This exemption is unfair for U.S. companies and contradicts the purported purpose of the Section 301 Tariffs.

2. Direct Distributors

[1] Outokumpu focuses its comments on the impact of the section 232 duties because competitive imports from China (and therefore subject to section 301 duties) are minimal in the wake of its successful trade remedies petitions and the resulting imposition of antidumping and countervailing duties on imports of stainless steel sheet and strip from China, discussed further below.

Chinese owned and operated companies are setting up direct to consumer operations in the U.S. and importing e-bikes at their manufactured cost to minimize Section 301 tariffs. Again, this puts U.S. companies at a competitive disadvantage and negates the purpose of the tariffs.

Pinnacle Climate Technologies, Inc.

No written summary. Please see EDIS for full submission.

Plumbing Manufacturers International

No written summary. Please see EDIS for full submission.

Polaris Industries, Inc.

No written summary. Please see EDIS for full submission.

Power Solutions International

No written summary. Please see EDIS for full submission.

Rauch

No written summary. Please see EDIS for full submission.

Retail Industry Leaders Association

No written summary. Please see EDIS for full submission.

Silgan

The section 232 tariffs are a significant burden on our operations. Despite the protection afforded by the tariffs domestic manufacturers have withdrawn capacity from the tin mill steel market. The resulting domestic supply shortage threatens can and closure manufacturers in the United States and ultimately introduces significant risks for domestic food supply. The Department of Commerce should grant a generally approved exemption for tin mill steel to help address this critical need.

SNP Inc

I am pleased to submit comments to the USITC as part of Investigation No. 332-591: Economic Impact of Section 232 and 301 Tariffs on U.S. Industries.

I am writing to inform you of the substantial impact that the Section 301 China tariffs and the uncertainty surrounding the federal government's policy pertaining to the tariffs have had on behalf of my small, family-owned business, SNP, Inc., and the nine hardworking Americans that I employ. The last four plus years have been incredibly challenging for our small business as we attempted to navigate the inconsistent and uncertain tariff policy and the exclusion process. These tariffs have impeded my business' ability to innovate and manufacture sustainable chemistries and have provided our foreign competitors with an advantage. SNP has survived to this point, but it has taken a financial and emotional toll that is much harder on small businesses.

We are proud to be the principal manufacturer and industrial supplier of alginic products in the U.S. SNP's line of natural sodium alginates is derived from kelp and is used in the manufacturing of paper coatings that are essential to prevent the deterioration paper products in labels, boxes, and packaging containing pharmaceutical, food, and industrial products.

We rely on a consistent supply of imported sodium alginate (HTS code 3913.10.0000), which is derived from brown algae. Brown algae and its derivatives cannot be artificially produced, and its commercial harvesting in the necessary quantities is limited to China.

The Section 301 tariffs have created a substantial financial burden on SNP, most notably a rise in costs that has harmed SNP's ability to compete against European rivals and forced U.S. manufacturers out of business. The fact that we have paid tariffs is especially galling when factoring in our consistent ability to secure tariff exclusions. Our tariffs paid should be $0. However, due to the federal government's inconsistent tariff and exclusion policies, we have, at times, found ourselves paying unnecessary tariffs with no recourse to claim refunds.

Though I was thankful that the exclusion on sodium alginate was reinstated, I was extremely disheartened that USTR made no provision to claim refunds on tariffs paid between January and October 2021, when it was deliberating its exclusion policy. USTR has repeatedly ruled that SNP should not be paying tariffs on imports of sodium alginate, but I was forced to pay tariffs on nine months' worth of shipments during peak harvest times.

Currently, there is no clarity as to whether I will have another opportunity to file for an exclusion extension before it expires this year.

This roller coaster ride would be difficult for any company to endure, but it is felt even more deeply in a small, family-owned business, like SNP. SNP asks for a permanent exclusion for sodium alginate imports from China. A permanent exclusion will provide certainty for our small business and allow SNP to better compete against foreign companies and continue to invest in innovative, sustainable, and green solutions.

Society of Chemical Manufacturers & Affiliates

SOCMA is the only U.S.-based trade association solely dedicated to the specialty and fine chemical industry – a $300 billion industry that is fueling high paying jobs in local economies across the United States. SOCMA members play an indispensable role in the global chemical supply chain, providing specialty chemicals to companies in markets ranging from aerospace and electronics to pharmaceuticals and agriculture.

SOCMA is not seeking the elimination of the Section 301 Tariffs, only the reopening of the tariff exclusion process. China’s unfair policies and practices towards intellectual property have had a range of negative effects on the American economy and have significantly undermined American manufacturing. Many SOCMA members have been victimized by IP theft in China – theft that is particularly hurtful to an industry that thrives on innovation. We respect the administration's need for a full range of options to deal with China's unfair practices and understand that tariffs are an impactful tool that should remain at the Administration's disposal.

Nevertheless, the Section 301 tariffs have placed burdens on domestic specialty chemical manufacturers that have placed them at a competitive disadvantage. In many cases, China is the only or predominant source of inputs and raw materials for the specialty chemical industry and there is a need to alleviate the tariffs on those products.

SOCMA encourages a three-step approach to 301 tariff exclusions:

- Reopen the exclusion process for previously extended exclusions (already completed by USTR).
- Open the exclusion process for all previously granted, now expired exclusions.
- Re-open the exclusion process to all 301 tariffs.

SOCMA strongly believes any exclusion process must be transparent and inclusive for all stakeholders, apply consistent procedures and processes for all tariff exclusion applications, and base decisions on clear evidence and consistent criteria.

There are a number of reasons to re-open the exclusion process, not the least of which is that tariffs on products that are not competitively available outside of China have a compounding effect on the US economy of which the chemical industry is a net exporter. The tariffs that are being paid by US companies hinder their production and growth opportunities, and because it increases the cost of US products it makes them less competitive in the global market, which in turn inhibit reductions in the US trade deficit.

SOCMA and its members appreciate the opportunity to share this input on the China Section 301 tariffs and the need to reinstate and exclusion process.

Southern Shrimp Alliance

The imposition of Section 301 duties on imports of Chinese seafood has been beneficial for the U.S. market for seafood, providing boons to both the U.S. commercial fishing industry and to American consumers.

Official import data indicate that imports into the United States of Chinese seafood products covered by the Harmonized Tariff Schedule of the United States (HTSUS) codes included in List 3 of the Section 301 trade action declined from $2.8 billion in 2018 to $1.6 billion in 2021. Nevertheless, despite a 44 percent decline in the value of Chinese seafood imports since the imposition of Section 301 duties, there is little indication that American consumers were adversely impacted. This is because importers shifted sourcing away from China, as evidenced by the value of imports of these products from all other sources increasing from $19.0 billion in 2018 to $25.8 billion in 2021. This $6.8 billion increase from all sources but China over the last three years demonstrates that the decline in Chinese seafood in the U.S. market has been more than offset as Americans consume more imported seafood than ever.

The shift away from Chinese seafood has led to a significant reduction in the volume of antibiotic-contaminated seafood in this market. Numerous academic studies published after the imposition of Section 301 duties have continued to document the widespread abuse of antibiotics in Chinese aquaculture. These studies' findings are supported by the enforcement actions taken by the U.S. Food and Drug Administration, which reports that over 46 percent of all refusals of seafood entry lines for reasons related to veterinary drug residues since 2018 have been for products originating from China. Accordingly, the decline in the presence of Chinese seafood in this market has reduced health risks to American consumers and has discouraged the proliferation of antimicrobial resistant pathogens.

Beyond the use of antibiotics in aquaculture, a decline in demand for Chinese seafood also has reduced unintentional American consumer support of environmentally-harmful practices and of labor abuse in the Chinese seafood sector. In its recent investigation regarding imports of illegal, unreported, and unregulated (IUU) seafood, the Commission noted the central role played by wild-caught seafood in the production of fishmeal and fish oil used in aquaculture.

Separately, the U.S. Department of Labor, the U.S. Department of State, and U.S. Customs and Border Protection (CBP) have all publicly reported extensive documentation of forced labor practices in the Chinese seafood harvesting sector, with CBP additionally confirming the use of North Korean workers in the Chinese seafood processing sector.

These characteristics of the Chinese seafood industry, both individually and collectively, have forced U.S. commercial fishing industries to compete for sales in the U.S. market with a substantial volume of unfairly-traded goods. Insofar as the Section 301 duties have led to a sharp decline in Chinese seafood imports while not impacting overall seafood imports, the trade action has inured to the benefit of the domestic commercial fishing industry as well as American consumers.

Specialty Equipment Market Association

No written summary. Please see EDIS for full submission.

ST Paper, LLC

No written summary. Please see EDIS for full submission.

Strato Inc.

Strato Inc. opposes the continued imposition of the Section 301 tariffs on Chinese imports of freight rail couplers and components ("FRCs"), including coupler bodies, knuckles, and yokes, which are sold to original equipment manufacturers of railcars and as replacement parts to join together two freight railcars. The additional 25% tariffs on these imports, which are classified under HTSUS 8607.30.10, 8606.10.00, 8606.30.00, 8606.91.00, 8606.92.00, and 8606.99, have had a negative financial impact by causing downstream inflationary price increases in the U.S. Such increases have impacted Strato's domestic sales of FRCs and its end customer – the railroads – resulting in higher shipping rates for all goods sent by rail.

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Because the FRCs at issue are only produced by a small number of foundries, there are no readily available substitutes for the Chinese products subject to the additional tariffs. Only approximately 30% of an average year's North American railroad maintenance and new car build requirement is available from domestic suppliers, and no new steel foundry has opened in the United States since the Section 301 tariffs took effect in 2018. Instead, over eighty steel foundries have closed since 2002, with a reduction in capacity of more than 27%. At best, domestic capacity has remained steady despite the large increase in rail shipping and traffic since the fall of 2020. Though Strato always attempts to first source these FRCs from domestic suppliers, sufficient domestic capacity to manufacture these products simply does not exist.

This situation forces Strato, one of only the four companies approved by the Association of American Railroads to supply FRCs, to continue sourcing from China, despite the additional tariff. The 25% tariff thus serves no purpose with regard to FRCs except to inflate costs. Higher shipping rates have a cascading inflationary effect on all goods shipped by rail, including oil, consumer goods, automobiles, food, building materials, and many other types of products purchased and relied upon by American consumers. Surely, this is not the impact intended by the USTR in imposing the Section 301 tariffs.

We ask that the specific impact of the Section 301 tariffs on FRCs be considered by the International Trade Commission in its report and that this important industry servicing 140,000 miles of track and 1.6 million freight cars be spared from further negative economic impacts resulting from the additional tariffs.

StreetStrider

No written summary. Please see EDIS for full submission.

Sunval, Inc.

No written summary. Please see EDIS for full submission.

Tariff Reform Coalition

Between March 23, 2018, and August 3, 2022, U.S. Customs and Border Protection ("CBP) collected over $162 billion in duties assessed under Sections 232 and 301. The Section 232 and 301 tariffs have distorted the market for products subject to the tariffs and increased the price of goods for consumers in the U.S. The price of goods produced in the U.S. and third markets has risen as well. Higher prices from the 232 and 301 tariffs are making U.S.-produced goods less competitive than products from other markets. Coalition members noted lost sales to third markets because of higher materials costs in the U.S. The 232 and 301 tariffs are distorting the market and picking winners and losers. While primary metals producers may be enjoying higher prices under the 232 tariffs, this increase is coming at the expense of downstream industries and U.S. consumers.

In addition to price increases and competitiveness challenges, the 232 and 301 tariffs have had a range of other impacts that adversely affect Coalition members, including creating difficulty obtaining a consistent supply of products subject to the tariffs. Changing suppliers when materials are not available is not easy. For products that are highly regulated, the supplier is routinely specified in the contract based on testing performed to the customer's requirements. During the term of a contract, raw material suppliers typically cannot be changed without agreement from the customer and any potential new supplier must undergo a qualification testing and approval process that can take 12-18 months.

While some Chinese-origin inputs may be available from other countries, the total cost (price, quantity, quality) often is higher than the price available in China, even when the 301 tariff is added to the Chinese good. Goods subject to safety approvals like UL standards would be subject to retesting and relisting at great expense if the country of origin changed. As a result, a number of U.S. companies decided to pay the 301 tariffs, especially during the pandemic, rather than face the higher costs and uncertainty of realigning their supply chains.

Several countries imposed retaliatory tariffs ranging from four to 70 percent on many U.S. exports in response to the Section 232 and 301 tariffs. In the agriculture sector alone, the retaliatory tariffs led to a reduction in U.S. agricultural exports to retaliating partners of more than $27 billion.

There is virtually no evidence that the Section 232 or 301 tariffs are having any effect on the problems they were intended to address. Rather, the burden of these tariffs is falling on US businesses and their customers who are being punished for problems they did not create and cannot solve.

Neither the 232 nor 301 tariffs have been effective and the President should eliminate them. Eliminating the tariffs could also help the Administration in their effort to reduce inflation, with one study showing that trade liberalization could deliver a one-time reduction in consumer price index (CPI) inflation of around 1.3 percentage points amounting to $797 per US household.

Tesla, Inc.

No written summary. Please see EDIS for full submission.

The Aluminum Association

No written summary. Please see EDIS for full submission.

The American Farm Bureau Federation

No written summary. Please see EDIS for full submission.

The Dental Trade Alliance

No written summary. Please see EDIS for full submission.

The Vision Council

No written summary. Please see EDIS for full submission.

Tile Council of North America

The Tile Council of North America (TCNA), the trade association of the North American tile industry, supports Section 301 tariffs on imports of ceramic tile from China. While the United States has a substantial ceramic tile industry, the industry has historically been threatened by the presence of unfairly traded Chinese imports in the marketplace. The inclusion of floor and wall tiles on USTR's China Section 301 retaliation list, therefore, has had broad-based, even universal, support among U.S. tile manufacturers and industry suppliers and has been justified on trade policy grounds.

Imports of Chinese floor and wall tiles have merited inclusion on the list of products subject to tariffs both because of mislabeling and because of intellectual property rights violations. Imports of Chinese tile have also historically undersold U.S.-made tile. This injurious underselling, a consequence of dumping and of massive Chinese government support for its ceramic tile industry, led to the imposition in 2020 of anti-dumping and countervailing duties, as outlined below.

The Section 301 tariffs have served as an appropriate means to redress mislabeling and intellectual property violations and have served and continue to serve their intended purpose. Indeed, imports of ceramic tile from China are now negligible. In 2018, China was the largest exporter to the United States (by quantity). In 2021, China was the 24th largest supplier. Surely, the steep drop in imports from China is primarily due to the U.S. Government's imposition of anti-dumping and countervailing duties on unfairly traded imports of tile from China in June 2020 (duties established as a consequence of the Commission's good work), but the Section 301 duties remain an appropriate and important way to address mislabeling and copying.

Meanwhile, the imposition of Section 301 duties on imports of Chinese tile has not negatively impacted consumers in the form of price increases. Per unit prices for U.S.-produced ceramic tile were $1.55 per square foot in the third quarter of 2018. In the first quarter of 2022, the price of domestically produced ceramic tile was $1.61 per square foot. The price of U.S.-made tile was $1.54 per square foot in the preceding quarter, the final quarter of 2021, a price decrease since imposition of the Section 301 tariffs.

Since the issuance of List 3, the U.S. Government has also applied anti-dumping and countervailing duties on imports of Chinese tile. These duties are much higher than the Section 301 tariffs. The price of domestic tile, therefore, has failed to increase, even after combined Section 301 and AD/CVD duties on imports of Chinese tile.

In part, the price of U.S.-made tile has failed to increase as a consequence of significant downward price pressure from non-Chinese suppliers. Countries such as Turkey and India are significant suppliers to the U.S. market with average unit values that are far lower than domestic average unit values. Clearly, Section 301 tariffs on imports of Chinese tile have not led to higher prices for U.S. consumers, in part because imports from other suppliers exert substantial downward price pressure.

Trinidad Benham Corporation

No written summary. Please see EDIS for full submission.

Turkish Steel Exporters' Association

The Turkish Exporters' Association, Çelik İhracatçıları Birliği, (the "Association") and its members have been negatively and disproportionately impacted by the Section 232 tariffs. First, the Section 232 tariffs have caused devastating costs and disruptions to the Turkish steel industry, while serving no national security purpose. Section 232 is meant to be specifically targeted to address national security threats, in this case global overcapacity driven by China. If properly implemented, Section 232 tariffs should differ from other trade enforcement tools, such as Section 201 and antidumping ("AD") and countervailing ("CVD") duties, which safeguard the U.S. industry from unfairly-traded imports. In reality, however, the current tariffs have functioned only as a protectionist measure to help the U.S. steel industry achieve business objectives, serving the exact same function as Section 201 and AD/CVD duties. Section 232 tariffs are not meant to create a framework that allows the U.S. industry to bypass trade remedy laws, as they have done here.

Second, the implementation of the additional tariffs has had a profound negative impact on U.S. purchasers of steel, and purchasers of Turkish steel in particular. For more than 9 months, the already high 25% tariff was doubled to 50% on Turkish steel only. This sudden, targeted action against Turkey was extremely disruptive to U.S. importers, resulting in diversion of shipments, placement of imports in expensive bonded warehouses, and other related losses totaling millions of dollars. Though more extreme, this real injury suffered by Turkish steel importers mirrors the experience of all importers, which have consistently reported cash flow issues, reduced funds for investment, staffing challenges, and other negative economic impacts since the tariffs took effect in 2018. The Section 232 tariffs have become unmoored from any rational national security purpose and have instead ironically become a deterrent to investment in and purchase of U.S. steel.

Finally, the Section 232 tariffs have had the unintended consequence of increasing calculated AD margins on imports covered by AD orders. Because Commerce treats special Section 232 tariffs as "ordinary customs duties," the full amount paid is deducted from the calculated U.S. price, resulting in a higher dumping margin. The practical result is that importers pay the 25% additional tariff twice – first at the time of import and again via calculation of higher dumping margins resulting from their payment. If foreign producers are shouldering the burden of the Section 232 tariffs, they are being penalized by Commerce. Inevitably the U.S. importer and downstream purchaser are impacted because producers cannot compete while also paying 25-50% in tariffs, plus an inflated AD rate. Commerce's treatment of the Section 232 tariffs is based on a conclusion that they have no remedial purpose. But, in reality, the tariffs are functioning in a manner such that their entire purpose is remedial – the tariffs exist to protect the domestic industry, even though they have ceased to do any such thing. The Commission should therefore report that the Section 232 tariffs have caused economic harm, including market uncertainty, disruptions, and increased costs.

U.S. Fashion Industry Association

The China Section 301 tariffs that have been in effect on apparel, home goods, and other fashion products since September 2018 ("List 3") and September 2019 ("List 4a) have negatively impacted American jobs created by USFIA's retail and apparel brand members. Indeed, 70 percent of the value of imported clothing remains here in the United States—even if the clothing is manufactured outside of

 This page has been changed to reflect corrections to the original publication.

the United States. The Section 301 tariffs have had the perverse impact of discouraging growth of these jobs at America’s most innovative and iconic brands, because, for many of these products, China is the leading supplier in the world and there are no realistic options for other sourcing destinations that can replace China.

Furthermore, these tariffs on clothing, footwear, and other fashion products constitutes a huge tax increase on U.S. consumers. As the U.S. faces the worst consumer inflation in decades, it makes little sense to burden struggling American families with higher prices on essential consumer goods such as clothing. USFIA agrees with Treasury Secretary Yellen’s comments that tariffs tend to increase domestic prices and raise costs to consumers and businesses and that lowering U.S. and Chinese tariffs could help ease inflation. Section 301 tariffs compounded by other inflationary pressures, impose a significant burden on American businesses and families trying to recover from the effects of the pandemic.

The China Section 301 tariffs on apparel, home goods, and related products is not only a tax increase on American families, but a massive regressive tax increase. The Section 301 duties require families, in the face of the worst inflation in decades, to pay more for such things as back-to-school shoes and sweaters for the fall. The average U.S. household in the bottom income quintile spends a higher portion of its income on apparel and footwear than wealthier Americans, meaning that tariffs on apparel and footwear have hit struggling families more than anyone else.

In this respect, it is also worth mentioning that USTR historically has crafted Section 301 retaliation lists with an eye towards imposing tariffs on products that are of export interest to the country that was the target of the Section 301 investigation while avoiding tariffs that would cause disproportionate economic harm to U.S. consumers and industries. Basically, USTR traditionally works to craft Section 301 retaliation lists with an eye towards inflicting economic pain upon the offending trading partner while not “shooting ourselves in the foot.” Here, the China Section 301 Lists 3 and 4a appear to have been prepared without regard to the impact of the tariffs on U.S. companies and consumers.

Meanwhile, imposing tariffs on imports of these fashion products has done nothing to solve the concerns about China’s IP policies and practices outlined in USTR’s March 2018 report. From the experience of USFIA member companies the best way to address these concerns is action at the multilateral level that includes other global trading partners – and USFIA’s member companies are no stranger to IP violations.

United States Steel Corporation

Global steel overcapacity of over 500 million tons continues to significantly threaten the American iron and steel industry and, thus, U.S. national security, including not only national defense/military but also critical infrastructure.

China is the largest offender, but many other countries with massive overcapacity target the U.S. market, including trading partners with which the United States has essentially one-way steel trade (e.g., the United States imports 3 to 9 million tons per year from the European Union, United Kingdom, and Japan but exports virtually no steel to those economies), as well as Canada and Mexico, which surged steel into the United States after the Section 232 tariffs were lifted on imports from North America.

The Section 232 national security action on steel imports ("Steel 232," including Section 232 tariffs, quotas, and tariff rate quotas), China Section 301 tariffs ("China 301"), and strong antidumping and countervailing duty ("AD/CVD") enforcement work together to mitigate some of the negative impact of foreign overcapacity and imports on the American iron and steel industry. The Steel 232 has a substantial positive economic effect on the U.S. industry and continues to strengthen national security. The combined Steel 232, China 301, and AD/CVD measures have supported, and continue to support, the domestic industry's efforts to return to sustainable operating levels, invest in new technology, reverse years of declining employment, and support more and better jobs for the next generation of advanced manufacturing.

Since 2018, United States Steel Corporation has invested or plans to invest over $4 billion in new technology, facilities, and skilled workers for the next generation of iron and steelmaking to meet our goal of net-zero greenhouse gas emissions by 2050.

In addition to these benefits for the overall American steel industry, the Steel 232 and China 301 provide significant upstream support to the American iron industry, miners, and steelworkers that mine, melt, and make iron and steel in the United States.

Any perceived negative economic impact of the Steel 232 has been mitigated in three ways: (1) Steel 232 tariff coverage has declined to less than one third of steel imports—and much less for carbon and alloy semi-finished steel products like slabs and billets; (2) the Steel 232 exclusion process provides tariff relief for covered steel products that are neither domestically available nor a threat to national security; and (3) most illegal retaliation targeting U.S. exports has been eliminated. Finally, the Steel 232 tariffs do not have any meaningful impact on inflation: though inflation increased this year, steel prices have declined roughly 50 percent since September 2021.

China 301 tariffs (a) cover many iron, steel, and steel-intensive products not covered by the Steel 232, AD/CVD, or other import measures; (b) provide leverage to address China's discriminatory practices; and (c) provide relief from Chinese and global steel overcapacity throughout the domestic steel supply chain.

Until there are enforceable global solutions that address the root cause of steel overcapacity, the Steel 232, China 301, and AD/CVD orders must be continued and, ideally, strengthened.

United Steelworkers

No written summary. Please see EDIS for full submission.

Wallaroo Hat Company

No written summary. Please see EDIS for full submission.

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Webb Wheel Products, Inc.

Webb Wheel Products, Inc. (“Webb”) has been a domestic manufacturer of brake drums, rotors, wheel hubs, and spoke hubs for commercial vehicles since 1946. Webb’s products are used in a broad spectrum of critical commercial automotive uses, including military vehicles, fire trucks, school buses, fuel tankers, and commercial electric vehicles. Imports from China that compete against Webb’s products and are subject to Section 301 tariffs (“the subject products”) are classified as follows:

- Brake drums of vehicles of headings 8701 to 8705 (described in HTS 8708.30.5020).
- Brake rotors (discs) of vehicles of headings 8701 to 8705 (described in HTS8708.30.5030).
- Parts for trailers, semi-trailers, or other vehicles not mechanically propelled, nesoi (described in HTS 8716.90.5060).

The Section 301 tariffs on imports of the subject products have leveled the playing field against unfairly priced Chinese imports. Since the Section 301 tariffs on the subject products were established, Webb has been able to achieve significant sales growth from 2018 to 2021, amounting to a 44.73% revenue increase from brake drum sales (HTS 8708.30.5020); 1256.02% revenue increase from rotor sales (HTS 8708.30.5030); and 42.44% revenue increase from trailer hub sales (HTS 8716.90.5060).

The additional revenue from these tariffs has significantly enhanced Webb’s ability to invest millions of dollars annually into domestic facilities and production equipment so that Webb can maintain efficient domestic operations and improve its performance in the domestic market. Since the establishment of the Section 301 tariffs on the subject products, Webb has been able to increase hourly employee headcount by 38% (from 154 to 212), increase production capacity by 17%, and expand production from a five-day work week to a continuous work week (24 hours per day, seven-days a week), all within the United States. Webb has also reinvested increased profits in its domestic manufacturing facilities – $5.8 million in 2021 and $9.8 million in 2022.

The Section 301 tariffs on the subject products have also increased the production of cast iron parts in the United States that used to be manufactured in China. The major input used to produce Webb’s products are castings that we source from Waupaca Foundry, a domestic manufacturer of iron castings headquartered in Waupaca (WI) and operating six iron foundries located in Waupaca (WI), Marinette (WI), Tell City (IN) and Etowah (TN). Waupaca employs approximately 4,400 American workers.

The Section 301 tariffs are necessary for Webb’s ability to continue this positive growth trajectory, continue to invest in and expand domestic production and employment, and reclaim U.S. market share from Chinese producers. If the Section 301 tariffs on the subject products are extended, Webb believes that it will be possible to meet domestic demand with a combination of domestic and non-Chinese production. On the other hand, failure to extend the Section 301 tariffs on the subject products would enable unfairly priced product from China to flood the U.S. market once again and result in a setback for Webb’s efforts to continue to onshore domestic production in support of critical supply chains.

xMotion Technologies

Section 301 tariffs are in America’s national security interests. Particularly automotive driveline products required for manufacturing Electric Vehicles (EVs). In total, auto parts manufacturing equates to $180

Billion in economic output — It's the fourth largest industry in the USA — China's illicit trade practices are meant to intentionally harm the auto industry by transferring intellectual property and cripple domestic suppliers through subsidizing exports. Much of this is done through U.S. registered shell companies, intentionally structured to usurp U.S. government regulation of foreign-controlled enterprises. Consequently, domestic suppliers of driveline technologies suffer from rampant intellectual property theft and a race-to-the-bottom price war against reverse engineered, Chinese-made product.

My company is making a stand here and now. We are domestically manufacturing our driveline products in the USA using U.S. Steel and we support any other automotive businesses wanting to bring supply chains back to the USA from overseas. We have the domestic capacity to produce over 1M driveline products per year, and the financial resources required to scale into additional product lines.

Driveline products are a 'carry over' category essential to EV powertrains. HTS codes 8708.99.6805, 8708.99.6890 and 8708.50.8500 are vital to producing EVs and the future of U.S. automotive manufacturing. Categories covered by HTS Code 8708 equal $2 billion in economic output growing at 25% per year for the U.S. automotive industry. Due to Chinese trade-practices, the entire U.S. automotive industry is forced to import these HTS categories from foreign-owned companies. In the aftermarket this includes: GSP (China), AIT/Wonh Industries/SurTrak (China), and ODM (China); who collectively supply 80% of the $200+ Million category for drive shafts. This is akin to the supply chain for OEMs, whose Tier-1 suppliers are all foreign: GKN (Germany), JTKT (Japan), Neapco (China), and Nexteer (China).

Chinese-owned U.S. Companies are sending their profits to China that are directly financing the expansion of the PRC and its' military vehicle capabilities. The Office of Foreign Asset Control (OFAC) and U.S. Commerce department are keenly aware of these illicit dealings. Sanctioning individual Chinese companies is like cutting the head off a hydra. Another one just takes its' place.

Look closely at Nexteer Automotive. Nexteer is majority-owned by AVIC, a Chinese state-owned conglomerate on the U.S. Sanctions list. Nexteer's Chairman of the Board, Mr. Jian WANG is a former senior executive of AVIC, a company with direct links supplying the Chinese military ("PLA"). How can the U.S. Government safeguard Nexteer's IP for steering, suspension, and driveline products from being shared with AVIC and the Chinese military.

The truth is U.S. innovation is being reverse engineered in China and sold back to the U.S. at a lower cost. Without the extension of Section 301 tariffs, the future of America's automotive industry, especially EV manufacturing won't merit financial investment. This impacts job creation, entrepreneurism, and economic security of businesses across the country.

Your vote to reinstate Section 301 Tariffs on China for HTS codes 8708 will send a clear and unequivocal message to Beijing that the future of the U.S. automotive industry is American made.

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Appendix E
Data Tables for Figures and Supplemental Data Tables

Data Tables for Figures

Table E.1 Cumulative monthly imports subject to additional duties under section 232, as of March 2022
In dollars. This table corresponds to figure 3.1.

Month	Section 232 steel	Section 232 aluminum	Aluminum without steel
January 2018	0	0	0
February 2018	0	0	0
March 2018	49,028,037	127,331,830	127,331,830
April 2018	205,789,853	300,436,991	300,436,991
May 2018	500,489,735	484,360,612	484,360,612
June 2018	1,609,935,676	1,252,967,146	1,252,967,146
July 2018	1,889,873,780	1,350,559,505	1,350,559,505
August 2018	1,795,150,776	1,221,051,959	1,221,051,959
September 2018	1,542,684,071	1,170,978,437	1,170,978,437
October 2018	1,680,938,535	1,181,689,920	1,176,824,924
November 2018	1,605,333,475	1,147,883,345	1,143,212,755
December 2018	1,452,877,854	1,105,653,219	1,100,302,335
January 2019	1,739,284,773	1,090,316,800	1,087,145,486
February 2019	1,243,010,700	982,870,566	980,347,045
March 2019	1,472,701,914	1,031,916,404	1,030,065,145
April 2019	1,375,189,856	1,086,364,945	1,084,018,112
May 2019	1,109,527,789	855,424,800	852,363,267
June 2019	807,013,483	594,682,826	592,780,735
July 2019	776,764,593	668,900,919	666,894,679
August 2019	682,154,552	552,418,446	551,294,574
September 2019	507,249,950	448,218,314	446,494,584
October 2019	485,587,381	476,435,724	475,319,608
November 2019	468,960,370	501,231,696	499,934,632
December 2019	421,892,087	426,217,358	424,768,061
January 2020	483,150,470	470,827,433	469,265,303
February 2020	377,164,482	384,674,831	382,021,427
March 2020	509,099,701	413,968,892	411,465,921
April 2020	446,032,024	428,887,971	425,163,016
May 2020	505,300,143	359,988,455	356,208,222
June 2020	414,012,114	290,801,769	286,188,989
July 2020	395,213,011	287,622,578	280,103,551
August 2020	354,532,882	295,188,340	289,409,656
September 2020	337,885,963	284,881,153	279,276,902
October 2020	351,425,886	304,831,826	299,032,951
November 2020	371,541,887	325,903,570	319,857,572
December 2020	339,216,122	327,902,976	322,258,756
January 2021	318,080,511	307,377,235	301,339,714
February 2021	375,714,149	280,489,199	275,316,613
March 2021	561,648,685	411,147,253	405,535,734
April 2021	443,004,196	382,836,580	376,791,979
May 2021	721,836,250	444,992,785	437,528,194
June 2021	764,088,437	407,556,932	399,957,891
July 2021	824,577,382	389,969,816	382,864,155
August 2021	855,033,302	491,289,065	484,410,641
September 2021	898,923,401	396,407,007	389,216,113

Month	Section 232 steel	Section 232 aluminum	Aluminum without steel
October 2021	885,737,174	504,478,949	496,161,825
November 2021	1,325,435,991	560,805,359	554,547,743
December 2021	1,224,590,378	592,498,482	585,581,596

Source: Compiled from USITC DataWeb/Census, accessed September 27, 2022.
Note: Some aluminum articles subject to tariffs under sections 232 and 301 are included under HTS subheadings that also cover subject steel articles. The "aluminum without steel" column is intended to remove potential overlap.

Table E.2 Cumulative monthly imports subject to additional duties under section 301, January 2018–December 2021
In dollars. This table corresponds to figure 3.1.

Month	Section 301 - tranche 1	Section 301 - tranche 2	Section 301 - tranche 2 without steel and aluminum	Section 301 - tranche 3	Section 301 - tranche 3 without steel and aluminum	Section 301 - tranche 4, list 1	Section 301 - tranche 4, list 1 without steel and aluminum
January 2018	—	—	—	—	—	—	—
February 2018	—	—	—	—	—	—	—
March 2018	—	—	—	—	—	—	—
April 2018	—	—	—	—	—	—	—
May 2018	—	—	—	—	—	—	—
June 2018	—	—	—	—	—	—	—
July 2018	1,353,497,870	—	—	—	—	—	—
August 2018	1,784,742,773	959,166	959,166	—	—	—	—
September 2018	1,595,173,135	297,040,945	297,040,945	4,809,494	405,528	—	—
October 2018	1,581,985,241	413,459,551	413,442,430	13,533,333,158	13,519,622,948	—	—
November 2018	1,424,853,649	701,368,817	701,200,867	13,498,162,801	13,485,606,051	—	—
December 2018	1,501,235,423	671,049,465	670,955,709	16,413,531,189	16,397,934,078	—	—
January 2019	1,574,634,422	668,378,641	668,378,641	11,540,693,574	11,529,007,969	—	—
February 2019	1,266,194,384	509,112,878	509,108,218	9,591,868,586	9,579,560,018	—	—
March 2019	1,351,972,089	527,603,841	527,590,446	8,226,434,613	8,217,529,491	—	—
April 2019	1,407,527,306	530,157,210	530,157,210	9,283,420,340	9,274,446,855	—	—
May 2019	1,409,735,853	540,759,056	540,759,056	10,553,190,472	10,543,180,409	—	—
June 2019	1,326,866,935	495,867,203	495,821,003	9,001,931,317	8,994,304,497	—	—
July 2019	1,402,225,678	516,363,366	516,336,119	9,524,198,860	9,514,706,656	—	—
August 2019	1,308,026,442	478,174,232	478,144,499	8,978,498,159	8,969,588,721	—	—
September 2019	1,248,336,256	429,198,018	429,198,018	8,601,609,677	8,593,732,283	6,047,777,093	5,966,752,503

Month	Section 301 - tranche 1	Section 301 - tranche 2	Section 301 - tranche 2 without steel and aluminum	Section 301 - tranche 3	Section 301 - tranche 3 without steel and aluminum	Section 301 - tranche 4, list 1	Section 301 - tranche 4, list 1 without steel and aluminum
October 2019	1,214,942,954	501,443,423	501,423,332	7,866,561,087	7,860,972,714	7,597,082,984	7,516,544,838
November 2019	1,111,877,057	415,839,892	415,839,892	6,926,395,214	6,921,113,740	6,616,020,008	6,548,385,739
December 2019	1,127,720,370	479,324,479	479,315,159	7,509,724,475	7,503,861,094	6,403,338,780	6,331,492,739
January 2020	1,281,819,041	459,596,439	459,596,439	8,236,675,014	8,230,015,437	6,774,149,550	6,680,682,453
February 2020	944,206,198	433,400,093	433,400,093	6,180,012,404	6,175,115,692	4,713,046,419	4,642,421,420
March 2020	867,284,461	432,740,220	432,740,220	4,207,141,526	4,204,511,088	3,353,288,726	3,295,431,648
April 2020	1,110,738,379	525,561,994	525,512,175	6,840,184,220	6,834,189,920	6,338,417,471	6,264,260,941
May 2020	1,185,498,720	632,074,369	631,980,221	7,785,999,559	7,778,737,855	8,582,931,122	8,503,842,022
June 2020	1,249,141,678	550,997,467	550,548,426	8,041,737,140	8,034,279,694	8,246,519,477	8,158,804,847
July 2020	1,285,603,340	612,636,620	612,636,620	8,939,135,182	8,928,923,274	9,071,881,892	8,970,006,127
August 2020	1,271,318,943	613,153,379	613,141,811	9,176,976,368	9,168,198,649	8,831,989,241	8,760,443,459
September 2020	1,337,361,885	628,843,093	628,843,093	8,858,634,212	8,849,414,203	8,911,754,466	8,852,723,965
October 2020	1,348,962,955	611,082,113	611,082,113	9,195,552,323	9,186,834,003	8,122,554,531	8,053,348,243
November 2020	1,383,666,163	668,848,170	668,830,774	9,116,853,118	9,108,230,546	7,361,441,316	7,278,887,250
December 2020	1,487,146,517	676,174,696	676,154,930	9,246,311,245	9,237,993,642	7,179,000,165	7,100,950,698
January 2021	1,735,723,504	647,811,873	647,725,110	9,586,861,429	9,577,556,369	7,173,410,317	7,102,604,170
February 2021	1,451,265,304	584,096,178	584,042,402	8,684,276,678	8,675,617,859	6,553,219,060	6,468,250,495
March 2021	1,911,399,015	740,319,867	740,319,867	10,332,232,462	10,323,031,954	7,931,185,898	7,830,499,826
April 2021	1,730,930,922	701,706,686	701,633,061	9,513,977,679	9,505,544,107	7,175,181,169	7,096,327,025
May 2021	1,807,814,756	772,617,760	772,615,547	9,947,792,475	9,938,402,177	7,548,981,922	7,443,676,737
June 2021	1,892,832,400	812,076,820	812,042,495	10,199,506,824	10,186,782,277	7,912,635,999	7,815,506,333
July 2021	1,988,005,117	831,540,522	831,528,420	10,011,269,704	10,000,733,270	8,042,835,116	7,935,927,944
August 2021	2,187,878,054	915,742,776	915,704,285	10,887,362,188	10,875,660,429	8,997,267,953	8,837,893,383
September 2021	2,085,500,867	911,648,719	911,648,719	10,700,834,529	10,688,643,760	9,580,800,984	9,447,601,490

Month	Section 301 - tranche 1	Section 301 - tranche 2	Section 301 - tranche 2 without steel and aluminum	Section 301 - tranche 3	Section 301 - tranche 3 without steel and aluminum	Section 301 - tranche 4, list 1	Section 301 - tranche 4, list 1 without steel and aluminum
October 2021	2,052,032,417	917,837,439	917,765,927	10,724,791,137	10,713,159,553	9,552,881,629	9,432,735,007
November 2021	2,042,875,830	923,948,401	923,944,043	10,665,468,168	10,655,133,105	9,376,535,060	9,235,683,360
December 2021	2,141,971,807	1,035,770,544	1,035,765,294	11,232,082,707	11,221,114,026	9,532,052,056	9,317,106,535

Source: Compiled from USITC DataWeb/Census, accessed September 27, 2022.
Note: "—" (em dash) denotes months preceding the imposition of the section 301 tariffs for each tranche, which were treated as 0 in figure 3.1.

Table E.3 Count of HTS subheadings subject to section 301 tariffs, tranche 1: by industry-commodity category, March 2022
This table corresponds to figure 3.2.

Category	Count of subheadings
Machinery	447
Electronic products	238
Transportation equipment	183
Others	6
Total tranche 1	874

Source: Compiled from the *Harmonized Tariff Schedule of the United States (2022) Revision 2*, February 2022.

Table E.4 Count of HTS subheadings subject to section 301 tariffs, tranche 2: by industry-commodity categories, March 2022
This table corresponds to figure 3.3.

Category	Count of subheadings
Chemicals and related products	149
Machinery	46
Transportation equipment	45
Electronic products	36
Others	16
Total tranche 2	292

Source: Compiled from the *Harmonized Tariff Schedule of the United States (2022) Revision 2*, February 2022.

Table E.5 Count of HTS subheadings subject to section 301 tariffs, tranche 3: by industry-commodity categories, March 2022
This table corresponds to figure 3.4.

Category	Count of subheadings
Chemicals and related products	1,446
Agricultural products	1,160
Textiles and apparel	980
Minerals and metals	828
Forest products	548
Others	956
Total tranche 3	5,918

Source: Compiled from the *Harmonized Tariff Schedule of the United States (2022) Revision 2*, February 2022.

Table E.6 Count of HTS subheadings subject to section 301 tariffs, tranche 4, list 1, by industry-commodity categories, March 2022
This table corresponds to figure 3.5.

Category	Count of subheadings
Agricultural products	1,164
Textiles and apparel	673
Minerals and metals	484
Electronic products	272
Miscellaneous manufactures	248
Others	441
Total tranche 4	3,282

Source: Compiled from the *Harmonized Tariff Schedule of the United States (2022) Revision 2*, February 2022.

Table E.7 Count of HTS subheadings subject to section 301 tariffs, all tranches, by industry-commodity categories, March 2022
This table corresponds to figure 3.6.

Category	Count of subheadings
Agricultural products	2,324
Chemicals and related products	1,733
Textiles and apparel	1,653
Minerals and metals	1,321
Machinery	849
Electronic products	824
Others	1,662
Total tranche 4	10,366

Source: Compiled from the *Harmonized Tariff Schedule of the United States (2022) Revision 2*, February 2022.

Table E.8 five leading producers of raw steel, by country, 2021
In million metric tons. This table corresponds to figures 4.1 and AV.2.

Country	Production
China	1,032.8
India	118.2
Japan	96.3
United States	85.8
Russia	75.6

Source: World Steel Association, “World Steel in Figures 2022,” 2022.

Table E.9 U.S. steel mill product imports and exports, by month and year, 2016–21
In million metric tons. This table corresponds to figure 4.2.

Month	General imports	Total exports
January 2016	2.33	0.74
February 2016	2.08	0.74
March 2016	2.34	0.74
April 2016	2.28	0.77
May 2016	2.62	0.77
June 2016	2.56	0.77
July 2016	2.98	0.70
August 2016	2.84	0.78
September 2016	2.47	0.77
October 2016	2.47	0.74
November 2016	2.56	0.70
December 2016	2.51	0.69

Month	General imports	Total exports
January 2017	2.49	0.79
February 2017	2.50	0.79
March 2017	3.10	0.91
April 2017	3.01	0.84
May 2017	3.15	0.96
June 2017	3.54	0.87
July 2017	3.18	0.77
August 2017	3.11	0.88
September 2017	2.83	0.86
October 2017	2.89	0.87
November 2017	2.50	0.84
December 2017	2.21	0.74
January 2018	2.60	0.79
February 2018	2.27	0.77
March 2018	3.06	0.86
April 2018	3.38	0.82
May 2018	2.68	0.82
June 2018	2.27	0.87
July 2018	2.68	0.63
August 2018	2.75	0.62
September 2018	2.37	0.57
October 2018	2.68	0.61
November 2018	2.30	0.59
December 2018	1.80	0.50
January 2019	2.87	0.63
February 2019	2.21	0.58
March 2019	2.37	0.58
April 2019	2.65	0.58
May 2019	2.13	0.61
June 2019	2.21	0.57
July 2019	2.58	0.60
August 2019	1.96	0.62
September 2019	1.74	0.59
October 2019	1.69	0.63
November 2019	1.79	0.57
December 2019	1.97	0.51
January 2020	2.09	0.64
February 2020	1.64	0.63
March 2020	1.96	0.65
April 2020	1.76	0.40
May 2020	1.92	0.35
June 2020	1.50	0.41
July 2020	1.80	0.47
August 2020	1.17	0.53
September 2020	1.24	0.62
October 2020	1.45	0.66
November 2020	1.24	0.61
December 2020	1.74	0.56
January 2021	1.59	0.61
February 2021	1.73	0.62
March 2021	2.31	0.72

Month	General imports	Total exports
April 2021	2.13	0.69
May 2021	2.30	0.68
June 2021	2.69	0.71
July 2021	2.50	0.69
August 2021	2.29	0.70
September 2021	2.65	0.67
October 2021	2.26	0.65
November 2021	2.65	0.66
December 2021	2.68	0.59

Source: U.S. Department of Commerce, U.S. Steel Executive Summary, August 2022, HTS subheadings 7206.10–7216.50, 7216.99–7301.10, 7302.10, 7302.40–7302.90, and 7304.10–7306.90.

Table E.10 U.S. imports for consumption of finished carbon and alloy steel mill products, by duty status, 2016–21

Quantity reported in metric tons; shares reported as a percentage of total (i.e., all duty statuses); index reported as a share in percentage of 2016 data. This table corresponds to figure 4.3.

Duty status	Measure	2016	2017	2018	2019	2020	2021
Subject to additional duties	Quantity	0	0	10,527,829	9,568,729	4,142,796	6,004,023
Not subject to additional duties	Quantity	23,094,515	26,014,220	12,019,687	8,905,060	10,001,561	13,900,085
All duty statuses	Quantity	23,094,515	26,014,220	22,547,516	18,473,789	14,144,357	19,904,108
Subject to additional duties	Share	0.0	0.0	46.7	51.8	29.3	30.2
Not subject to additional duties	Share	100.0	100.0	53.3	48.2	70.7	69.8
All duty statuses	Share	100.0	100.0	100.0	100.0	100.0	100.0
All duty statuses	Index	100.0	112.6	97.6	80.0	61.2	86.2

Source: USITC DataWeb/Census, accessed August 16, 2022.

Note: Finished carbon and alloy steel mill product are composed of imports under HTS subheadings 7208.10, 7208.25, 7208.26, 7208.27, 7208.36, 7208.37, 7208.38, 7208.39, 7208.40, 7208.51, 7208.52, 7208.53, 7208.54, 7208.90, 7209.15, 7209.16, 7209.17, 7209.18, 7209.25, 7209.26, 7209.27, 7209.28, 7209.90, 7210.11, 7210.12, 7210.20, 7210.30, 7210.41, 7210.49, 7210.50, 7210.61, 7210.69, 7210.70, 7210.90, 7211.13, 7211.14, 7211.19, 7211.23, 7211.29, 7211.90, 7212.10, 7212.20, 7212.30, 7212.30, 7212.40, 7212.50, 7212.60, 7225.11, 7225.19, 7225.30, 7225.40, 7225.50, 7225.91, 7225.92, 7225.99, 7226.11, 7226.19, 7226.91, 7226.92, 7226.99, 7226.93, 7226.94, 7213.10, 7213.20, 7213.91, 7213.99, 7214.10, 7214.20, 7214.30, 7214.91, 7214.99, 7215.10, 7215.50, 7215.90, 7216.10, 7216.21, 7216.22, 7216.31, 7216.32, 7216.33, 7216.40, 7216.50, 7216.99, 7217.10, 7217.20, 7217.30, 7217.90, 7226.20, 7227.10, 7227.20, 7227.90, 7228.10, 7228.20, 7228.30, 7228.40, 7228.50, 7228.60, 7228.70, 7228.80, 7229.20, 7229.90, 7301.10, 7302.10, 7302.40, 7225.20, 7229.10, 7304.19, 7304.23, 7304.29, 7304.31, 7304.39, 7304.51, 7304.59, 7304.90, 7305.11, 7305.12, 7305.19, 7305.20, 7305.31, 7305.39, 7305.90, 7306.19, 7306.29, 7306.30, 7306.50, 7306.61, 7306.69, 7306.90, 7304.10, 7304.21, 7306.10, 7306.20, and 7306.60.

Table E.11 U.S. imports for consumption of semifinished carbon and alloy steel mill products, by duty status, 2016–21

Quantity reported in metric tons; shares reported as a percentage of total (i.e., all duty statuses); index reported as a share in percentage of 2016 data. This table corresponds to figure 4.3.

Duty status	Measure	2016	2017	2018	2019	2020	2021
Subject to additional duties	Quantity	0	0	1,049,186	756,176	359,143	1,380,528
Not subject to additional duties	Quantity	6,004,807	7,500,036	6,108,405	5,284,933	4,788,714	6,130,003
All duty statuses	Quantity	6,004,807	7,500,036	7,157,591	6,041,109	5,147,857	7,510,531
Subject to additional duties	Share	0.0	0.0	14.7	12.5	7.0	18.4
Not subject to additional duties	Share	100.0	100.0	85.3	87.5	93.0	81.6
All duty statuses	Share	100.0	100.0	100.0	100.0	100.0	100.0
All duty statuses	Index	100.0	124.9	119.2	100.6	85.7	125.1

Source: USITC DataWeb/Census, accessed August 16, 2022.

Note: Semifinished carbon and alloy steel mill products are composed of imports under HTS subheadings 7206.10, 7206.90, 7207.11, 7207.12, 7207.19, 7207.20, 7224.10, and 7224.90.

Table E.12 U.S. imports for consumption of stainless steel products, by duty status, 2016–21

Quantity reported in metric tons; shares reported as a percentage of total (i.e., all duty statuses); index reported as a share in percentage of 2016 data. This table corresponds to figure 4.3.

Duty status	Measure	2016	2017	2018	2019	2020	2021
Subject to additional duties	Quantity	0	0	457,588	533,420	316,196	457,349
Not subject to additional duties	Quantity	918,302	1,108,537	504,856	234,902	379,107	685,898
All duty statuses	Quantity	918,302	1,108,537	962,445	768,323	695,303	1,143,247
Subject to additional duties	Share	0.0	0.0	47.5	69.4	45.5	40.0
Not subject to additional duties	Share	100.0	100.0	52.5	30.6	54.5	60.0
All duty statuses	Share	100.0	100.0	100.0	100.0	100.0	100.0
All duty statuses	Index	100.0	120.7	104.8	83.7	75.7	124.5

Source: USITC DataWeb/Census, accessed August 16, 2022.

Note: Stainless steel is composed of imports under HTS subheadings 7218.10, 7218.91, 7218.99, 7219.11, 7219.12, 7219.13, 7219.14, 7219.21, 7219.22, 7219.23, 7219.24, 7219.31, 7219.32, 7219.33, 7219.34, 7219.35, 7219.90, 7220.11, 7220.12, 7220.20, 7220.90, 7221.00, 7222.11, 7222.19, 7222.20, 7222.30, 7222.40, 7223.00, 7304.11, 7304.22, 7304.24, 7304.41, 7304.49, 7306.11, 7306.21, and 7306.40.

Table E.13 U.S. imports for consumption of steel derivatives reported in metric tons, by duty status, 2016–21

Quantity reported in metric tons; shares reported as a percentage of total (i.e., all duty statuses); index reported as a share in percentage of 2016 data. This table corresponds to figure 4.3.

Duty status	Measure	2016	2017	2018	2019	2020	2021
Subject to additional duties	Quantity	0	0	2,545	6,130	95,488	122,228
Not subject to additional duties	Quantity	224,520	221,981	263,851	258,739	155,779	164,074
All duty statuses	Quantity	224,520	221,981	266,396	264,868	251,267	286,302
Subject to additional duties	Share	0.0	0.0	1.0	2.3	38.0	42.7
Not subject to additional duties	Share	100.0	100.0	99.0	97.7	62.0	57.3
All duty statuses	Share	100.0	100.0	100.0	100.0	100.0	100.0
All duty statuses	Index	100.0	98.9	118.7	118.0	111.9	127.5

Source: USITC DataWeb/Census, accessed August 16, 2022.

Note: Steel derivatives reported in metric tons are composed of imports under HTS statistical reporting numbers 7317.00.3000, 7317.00.5503, 7317.00.5505, 7317.00.5507, 7317.00.5560, 7317.00.5580, and 7317.00.6560.

Table E.14 U.S. imports for consumption of steel derivatives reported in number, by duty status, 2016–21

Quantity reported in number; shares reported as a percentage of total (i.e., all duty statuses); index reported as a share in percentage of 2016 data. This table corresponds to figure 4.3.

Duty status	Measure	2016	2017	2018	2019	2020	2021
Subject to additional duties	Quantity	0	0	69,178	236,497	347,493	417,978
Not subject to additional duties	Quantity	3,495,855	2,918,418	3,840,569	3,617,323	441,902	197,409
All duty statuses	Quantity	3,495,855	2,918,418	3,909,747	3,853,820	789,395	615,387
Subject to additional duties	Share	0.0	0.0	1.8	6.1	44.0	67.9
Not subject to additional duties	Share	100.0	100.0	98.2	93.9	56.0	32.1
All duty statuses	Share	100.0	100.0	100.0	100.0	100.0	100.0
All duty statuses	Index	100.0	83.5	111.8	110.2	22.6	17.6

Source: USITC DataWeb/Census, accessed August 16, 2022.

Note: Steel derivatives reported in number are composed of imports under HTS statistical reporting numbers 8708.10.3010, 8708.10.3020, 8708.10.3030, 8708.10.3040, 8708.10.3050, 8708.29.2100, 8708.29.2120, 8708.29.2130, and 8708.29.2140. Data before 2021 are likely overstated as discontinued HTS statistical reporting numbers 8708.10.3010 and 8708.29.2100 include parts made from both steel and aluminum.

Table E.15 U.S. imports for consumption of all steel (excluding steel derivatives measured in number), by duty status, 2016–21

Quantity reported in metric tons; shares reported as a percentage of total (i.e., all duty statuses); index reported as a share in percentage of 2016 data. This table corresponds to figure 4.3.

Duty status	Measure	2016	2017	2018	2019	2020	2021
Subject to additional duties	Quantity	0	0	12,037,148	10,864,455	4,913,623	7,964,128
Not subject to additional duties	Quantity	30,242,144	34,844,775	18,896,800	14,683,634	15,325,161	20,880,059
All duty statuses	Quantity	30,242,144	34,844,775	30,933,947	25,548,089	20,238,784	28,844,187
Subject to additional duties	Share	0.0	0.0	38.9	42.5	24.3	27.6
Not subject to additional duties	Share	100.0	100.0	61.1	57.5	75.7	72.4
All duty statuses	Share	100.0	100.0	100.0	100.0	100.0	100.0
All duty statuses	Index	100.0	115.2	102.3	84.5	66.9	95.4

Source: USITC DataWeb/Census, accessed August 16, 2022.

Note: Data encompass finished and semifinished carbon and alloy steel mill products, stainless steel products, and those steel derivative products reported in metric tons categories presented above.

Table E.16 U.S. steel production and capacity utilization by year, 2016–21

In thousands of metric tons. This table corresponds to figure 4.4.

Year	U.S. raw steel production	Capacity utilization
2016	78,500	71%
2017	81,600	74%
2018	86,600	78%
2019	87,800	80%
2020	72,700	68%
2021	85,800	81%

Source: World Steel Association and American Iron and Steel Institute, prehearing brief, July 8, 2022, 6.

Table E.17 U.S. and world prices of hot-rolled steel coil, by month and year, 2016–21
In dollars per metric ton. This table corresponds to figure 4.5.

Date	U.S.	World
January 2016	433	282
February 2016	442	278
March 2016	462	310
April 2016	532	402
May 2016	655	440
June 2016	694	388
July 2016	690	365
August 2016	670	372
September 2016	610	381
October 2016	558	408
November 2016	565	463
December 2016	650	503
January 2017	681	525
February 2017	677	522
March 2017	702	527
April 2017	709	519
May 2017	680	496
June 2017	667	477
July 2017	677	484
August 2017	689	539
September 2017	696	569
October 2017	667	572
November 2017	677	564
December 2017	697	571
January 2018	731	582
February 2018	816	606
March 2018	902	634
April 2018	948	617
May 2018	974	607
June 2018	991	600
July 2018	1,001	593
August 2018	989	591
September 2018	965	587
October 2018	934	578
November 2018	892	542
December 2018	852	500
January 2019	785	501
February 2019	773	526
March 2019	782	546
April 2019	775	554
May 2019	711	521
June 2019	652	515
July 2019	628	506
August 2019	649	504
September 2019	633	479
October 2019	564	427
November 2019	562	434
December 2019	607	470
January 2020	649	500

Date	U.S.	World
February 2020	643	480
March 2020	636	468
April 2020	560	392
May 2020	553	401
June 2020	567	420
July 2020	543	434
August 2020	532	488
September 2020	609	511
October 2020	703	518
November 2020	773	570
December 2020	998	663
January 2021	1,120	744
February 2021	1,271	730
March 2021	1,383	811
April 2021	1,490	938
May 2021	1,654	1,085
June 2021	1,844	1,068
July 2021	1,952	1,006
August 2021	2,037	957
September 2021	2,092	928
October 2021	2,134	885
November 2021	2,039	902
December 2021	1,855	810

Source: USDOC, "Steel Executive Summary" August 2022, 4.

Table E.18 U.S. apparent consumption and import penetration of finished steel mill products, 2016–21
In million metric tons and percentages. This table corresponds to figure 4.6.

Year	Imports	Domestic production	Import penetration
2016	23.1	91.9	25%
2017	26	97.7	27%
2018	22.5	99.8	23%
2019	18.5	97.6	19%
2020	14.14	80	18%
2021	20	97.1	21%

Sources: World Steel Association, USITC DataWeb/Census, accessed August 16, 2022.

Table E.19 U.S. aluminum imports and exports, by month and year, 2016–21
In thousand metric tons.
This table corresponds to figure 4.7.

Date	Imports for consumption	Exports
January 2016	490.9	128.2
February 2016	393.0	136.0
March 2016	525.2	136.1
April 2016	490.8	133.5
May 2016	492.5	134.7
June 2016	556.5	132.3
July 2016	502.4	140.0
August 2016	493.9	161.3
September 2016	483.7	153.8