Disentangling the Effects of the 2018-2019 Tariffs on a Globally Connected U.S. Manufacturing Sector *

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Abstract

This paper estimates the relationship between the U.S. tariff increases of 2018-2019 and outcomes in domestic manufacturing. Despite being intended to boost manufacturing activity, we find U.S. industries more exposed to tariff increases experience relative reductions in employment, as a small positive effect from import protection is offset by larger negative effects from rising input costs and retaliatory tariffs. Higher tariffs are also associated with relative increases in producer prices due to rising input costs. Lastly, we document broader labor market impacts, as counties more exposed to rising tariffs exhibit relative increases in unemployment and declines in labor force participation.

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The unprecedented increase in tariffs imposed by the United States against its major trading partners in 2018-2019 has brought renewed attention to the economic effects of tariffs. While vast theoretical and empirical literatures document the effects of changes in trade policy, it is not clear how prior estimates apply when there are virtually no modern episodes of a large, advanced economy raising tariffs in a way comparable to the U.S. during this period. Further complicating estimation of the effects of tariffs is the rapid expansion of globally interconnected supply chains, in which tariffs can have impacts through channels beyond their traditional effect of limiting import competition.

Another important feature of these tariffs is that they were imposed, in part, to boost the U.S. manufacturing sector by protecting against what were deemed to be the unfair trade practices of trading partners, principally China. Thus, understanding the impact of tariffs on manufacturing is vitally important, as some may view the negative consequences of tariff increases documented in existing research—including higher prices, lower consumption, and reduced business investment—as an acceptable cost for boosting manufacturing activity in the United States.

This paper provides the first comprehensive estimates of the effect of recent tariffs on the U.S. manufacturing sector, while also considering spillovers to the broader labor market. A key feature of this analysis is simultaneously accounting for the different channels through which tariffs could affect manufacturers in the presence of global trade and supply chain linkages. On the one hand, U.S. import tariffs may protect some U.S.-based manufacturers from import competition in the domestic market, allowing them to gain market share at the expense of foreign competitors. On the other hand, U.S. tariffs have also been imposed on intermediate inputs, and the associated increase in costs may hurt U.S. firms' competitiveness in producing for both the export and domestic markets. Moreover, U.S. trade partners have imposed retaliatory tariffs on U.S. exports of certain goods, which could again put U.S. firms at a disadvantage in those markets, relative to their foreign competitors. Disentangling the effects of these three channels and determining which effect dominates is an empirical question of critical importance.

Toward this end, we construct industry-level measures of exposure to each of these three channels. We measure the import protection channel as the tariff rate impact on the share of domestic absorption covered by newly imposed tariffs. We account for an industry's exposure to retaliatory tariffs by U.S. trading partners based on the share of industry-level shipments subject to new retaliatory tariffs. Finally, we measure possible increases in production costs associated with tariffs on imported inputs as the tariff rate impact on the share of industry costs subject to new tariffs. We then relate the measures for these three channels of tariff exposure to monthly data on manufacturing employment, output, and producer prices.

We begin by regressing the industry-month-level outcomes on interactions of measures of the three channels with a set of month dummies, using the approach from Finkelstein (2007) to difference out pre-existing industry-level trends, which are important in this setting. Industry and month fixed effects in the regressions control for time-invariant characteristics of industries and aggregate shocks. In addition, we include interactions of month dummies with a set of industry-level characteristics—including measures of international exposure and capital intensity—whose relationship with the dependent variable may change over time.

We find that tariff increases enacted since early 2018 are associated with relative reductions in U.S. manufacturing employment and relative increases in producer prices. In terms of manufacturing employment, rising input costs and retaliatory tariffs account for the negative relationship, and the contribution from these channels more than offsets a small positive effect from import protection. For producer prices, the relative increases associated with tariffs are due primarily to the rising input cost channel. We find little evidence for a relationship between industrial production and any of the three tariff channels considered and provide evidence that this lack of a response is due to the historically high orders backlog that manufacturers built up in the two years prior to imposition of the tariffs.

In terms of economic significance, we find that shifting an industry from the 25th percentile to the 75th percentile in terms of exposure to each of these channels of tariffs is associated with a relative reduction in manufacturing employment of 2.7 percent, with the positive contribution from the import protection effects of tariffs (0.4 percent) more than offset by the negative effects associated with rising input costs (-2.0 percent) and retaliatory tariffs (-1.1 percent). For producer prices, we find that an interquartile shift in exposure to tariffs is associated with a 3.3 percent relative increase in factory-gate prices.

To consider potential broader effects of the tariffs beyond the manufacturing sector, we estimate the relationship between county-level labor market indicators and geographic measures of exposure to the three tariff channels. We find that counties with higher exposure to tariffs experience relative increases in unemployment rates and relative decreases in labor force participation. These findings suggest that workers who lose employment in the manufacturing sector due to tariffs are not readily absorbed into employment in other sectors.

Our results suggest that the traditional use of trade policy as a tool for the protection and promotion of domestic manufacturing is complicated by the presence of globally interconnnected supply chains and the retaliatory actions of trade partners. Indeed, we find the impact from the traditional import protection channel is completely offset in the short-run by reduced competitiveness from retaliation and especially by higher costs in downstream industries. As such, this is the first paper to document the interplay between these potentially offsetting channels and show that their net effect is a relative reduction in manufacturing employment.

All results in this paper necessarily represent short-term effects of tariffs, and the longer-term implications may differ from those estimated here. For example, adjustment to the imposition of tariffs may take time as firms re-evaluate contracts and relationships with customers and suppliers. To a large extent, the longer-term effects of the tariffs will depend on firms' continuing evaluation of how long they are likely to remain in place. While a Phase One trade agreement between the U.S. and China in early 2020 temporarily halted the imposition of new tariffs, the vast majority of the tariffs examined in this paper remain in effect. Moreover, with the tariffs now spanning two Presidential administrations and tensions between the U.S. and China remaining high, the prospect of their quick removal appears slim, highlighting their continued relevance for researchers and policymakers.

This paper contributes to the evolving literature examining the effects of recent global trade tensions on the U.S. economy. Early work in this literature includes Amiti et al. (2019) and Fajgelbaum et al. (2020) who find near-complete pass-through of U.S. tariff increases to domestic prices, implying welfare losses, though of a relatively small magnitude. Cavallo et al. (2021) show that product composition appears to be a key determinant in the differences in tariff pass-through between U.S. imports and U.S. exports during the 2018-2019 tariff escalation, while also showing that the majority of U.S. tariff increases are being absorbed by U.S. retailers. Flaaen et al. (2020) examine the case of U.S. tariffs imposed on washing machines, showing that tariffs on individual countries can lead to the relocation of production across borders, while tariffs on broader sets of countries lead to substantial retail price increases for both targeted products and complementary goods.

Another example of the importance of the rising input cost channel is found in concurrent work by Handley et al. (2020) who find that U.S. import tariffs on inputs lead to reduced *exports* for firms in affected industries. While Handley et al. (2020) examines an indirect effect of tariffs on output, via exports, our paper provides a direct and comprehensive view of the effects of the tariffs on overall manufacturing activity, including the highly policy-relevant outcome of employment. Bown et al. (2020) also show that tariffs imposed since the 1980s have lowered sales and employment while increasing prices in downstream industries. Unlike these papers, which focus on the input cost channel, we estimate the relative magnitudes of the various ways that tariffs have impacted U.S. manufacturing and, ultimately, their net effect on the sector. Our results, therefore, highlight the importance of multi-directional global value chains and networks for evaluating the effects of tariffs (Antràs et al., 2017; Antràs and Chor, 2018; Alfaro et al., 2019; Bernard and Moxnes, 2018).

Focusing on geographic exposure to tariffs, Waugh (2019) finds that counties specializing in industries subject to Chinese retaliatory tariffs experience reductions in new auto sales, Goswami (2020) finds that commuting zones subject to higher retaliatory tariffs experience lower employment growth, with no effect from import protection, and Blanchard et al. (2019) show that retaliatory tariffs can explain a shift in voting away from Republican House candidates in the 2018 election. Huang et al. (2023) and Amiti et al. (2020) find that the effects of tariffs carry through to firms' financial performance. Lastly, Reyes-Heroles et al. (2020) note that the effects of tariff actions by major trading countries can also have implications for the trade patterns of emerging market economies.

Although we highlight the recent and rapidly expanding literature on the 2018-2019 tariffs, the ideas of accounting for retaliatory tariffs and supply chain effects of tariffs go back decades. Early examinations of optimal tariffs given the potential for retaliation can be found in Kaldor (1940) and Johnson (1953). The counteracting effect of tariffs on intermediate inputs used in further domestic production—the rising input cost channel described above—was highlighted in Balassa (1965) and Corden (1966), and is present in a wide range of more recent empirical research such as Amiti and Konings (2007) and Topalova and Khandelwal (2011), among others.[1] However, the scale of the 2018-2019 tariffs, the increased availability of data, and the immensely expanded network of global supply chains permits a quantitative examination of these channels that has not been possible before.

Our paper makes several contributions to the existing literatures. First, we explicitly measure and estimate the effects of several channels through which tariffs could affect manufacturing industries. Second, we focus specifically on the manufacturing sector, the sector whose output and employment were targeted to be boosted by tariffs. Third, we provide the first simultaneous examination of the output, employment, and price effects of the 2018-2019 tariffs in a particular sector. And finally, we consider the possibility of spillover effects from the manufacturing sector to the broader economy and find that manufacturing workers who lose employment due to tariffs have not been quickly absorbed into employment in other sectors, consistent with findings for other trade shocks (e.g. Autor et al. (2013), Dix-Carneiro and Kovak (2017)).

[1]The effects of changes in tariffs on an industry's output—the import protection channel we examine—have been examined in an extensive empirical literature going back to Pavcnik (2002).

2 Background, Data, and Industry-Level Measurement

We begin by providing some brief background on trends in manufacturing activity in the period leading up to and during the imposition of tariffs. Figure 1 displays manufacturing production, employment, and the share of manufacturing in private employment from January 2017 to September 2019, with each data series converted to an index that equals 100 in January 2018, just before the imposition of the first round of new tariffs. As indicated in the Figure, manufacturing employment and output increased at a steady pace in 2017 and, indeed, through much of 2018. Toward the end of 2018, however, growth in manufacturing employment and output stalled. Moreover, the concomitant decline in the manufacturing share of employment indicates that the weakness in manufacturing employment was specific to that sector, as nonmanufacturing employment continued to grow steadily throughout this time period. Given the inflection point in manufacturing activity, which came after the imposition of substantial tariffs by the U.S. and its trading partners, it seems reasonable to ask whether the tariffs implemented in 2018 played some role in this manufacturing slowdown. Indeed, media and other anecdotal reports from the time are rife with worries about tariffs, especially among manufacturers. The Federal Reserve's July 2018 Beige Book, for example, notes that "[m]anufacturers in all Districts expressed concern about tariffs and in many Districts reported higher prices and supply disruptions that they attributed to the new trade policies," while the September 2018 version reports that "[t]ariffs were reported to be contributing to rising input costs, mainly for manufacturers."

2.1 Timing and Features of U.S. and Retaliatory Tariffs

To evaluate the effects of recent tariffs, it is important to understand their timing and scope. The tariffs imposed by the U.S. and its trading partners since 2018 can be classified under three separate actions, with the largest round of U.S. tariffs occurring in late September 2018. Figures 2a and 2b display the magnitude and timing of these trade actions, and Appendix Section B.2 examines characteristics of products subject to tariffs and shows that they were predominantly intermediate and capital goods used as inputs by U.S. manufacturers.

2.1.1 U.S. Import Tariffs

Figure 2a displays the magnitude and timing of the three main U.S. tariff actions—which were initiated by the U.S. government, as opposed to being requested by industries or firms—in 2018 and 2019. The first of these actions, shown in black, entailed "Section 201" tariff rate quotas with effective rates of around 30 percent, which were enacted in February 2018 against imports of washing machines and solar panels from all countries. The second major tariff action, shown in dark gray, affected steel and aluminum imports beginning in March 2018. These rarely-used "Section 232" tariffs, which were justified on national security grounds, were applied at 25 percent on steel and 10 percent on aluminum, and covered nearly all countries, with limited exceptions. The third and most significant action—shown in shades of light gray—followed a "Section 301" investigation that concluded that certain Chinese intellectual property and technology transfer policies were illegal under U.S. trade law. The original U.S. tariffs resulting from this investigation were imposed in July 2018 and covered \$34 billion of imports from China at a 25 percent rate. However, in a series of back-and-forth retaliations between the U.S. and China, the U.S. expanded the list of covered imports by $16 billion in August and then by nearly $200 billion in September. This latter round of U.S. tariffs was initially imposed at a rate of 10 percent, which was later raised to 25 percent in May 2019.

2.1.2 Retaliatory Tariffs

U.S. trading partners responded to these actions with retaliatory tariffs on U.S. exports, which are summarized in Figure 2b. As shown in dark gray, in response to the Section 232 tariffs on steel and aluminum, China announced tariffs on U.S. exports in April of 2018, while other countries imposed retaliatory tariffs in June and July. In response to the Section 301 tariffs, China imposed retaliatory tariffs in three phases shown in shades of light gray. The equal scale of the axes in the two panels makes clear that the value of U.S. exports subject to retaliatory tariffs was substantially smaller than the value of U.S. imports subject to U.S. tariffs.

2.2 Data and Measurement

This section describes the data sources and measurement for the empirical analysis presented in Section 3. We use publicly available data on the lists of products covered by U.S. import tariffs and foreign retaliatory tariffs.[2] For U.S. tariffs, product lists are from the United States Trade Representative and the U.S. Federal Register. For retaliatory tariffs

[2]We use statutory rather than effective tariff rates for several reasons. Statutory rates are the salient policy change influencing firm behavior, and measures of effective tariff rates for export retaliation aren't readily available. See Appendix B for more discussion.

by U.S. trade partners, data are drawn from the relevant government agencies including the Canadian Department of Finance, the European Commission, as well as the World Trade Organization. These lists of affected products have been helpfully collected by other researchers who have made them available for public use.[3] Table B1 provides links to all lists of affected products. We map the Harmonized System (HS) codes covered by tariffs described above to the North American Industry Classification System (NAICS) using the concordance developed by Pierce and Schott (2012).[4]

Our measures of exposure to the various rounds of tariffs imposed by the U.S. and its trading partners also require industry-level data on the value of overall imports, exports and shipments. We collect data on the dollar value of U.S. imports and exports from the USITC and on industry shipments from the Annual Survey of Manufactures (ASM) for a pre-tariff year, 2016. Data on the input usage of each industry are drawn from the Bureau of Economic Analysis (BEA) detailed input-output tables for 2012.[5]

Lastly, we draw monthly values of the dependent variables for our analysis—industry output, employment, and producer prices—from three sources. Our measures of monthly industry output come from the Federal Reserve's G.17 Release on Industrial Production and Capacity Utilization. Monthly data on employment and producer prices are from the Bureau

[3]See, for example, Bown and Kolb (2019) and the website maintained by the Crowell-Moring International Trade law firm.

[4]See Appendix B for details of this mapping. Industry-level analysis in the paper is typically conducted at an aggregation similar to the four-digit NAICS level, as described in Appendix Section C.1.

[5]We use the NAICS-IO concordance provided by BEA as the foundation for further concording of these detailed codes to our industry and commodity measures.

of Labor Statistics. Our sample extends from January 2017 to September 2019.

2.3 Industry-Level Measures of Trade Policy Impact

This section describes the measures we construct to quantify the industry-level effects of the trade policies enacted by the U.S. and its trading partners since 2018. A range of theoretical models that involve input-output linkages could be used to motivate the channels we highlight empirically below. We describe one useful example from Adão et al. (2020) in detail in Appendix A and discuss how their measures of the various responses to bilateral trade cost shocks compare with the measures we employ.[6] Our focus in constructing these measures is capturing the effect of realized changes in tariffs on forces likely to affect outcomes in the manufacturing sector, including the amount of import competition in the U.S. market, the competitiveness of U.S. exports in foreign markets, and input costs. In particular, we construct three industry-level measures capturing each of these channels of potential trade policy impact. As shown by the densities displayed in Appendix Figure C2, the three measures of exposure to tariffs we construct vary substantially across industries, driven by variation in the share of imports of each product sourced from or exported to China, the share of products within an industry subject to US or retaliatory tariffs, the tariff increase applied to U.S. imports or exports, and, in the case of the rising input cost channel, the intensity with which each input is used in the production process. Appendix Tables C3 and C4 provide unweighted and weighted summary statistics for the three exposure measures.

[6] In addition, we show in Section D.2 of the Appendix that our main results are robust to alternate measures of exposure to tariffs, including measures based solely on tariff rates and measures that do not normalize by absorption or shipments.

Import Protection

One of the most salient ways that tariffs could affect an industry's economic activity is by restricting foreign competition. Let Ω^I be the list of U.S. imported product-country pairs (pc) subject to new tariffs. The variables imp_i and exp_i identify total industry i imports and exports, and Q_i equals domestic production, each measured as of 2016. $\Delta\tau_{ipc}$ is the change in the tariff rate (in percentage points) from the beginning to end of our sample period. Using these definitions, our measure of import protection is given by:

$$\text{Import Protection}_i = \frac{\sum_{pc\in\Omega^I} imp_{ipc}\Delta\tau_{ipc}}{Q_i + imp_i - exp_i}, \tag{1}$$

As indicated in the equation, this measure is calculated for each industry, i, by summing the product of the value of tariff-affected imports from country c of product p and the applicable tariff rate, and then dividing that sum by the value of domestic absorption. In our baseline analysis, we calculate equation (1) based on the cumulative set of products covered by all tariffs described in Section 2.1, and define $\Delta\tau_{ipc}$ based on the tariff rates in effect at the end of our sample period.[7]

Export Retaliation

While U.S. tariffs may reduce competition for some industries in the domestic market, U.S. trading partners responded to these tariffs by imposing retaliatory tariffs. These retaliatory

[7] Measures of export retaliation and rising input costs are also based on the cumulative set of tariffs. In Appendix D.16 we describe additional results in which we calculate separate measures of import protection for each individual wave of tariffs.

tariffs may harm U.S. manufacturers by decreasing their competitiveness in foreign markets.

We measure this potential effect for each industry as the value of U.S. exports subject to new retaliatory tariffs, multiplied by the applicable increase in tariff rates, and divided by the value of U.S. output. In particular, defining Ω^E to be the list of U.S. exported product-country pairs (pc) subject to retaliatory tariffs, we calculate a measure of an industry's exposure to "export retaliation" as the following:

$$\text{Export Retaliation}_i = \frac{\sum_{pc \in \Omega^E} exp_{ipc} \Delta \tau_{ipc}}{Q_i}. \tag{2}$$

Rising Input Costs

The final channel we study traces the impact of U.S. tariffs on input costs via supply chain linkages with foreign countries. An industry's sources of inputs used in production is described in the "use" table of the BEA's input-output tables, which consist of a matrix with elements use_{ij}—the dollar value of commodity j used in industry i production.[8] Combined with information on industry i's use of total intermediate inputs M_i and compensation of employees $Comp_i$, it is straightforward to construct a matrix S_{ij} with the share of input costs of commodity j in industry i:

$$S_{ij} = \frac{use_{ij}}{M_i + Comp_i}, \tag{3}$$

[8]For manufactured goods, import shares are updated with information from 2016.

Then, we define TIS_j as the tariff-affected import share of domestic absorption of commodity j to capture the relevance of tariffs to the domestic market for commodity j:

$$TIS_j = \frac{\sum_{pc \in \Omega^I} imp_{jpc} \Delta\tau_{jpc}}{Q_j + imp_j - exp_j}, \tag{4}$$

By multiplying the terms from equations (3) and (4) we arrive at the tariff-affected import share of costs in industry i from commodity j. Finally, summing across commodities j yields our measure of exposure to "rising input costs" for industry i:

$$\text{Rising Input Costs}_i = \sum_j \frac{use_{ij}}{M_i + Comp_i} \frac{\sum_{pc \in \Omega^I} imp_{jpc} \Delta\tau_{jpc}}{Q_j + imp_j - exp_j}, \tag{5}$$

3 Short-Run Impacts of Tariffs on Manufacturing

This section discusses the generalized difference in differences empirical strategy we use to estimate the relationship between recent tariffs and outcomes in the manufacturing sector and presents our baseline results.

3.1 Empirical Strategy

Some industries may be highly protected with respect to their output, while also being highly subject to tariffs on their inputs or exports, underscoring the need for a systematic approach to disentangle the impacts of tariffs on the manufacturing sector. In particular, the weighted (unweighted) correlation coefficient is 0.37 (0.39) for rising input costs and import protection, 0.07 (0.08) for rising input costs and export retaliation, and 0.24 (0.23) for import protection and export retaliation. As a result, any univariate relationship between an outcome measure and one of the channels identified above could end up conflating multiple, potentially offsetting effects on an industry. Therefore, we will control for all channels of exposure to tariffs in our baseline specification, allowing us to calculate estimates of the effect of each channel holding the others constant.[9]

We adopt a flexible setup that allows the effects of each of the channels to vary over time. In particular, we interact the industry-level measures for each of the tariff channels with a full set of month dummies. This approach allows us to observe the exact timing of any change in trend associated with the three tariff channels and subsequently control for any pre-trends in outcome variables across industries. Recognizing that industries with varying exposure to international trade may respond differently to shocks even in the absence of changes in trade policy, we include additional controls that account for a baseline level of export exposure, import exposure, input cost exposure, and capital intensity for each industry.[10] These controls account for general exposure to international conditions such as changes in the value of the dollar and foreign GDP growth, as well as allowing for the possibility that

[9] Section D.15 of the Appendix provides equivalent results in which the dependent variables are regressed separately on each individual tariff channel measure.

[10] Our export exposure measure is the export share of output, our import exposure measure is the import share of domestic absorption, and our import cost exposure is the fraction of an industry's input costs coming from imported goods. Each of these measures is calculated using data from 2016. Input cost shares are from the 2012 detailed input-output tables. Our measure of the capital intensity of each industry is capital per worker as measured by the NBER CES Manufacturing Industry Database.

industries with different levels of exposure to trade and capital intensity behave differently at different points in the business cycle. Our estimating equation is given by:

$$
\begin{aligned}
y_{it} = \quad & \alpha + \sum_t \gamma_t \mathbf{1}(M_t = t)(\text{Import Protection}_i) + \sum_t \lambda_t \mathbf{1}(M_t = t)(\text{Export Retaliation}_i) \ldots \\
& + \sum_t \theta_t \mathbf{1}(M_t = t)(\text{Input Cost}_i) + \sum_t \Big(\mathbf{1}(M_t = t) \times \mathbf{X_i'} \boldsymbol{\beta_t} \Big) + \delta_i + \delta_t + \varepsilon_{it}
\end{aligned} \tag{6}
$$

where the outcome of interest, y_{it}, is either log employment, log output, or the log of the producer price index of industry i in time t. The $\mathbf{1}(M_t = t)$ terms indicate a set of month dummies (spanning February 2017 to September 2019). Import Protection$_i$, Export Retaliation$_i$, and Input Cost$_i$ are the three tariff channel measures described above, and the term $\mathbf{X_i'}$ contains the general controls for international conditions as well as capital intensity. The δ_i and δ_t terms are industry and month fixed effects, respectively. Standard errors are calculated using clustering at the three-digit NAICS level.

3.1.1 Assignment of Tariffs

One concern with this approach is the potential for tariffs to have been assigned to specific industries based on trends in the dependent variables we examine, i.e., employment, production, or prices. Several aspects of how the 2018-2019 tariffs were determined, however, make detailed targeting of industries based on these outcomes unlikely, and our treatment of tariffs in equation (6) is consistent with that in the existing literature (i.e. Fajgelbaum et al. (2020) and Cavallo et al. (2021)). First, the bulk of the 2018-2019 tariffs resulted from investigations initiated *by the U.S. government* for the purpose of addressing longstanding complaints against trading partners, especially treatment of intellectual property in China.

This process stands in contrast to that associated with temporary tariffs like antidumping duties, where industries experiencing negative shocks apply for assistance from the government. Second, the tariffs imposed were largely uniform—91 percent of the value of targeted imports was subject to a 25 percent ad valorem duty rate—and covered broad groups of industries, with nearly all imports from China ultimately subject to tariffs. Third, tariff lists were assembled quickly, with the timing of tariffs imposed and magnitude of trade covered largely determined by the tit-for-tat responses of U.S. trading partners, particularly China.

One particular concern is that tariffs may have been assigned based on political economy considerations to reward preferred or politically connected industries. Assessing this possibility, Fajgelbaum et al. (2020) highlight the generally uniform level of tariffs granted across industries, as well as a somewhat negative relationship between industry-level protection and campaign contributions, and conclude that "...tariff changes are unlikely to have been driven by specific interest groups." Our focus on the separate effects of three tariff channels provides additional evidence for considering the role of political economy considerations in the government's tariff setting. In particular, the most likely way that the government might try to protect particular industries would be by providing import protection to industries experiencing positive or negative shocks, which would manifest as pre-existing trends in terms of our outcome variables of employment, output, or prices for industries more exposed to the import protection channel.[11] Importantly, however, Figure 3 (discussed below) indicates a lack of pre-trends for the import protection channel for all three outcome variables, which is confirmed in a formal hypothesis test in Section D.6 of the Appendix. In sum, while products

[11]It seems much less likely that the U.S. government could assign tariffs based on trends in input costs, especially given the rapid rollout of rounds of tariffs described above.

subject to tariffs were clearly not chosen randomly, there is substantial evidence that they were chosen primarily based on strategic considerations of the tariff escalation, rather than on short-run industry-specific trends in employment, output, or prices.

3.1.2 Accounting for Pre-Trends

Another feature of difference in differences analysis is the need to address differing trends across industries prior to the implementation of new tariffs, which we find to be important in our analysis. To illustrate the relevance of accounting for pre-trends in this setting, Figure 3 presents results from estimating equation (6) in unadjusted form. The three panels of the figure display coefficient estimates and 90 percent confidence intervals for the interactions of the tariff channel measures with month dummies for the dependent variables of employment (Panel (a)), IP (Panel (b)), and producer prices (Panel (c)). Estimates are weighted by either December 2017 employment (for employment) or value-added (for IP and PPI).

Two aspects of the results stand out. First, we find evidence of differing pre-trends across industries prior to the introduction of tariffs, which appear, for example, as the pre-tariff upward trend in coefficient estimates for the relationship between exposure to rising input costs and employment in the right column of Panel (a).[12]

Second, the figure highlights clear breaks in pre-existing trends that occur when tariffs are put into place, as seen by the flattening and ultimate decline in coefficient estimates in the same right column of Panel (a). As discussed in Finkelstein (2007), it is these *breaks in*

[12] Appendix Section D.6 formally tests for the presence of pre-trends and finds that they are present for the rising input cost and export retaliation channels for both the employment and PPI regressions.

trend that capture the impact on the outcome variables attributable to the change in policy.

Therefore, in our baseline results, we utilize two approaches to explicitly account for these pre-trends in our baseline results, each of which yields similar results. First, we estimate equation (6) and then follow Finkelstein (2007) by differencing out the pre-trend path for each coefficient, thereby arriving at a point estimate that isolates the impact of each tariff channel, net of any pre-existing trends. Specifically, for a given set of coefficients (say, the γ_t coefficients above) we calculate the following:

$$\Delta y_{it}^{\gamma} = \quad (\overline{\gamma}_{\text{Jul-Sep19}} - \overline{\gamma}_{\text{Dec17-Feb18}}) - \kappa(\overline{\gamma}_{\text{Dec17-Feb18}} - \overline{\gamma}_{\text{Feb17-Apr17}}). \tag{7}$$

This calculation compares changes in average coefficients over two periods: A post-tariff period spanning just before tariffs were put in place (Dec. 2017 - Feb. 2018) to the final three months of our sample (Jul.-Sep. 2019); and a pre-tariff period from the start of the sample (Feb. - Apr. 2017) to just before tariffs were put in place (Dec. 2017 - Feb. 2018). The κ term adjusts for the differing lengths of the post-tariff and pre-tariff periods.

Second, as an alternative approach for netting out pre-trends, we replace the outcome variable y_{it} in equation (6) with the equivalent measure after removing an industry-specific linear trend for the period from January 2017 to January 2018, the last full year before the implementation of new tariffs. One attractive feature of this approach is that it allows us to observe the precise timing of any change in relationship between exposure to the tariff channels and manufacturing outcomes.

We note that estimated results in Section 3.2 should be interpreted as short-term effects of tariffs, both in terms of the duration of outcomes we observe after tariffs are put in place, as well as the comparison with the pre-existing trend. Appendix Section D.7 describes the manufacturing trends in the pre-period, estimates a placebo test during a pre-tariff period, and provides estimates with an extended pre-tariff period.

3.2 Results

This sub-section provides baseline results accounting for the presence of pre-trends. Table 1 reports estimates from the Finkelstein (2007) approach (equation 7) and Figure 4 presents results of estimating equation (6) with de-trended dependent variables.

Estimates for employment are reported in column 1 of Table 1 and Panel (a) of Figure 4. As shown in the first column of the table, we find statistically significant relationships between manufacturing employment and all three tariff channels, with each relationship taking the expected sign. First, we find a negative and highly statistically significant relationship between manufacturing employment and exposure to the rising input cost channel capturing tariffs on imported inputs. The timing of this impact is shown in Figure 4 (right column of Panel (a)) as a downward shift of coefficient estimates following the imposition of tariffs. Table 1 also reveals a negative and statistically significant relationship between exposure to export retaliation and manufacturing employment, which appears as a downward turn of coefficient estimates in the middle column of Panel (a) of Figure 4. Lastly, we find a positive and marginally statistically significant relationship between import protection and employment in Table 1, which manifests itself as a subtle and imprecisely estimated shift up in coefficient estimates once tariffs begin to be imposed in the left column of Panel (a).[13] The results in Panel (a) of Figure 4 also indicate intuitive differences in the timing of ob-

[13] Appendix Section D.5 reports results of an alternative specification in which the depen-

served effects for each of the channels. Coefficient estimates for the retaliatory tariff channel begin to shift almost immediately after those tariffs are imposed, while the relationship with exposure to rising input costs takes longer to appear given that these effects only arise as the impacts of tariffs are passed through supply chains.[14]

We calculate the economic significance of these estimates by comparing an industry at the 75th percentile of exposure to the three tariff channels to an industry at the 25th percentile, where these and other summary statistics are reported in Section C.2 of the Appendix.[15] In this comparison, the industry more exposed to the rising input cost channel experiences a relative reduction in manufacturing employment of 2.0 percent, relative to the less exposed industry. Including the other two channels boosts this effect to a 2.7 percent relative reduction in manufacturing employment, as the negative contribution from retaliatory tariffs (-1.1 percent) more than outweighs the (somewhat less precisely estimated) positive contribution from the import protection effect (0.4 percent). Another way of calculating the economic significance of these estimates is to consider the effect of shifting to an alternative scenario with zero tariff exposure. This scenario indicates that exposure to rising input costs is associated with a 1.8 percent relative decrease in employment (or around 230,000 jobs); incorporating the other two channels increases the estimated effect to 2.6 percent (or around

---

dent variable is transformed to first differences. Estimates are qualitatively similar.

[14]By measuring industries' tariff exposure based on *cumulative* tariffs, we side-step some of the main concerns of staggered treatment highlighted in Goodman-Bacon (2021) and Callaway and Sant'Anna (2021). See Appendix D.8.

[15]Section D.9 of the Appendix presents standardized coefficient estimates, which report the changes in the dependent variables (measured in standard deviations) associated with one standard deviation changes in the independent variables.

320,000 jobs).[16] A test of joint significance of the three tariff channel variables similarly indicates a negative and statistically significant relationship with employment.

While these alternative estimates do not account for additional general equilibrium effects that might be associated with the tariffs, which have been examined in existing work by Fajgelbaum et al. (2020), exploratory work in Appendix D.18 suggests such effects may amplify the negative effects. Indeed, contrary to results found elsewhere, Appendix D.18 does not find significant positive impacts coming from the import protection channel when also accounting for general equilibrium effects.

Column 2 of Table 1 and Panel (b) of Figure 4 present estimates pertaining to the relationship between tariffs and industrial production. Here, we see little evidence of significant impacts from the tariffs. Estimates in column 2 of Table 1 are not statistically different from zero, and coefficients displayed in Figure 4 are little-changed, on net, following the imposition of tariffs. As discussed in Appendix Section D.11, we find evidence that this lack of impact is due to the presence of historically high orders backlogs for manufacturers before the tariffs were put in place, which supported production in the short term.

Finally, column 3 of Table 1 indicates that new tariffs are associated with a statistically significant relative increase in producer prices due to exposure to rising input costs.[17] In terms of economic significance, an interquartile shift in exposure to rising input costs is associated with a 3.9 percent relative increase in factory-gate prices. Including the other statistically insignificant channels implies a 3.3 percent relative increase in factory-gate prices.

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[16] Appendix Sections D.10 and D.13 explore alternate methods for assessing the economic significance of our estimates.

[17] The joint test statistic for the three measures is also positive and significant.

These results are consistent with Amiti et al. (2019) who find a role for input tariffs in increasing U.S. prices. In terms of timing, the right column of Panel (c) of Figure 4 indicates that the positive relationship between exposure to rising input costs and producer prices becomes apparent almost immediately after the first round of U.S. tariffs is imposed.

3.3 Robustness Checks

In this section, we consider a range of robustness checks designed to examine the sensitivity of the baseline results. As described below, results are stable across a range of specifications that include controlling for trade policy uncertainty, dropping some or all of the control variables included in the baseline, and clustering of standard errors at different levels. Results for employment are reported in Table 2, with the baseline estimates from Table 1 replicated in column 1 for comparison. Results for other dependent variables are available on request.

Trade Policy Uncertainty: Some discussion of the effects of the 2018-2019 tariffs has focused on the role of uncertainty about trade policy (Handley and Limão, 2022). Here, we explore the effects of augmenting equation (6) with a commonly-cited measure of trade policy uncertainty related to the 2018-2019 tariffs from Caldara et al. (2019). This measure of trade policy uncertainty is based on a textual analysis of the quarterly earnings calls of publicly traded U.S. firms at the quarter-Fama-French 12 industry-level. Because Caldara et al. (2019)'s measure of trade policy uncertainty is only defined through the second quarter of 2019, our analysis in this robustness check ends in June 2019, versus September 2019 in our baseline results. Results are presented in column 2 of Table 2.

As indicated in column 2 of the Table, relationships between realized tariff changes and employment when controlling for trade policy uncertainty are highly similar to the baseline estimates, and the coefficient on the measure of trade policy uncertainty is not statistically significant at conventional levels. We caution that the Caldara et al. (2019) measure of trade policy uncertainty is defined at a more aggregate industry level (Fama-French 12) and frequency (quarterly) than our dependent variable, and that a more disaggregated measure of trade policy uncertainty may yield a stronger effect on manufacturing employment. Nonetheless, these results support the idea that actual changes in tariffs are associated with changes in economic activity that are distinct from effects of trade policy uncertainty.

Evaluating the Importance of Control Variables: Next, we explore the relevance to our baseline results of the control variables for overall (non-tariff) international exposure and capital intensity. Results in columns 3 to 5 of Table 2 show that the estimates are not substantially affected by varying the groups of control variables included. In column 3, which drops controls for industry-level capital intensity, coefficient estimates are highly similar to the baseline (column 1), with a very small decrease in precision for import protection, and a very small increase in precision for export retaliation. In column 4, which instead drops controls for general non-tariff international exposure, estimates of the positive effect of import protection are modestly larger and more precise—though they are still more than outweighed by the negative contribution of rising input costs—while the coefficient for export retaliation becomes smaller and loses statistical significance. Estimates in column 5, which drops both international exposure and capital intensity are similar to those in column 4.

Evaluating Clustering at Different Levels of Aggregation: Our baseline estimates include clustering at the three-digit NAICS (sector) level, which accounts for correlation of errors across industries within sectors. To examine whether the choice of level of clustering is important for our results, we re-estimate with clustering at the four-digit NAICS (column 6) or two-way clustering at the three-digit NAICS and month level (column 7). As shown in the table, the precision of the results is little-changed due to these different levels of clustering, with slightly larger standard errors when clustering at the four-digit NAICS level and slightly smaller standard errors when two-way clustering for three-digit NAICS and month.

3.4 Margins of Employment Adjustment

The employment effects we identify above could result from increased layoffs or slowdowns in hiring by affected firms, and analyzing differences along these margins provides important supporting information on employment adjustments to tariff shocks. To explore which of these margins accounts for our results, we use data from the Census Bureau's Quarterly Workforce Indicators, which reports the number of hires and separations, by quarter, for all U.S. manufacturers at the four-digit NAICS industry level.[18]

We employ the same estimation strategy as in Section 3, adapted to quarterly data. Here, the dependent variable is the log level of either hires or separations for industry i in quarter q. The industry-level measures are identical to those in equation (6), but are interacted with quarter dummies, rather than month dummies. We continue to cluster standard errors at the three-digit NAICS level.

Table 3 displays results of applying the Finkelstein (2007) approach to the resulting coefficient estimates. The estimates indicate that exposure to tariffs is associated with a reduction in hiring due to higher exposure to the rising input cost channel and an increase

[18]We seasonally adjust these data using the standard Census Bureau X-13 seasonal adjustment program available at https://www.census.gov/srd/www/x13as/.

in separations due to export retaliation. In terms of the relative importance of the hiring and separation margins, the impact of an interquartile shift in exposure to each channel on hires is about twice the magnitude of the effect on separations, though the relationship for hires is a bit less precisely estimated.[19]

4 Broader Effects of Tariffs on Manufacturing

Given the relationship between tariffs and activity in the manufacturing sector described above, we next examine whether this relationship has broader implications outside the sector. We do this by considering whether the negative relationship between tariffs and manufacturing employment is sufficiently large to have implications for other labor market measures, such as county-level labor force participation and unemployment rates. This exercise also provides information on the difficulty with which manufacturing workers displaced by tariffs were able to find employment in other sectors. Appendix Section D.17 provides an industry-level analysis of the relationship between exposure to the rising input costs channel and employment for the nonmanufacturing sector.

4.1 Examining County-Level Labor Market Measures

One way to examine whether the 2018-2019 tariffs have spillover effects beyond the manufacturing sector is to construct measures of geographic exposure to the tariffs and relate those measures to broader labor market outcomes. This is particularly important as the impact

[19]In subsequent work, Javorcik et al. (2022) find that exposure to input tariffs and retaliatory tariffs decreases online job postings in the U.S., consistent with this finding of effects of tariffs on the hiring margin.

of tariffs could be concentrated in specific areas of the United States. Several recent papers have analyzed this geographic dimension of the 2018-2019 tariffs, emphasizing the effects on political economy (Fajgelbaum et al. (2020) and Blanchard et al. (2019)), consumption (Waugh (2019)), and employment (Goswami (2020)).[20]

Here, we calculate county-level measures of exposure to each of the three tariff channels described above. To do so, we apply the industry-level measures of each tariff channel described in Section 2.2 to each county's industrial structure based on data from the Census Bureau's County Business Patterns.[21] Specifically, for an individual county k, we define exposure to each of the three tariff channels as the employment-weighted averages of exposure of the industries present in each county:

$$\text{Channel}_k = \sum_i \left(\frac{m_{ik}}{m_k}\right) \text{Channel}_i, \tag{8}$$

where m_{ik} is employment in industry i in county k in 2016, and the three channels are once again exposure to rising input costs, import protection, and export retaliation.

When constructing these county-level measures, all industries, whether manufacturing or nonmanufacturing, have varying levels of exposure to the rising input cost channel via their input-output structures, as discussed in Appendix Section D.17. Manufacturing industries are also exposed to the import protection and export retaliation channels via U.S.

[20]While some papers note that tariffs may have been targeted based on *future political considerations*, there is no evidence that tariffs were targeted—either by the U.S. or its trading partners—based on *industry performance*.

[21]We use CBP data from a pre-tariff year, 2016 and apply the imputations from Eckert et al. (2020) to address well-known issues of data supression due to confidentiality requirements.

tariffs on their output, and retaliatory tariffs on their exports. Services industries, by contrast, have zero exposure to these channels, by definition, as their output is not subject to tariffs. While nonmanufacturing goods-producing industries—i.e. logging, mining, and agriculture—received very modest import protection and were subject to export retaliation, we are unable to include their exposure to these channels because there is not a readily comparable analogue of the Annual Survey of Manufactures to measure industry-level shipments for these industries. While new U.S. import protection on these industries was inconsequential (less than 1 percent of the value of trade covered by new tariffs, based on 2017 value), this is more relevant for retaliatory tariffs, as a large component of these tariffs targeted agricultural products (roughly 15 percent of the value of new retaliatory tariffs on exports by 2017 value). Therefore, while our county-level analysis accounts well for spillovers of manufacturing tariffs to other sectors, it will not reflect the direct effects of the retaliatory tariffs on agriculture and mining that have been found to be important in Waugh (2019). In this sense, our estimates of the impact of export retaliation may be conservative. The county-level distributions of the three tariff channels are displayed in Appendix Figure C3.

We use these county-level measures of each channel to examine the relationship between exposure to tariffs and broader measures of labor market outcomes, including labor force participation and the unemployment rate. These data come from the BLS's Local Area Unemployment Statistics (LAUS), which collects information on labor market outcomes at the county-level.[22] Our approach mirrors that used to estimate equation (6) in Section 3, but using county-month-level data in place of industry-month-level data:

[22]See Appendix C.4 for information about the LAUS.

$$
\begin{aligned}
y_{kt} = \quad & \alpha + \sum_t \gamma_t \mathbf{1}(M_t = t)(\text{Import Protection}_k) + \sum_t \lambda_t \mathbf{1}(M_t = t)(\text{Export Retaliation}_k) \ ... \\
& + \sum_t \theta_t \mathbf{1}(M_t = t)(\text{Input Cost}_k) + \sum_t \Big(\mathbf{1}(M_t = t) \times \mathbf{X_k'} \boldsymbol{\beta_t}\Big) + \delta_k + \delta_t + \varepsilon_{kt}
\end{aligned} \tag{9}
$$

The dependent variable (y_{kt}) is either the county-month labor force participation rate or unemployment rate, and the independent variables are interactions of month dummies with the county-level measures of each of the three tariff channels, the measures of international exposure described above, and the manufacturing employment share. Equation (9) also includes county and month fixed effects. Standard errors are clustered at the state level.

We report results of estimating equation (9) in terms of the Finkelstein (2007) hypothesis test described above, with results reported in the first column of Table 4. We find a positive and statistically significant relationship between the county-level unemployment rate and exposure to the rising input cost channel. The other two channels have marginally significant effects on unemployment, and while the effect coming from import protection is positive (and hence, contrasts with the industry-level results above), the implied magnitude is small.[23] We similarly find a negative and statistically significant relationship between labor force participation and the rising input cost channel, whereas the other two channels are small in magnitude and statistically insignificant. In terms of economic significance, these estimates imply that a county in the 75th percentile of the distribution for each tariff channel experiences a 0.2 percentage point increase in the county-level unemployment rate, relative to a county in the 25th percentile (and a smaller decrease in overall labor force

[23]Moreover, when accounting for implied general equilibrium effects in Appendix D.18, the joint effect of this channel becomes even smaller and insignificant.

participation). While these effects are modest in size, they are not trivial. Furthermore, it suggests that the decline in manufacturing employment due to the imposition of tariffs is not readily absorbed by gains in other industries. These results, therefore, provide further evidence of the presence of substantial adjustment costs for workers attempting to move between industries or geographic areas.

This exercise has a natural interpretation that follows the growing literature utilizing Bartik or shift-share instruments. In particular, Borusyak et al. (2021) argue that standard errors associated with estimates coming from regressions at the level of geography could be under-stated, as they do not properly account for the variance of the quasi-experimental shocks. We show results from applying the suggested re-weighting approach in the second and fourth columns of Table 9.[24] The statistical significance is qualitatively unchanged using this "shock-level" version: the standard errors corresponding to the rising input cost channel on unemployment rates increase somewhat while those corresponding to labor force participation decline slightly.

5 Conclusion

This paper examines the relationship between three aspects of the 2018-2019 tariffs—import protection, export retaliation, and rising input costs—and outcomes in the U.S. manufacturing sector and broader labor market. We find that the tariffs are associated with relative

[24]The equivalence result highlighted in Borusyak et al. (2021) holds in our case, subject to some slight discrepancies, which we attribute to differences in numerical precision given the presence of multiple sets of shocks and a host of controls (including time-varying county-level controls) that we pull through to apply the Finkelstein (2007) hypothesis test.

reductions in manufacturing employment, as a small and imprecisely estimated boost from import protection is more than offset by larger drags from the effects of retaliatory tariffs and, especially, exposure to rising input costs. Exposure to rising input costs is also associated with relative increases in producer prices. Examination of broader labor market outcomes reveals that tariffs are associated with relative increases in unemployment rates and declines in labor force participation rates. While the longer-term effects of the tariffs may differ from those that we estimate here, the results indicate that the traditional use of trade policy as a tool for the protection and promotion of domestic manufacturing is complicated by the presence of globally interconnnected supply chains.

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Table 1: Point Estimates of Cumulative Effect by Channel

Variable	Employment	Industrial Production	Producer Prices
Import Protection	0.310*	-0.485	-1.266
	(0.171)	(1.006)	(0.758)
Export Retaliation	-4.479**	2.717	1.954
	(1.679)	(2.380)	(3.868)
Rising Input Costs	-3.085***	-1.222	6.538***
	(0.867)	(2.688)	(1.888)
Test of Joint Significance	-7.255***	1.026	7.225**
	(1.966)	(2.473)	(3.444)
Industry Fixed Effects	yes	yes	yes
Month Fixed Effects	yes	yes	yes
Number of Industries	76	84	82
Observations	2,508	2,772	2,706

Sources: Federal Reserve Board (FRB), U.S. Department of Labor, Bureau of Labor Statistics; authors' calculations.

Notes: Table displays coefficient estimates and standard errors of the Finkelstein (2007) approach presented in equation (7) in the text, along with the test statistic for a test of the joint significance of all three tariff channels. Results are weighted by December 2017 employment (for employment regression) or value added (for IP and producer prices). Standard errors (in parentheses) are clustered by 3-digit NAICS industry. $* \, p < 0.10$, $** \, p < 0.05$, $*** \, p < 0.01$.

Table 2: Robustness Checks

	Dep. Var: Log Employment						
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Import Protection	0.31*	0.225	0.304	0.52***	0.516***	0.31	0.31**
	(0.171)	(0.159)	(0.21)	(0.16)	(0.16)	(0.305)	(0.146)
Export Retaliation	-4.479**	-3.553**	-4.821***	-3.148	-3.283	-4.479**	-4.479***
	(1.679)	(1.429)	(1.678)	(2.345)	(2.277)	(2.184)	(1.206)
Rising Input Costs	-3.085***	-1.942***	-2.876***	-3.045***	-2.982***	-3.085***	-3.085***
	(0.867)	(0.616)	(0.842)	(0.86)	(0.83)	(0.92)	(0.775)
Trade Policy Uncertainty		-0.01					
		(0.024)					
Intl. Exposure Controls	Yes	Yes	Yes	No	No	Yes	Yes
Cap. Intensity Controls	Yes	Yes	No	Yes	No	Yes	Yes
Clustering	N3	N3	N3	N3	N3	N4	N3, Mo.
Observations	2,508	2,280	2,508	2,508	2,508	2,508	2,508

Sources: Federal Reserve Board (FRB), U.S. Department of Labor, Bureau of Labor Statistics; authors' calculations.

Notes: For import protection, rising input costs, and export retaliation, the table displays coefficient estimates and standard errors of the Finkelstein (2007) approach presented in equation (7) in the text. For trade policy uncertainty, the table displays the coefficient estimate and standard error of the time-varying industry-level measure of trade policy uncertainty based on Caldara et al. (2019). Column 1 reproduces the baseline estimates from Table 1, and column 2 adds the control for trade policy uncertainty. Columns 3 through 5 vary the sets of control variables included, and columns 6 and 7 consider alternate levels of clustering standard errors. All regressions include industry and month fixed effects. Results are weighted by employment as of December 2017. $* \, p < 0.10$, $** \, p < 0.05$, $*** \, p < 0.01$.

Table 3: Hires, Separations, and Tariffs

Variable	Hires	Separations
Import Protection	0.469	0.156
	(1.540)	(1.511)
Export Retaliation	-5.190	13.155***
	(9.385)	(4.350)
Rising Input Costs	-17.351**	3.369
	(6.336)	(2.160)
Industry Fixed Effects	yes	yes
Quarter Fixed Effects	yes	yes
Number of Industries	76	76
Observations	836	836

Sources: U.S. Census Bureau; authors' calculations.

Notes: Table displays coefficient estimates and standard errors of the Finkelstein (2007) approach applied to quarterly equivalent of equation (6). Results are weighted by employment as of December 2017. Standard errors (in parentheses) are clustered by 3-digit NAICS industry. $*\ p < 0.10$, $**\ p < 0.05$, $***\ p < 0.01$.

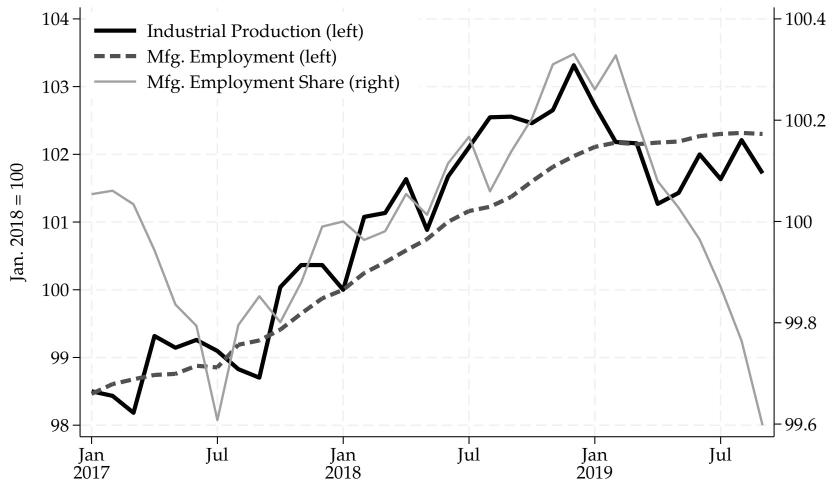
Table 4: Point Estimates of Cumulative Effect by Channel: Labor Market Measures

Variable	Unemployment Rate (1)	Unemployment Rate (2)	Labor Force Participation (3)	Labor Force Participation (4)
Import Protection	9.76*	9.95*	0.47	0.47
	(5.48)	(5.85)	(0.72)	(1.11)
Export Retaliation	51.67*	52.70*	1.42	0.98
	(31.08)	(29.93)	(3.16)	(3.48)
Rising Input Costs	64.18***	64.08**	-8.57***	-9.01***
	(17.81)	(27.10)	(2.60)	(2.23)
Manufacturing Share Controls	yes	yes	yes	yes
County Fixed Effects	yes	N.A.	yes	N.A.
Month Fixed Effects	yes	yes	yes	yes
Number of Counties	3,131	N.A.	3,131	N.A.
Number of Industries	N.A.	250	N.A.	250
Observations	103,323	8,250	103,323	8,250

Sources: U.S. Department of Labor, Bureau of Labor Statistics; authors' calculations.

Notes: Columns (1) and (3) display results of the Finkelstein (2007) approach described in equation 7, based on OLS regressions of unemployment or labor force participation rates on measures of exposure to the rising input cost, import protection, and export retaliation channels of tariffs. Columns (2) and (4) are the equivalent regressions translated to a shock-level (industry) basis following Borusyak et al. (2021). Estimates are weighted by December 2017 labor force. Standard errors (in parentheses) are clustered at the state-level in columns (1) and (3), and NAICS-3 level in columns (2) and (4). $* \ p < 0.10$, $** \ p < 0.05$, $*** \ p < 0.01$.

Figure 1: Measures of Manufacturing Activity: Jan. 2017 to Sep. 2019

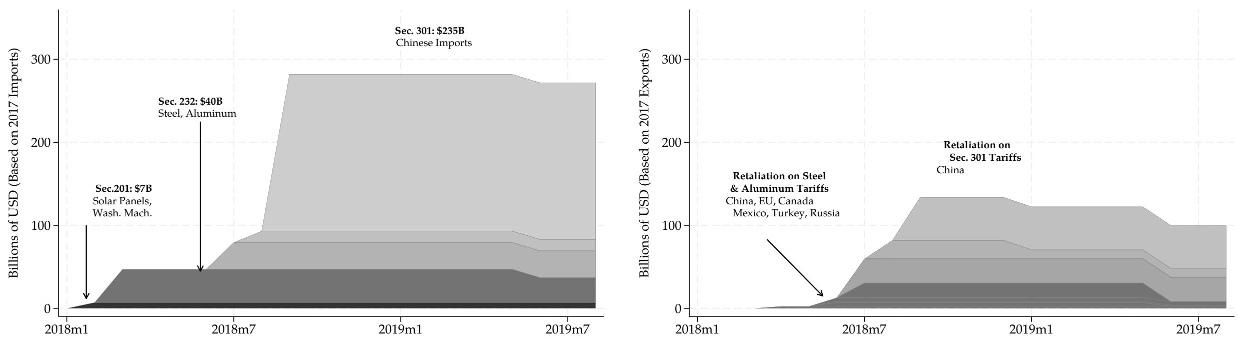


Sources: Federal Reserve Board (FRB) for industrial production; U.S. Department of Labor, Bureau of Labor Statistics for employment.

Notes: Figure displays manufacturing industrial production, manufacturing employment, and the manufacturing share of private employment, each indexed to be 100 in January 2018.

Figure 2: Timeline of New Tariffs Imposed: 2018-2019

(a) New U.S. Import Tariffs **(b)** Retaliatory Tariffs on U.S. Exports

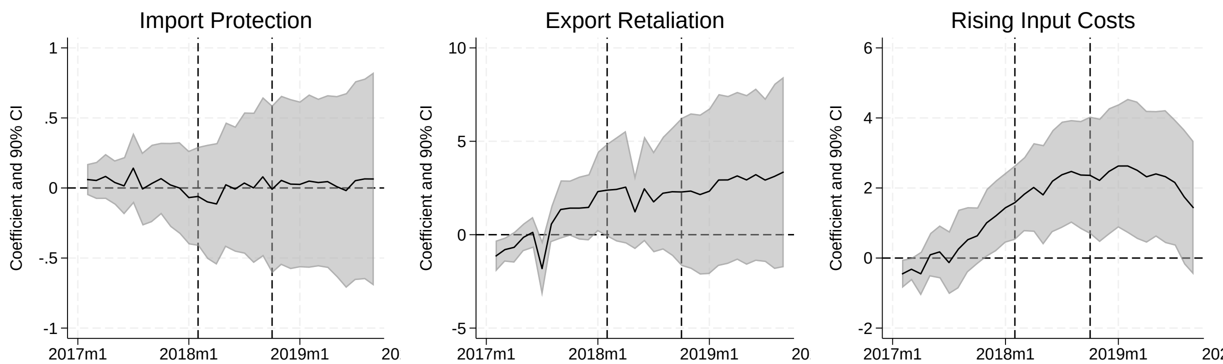


Sources: United States International Trade Commission (USITC) for 2017 import and export values.

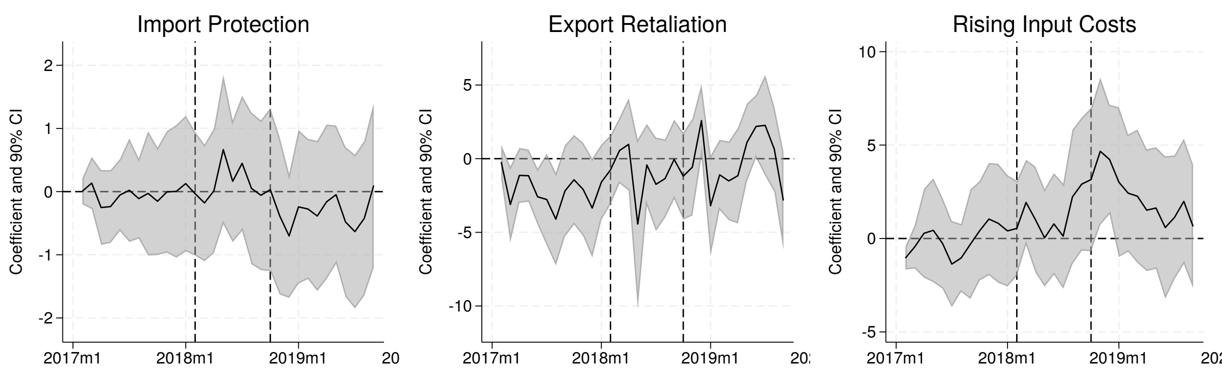
Notes: See Tables B1 and B2 for details on the set of relevant products and trade values. In Panel (2a), the decline in mid-2019 reflects Canada and Mexico being removed from the steel and aluminum tariffs.

Figure 3: Effects of Cumulative Tariffs, Non-Detrended Outcome Variables

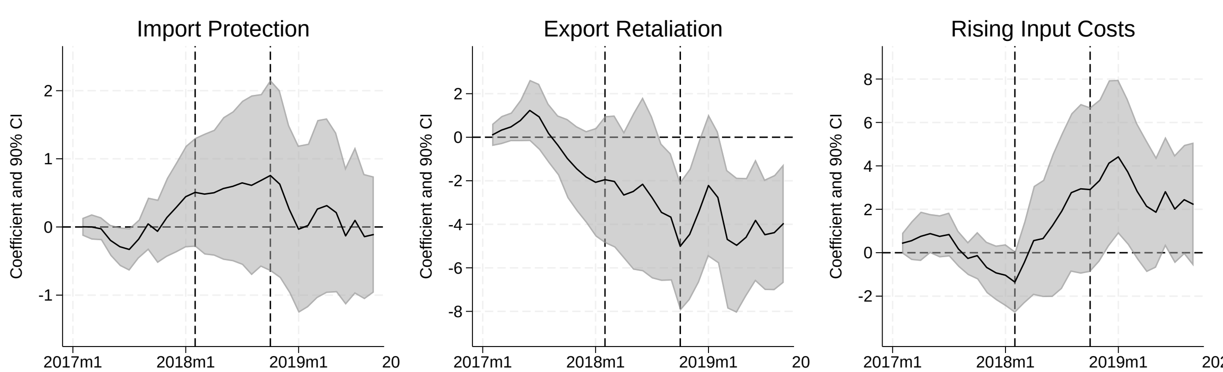
(a) Employment



(b) Industrial Production (Output)



(c) Producer Price Index

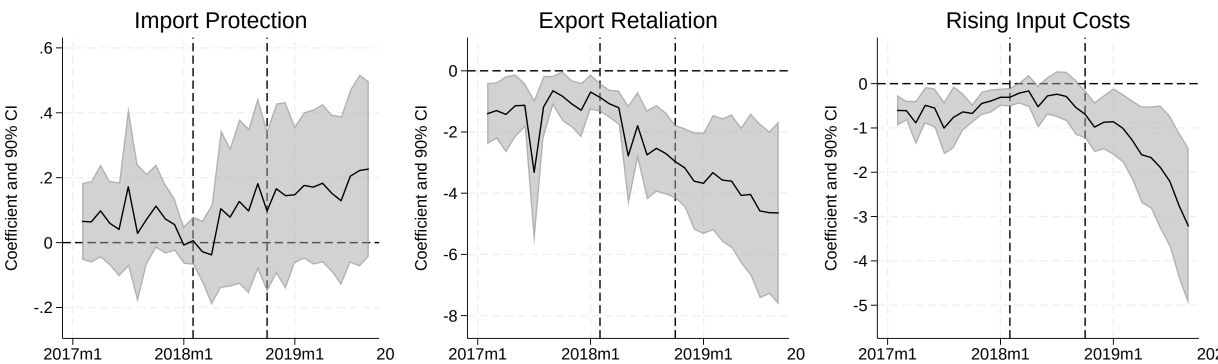


Sources: Federal Reserve Board (FRB), U.S. Department of Labor, Bureau of Labor Statistics; authors' calculations.

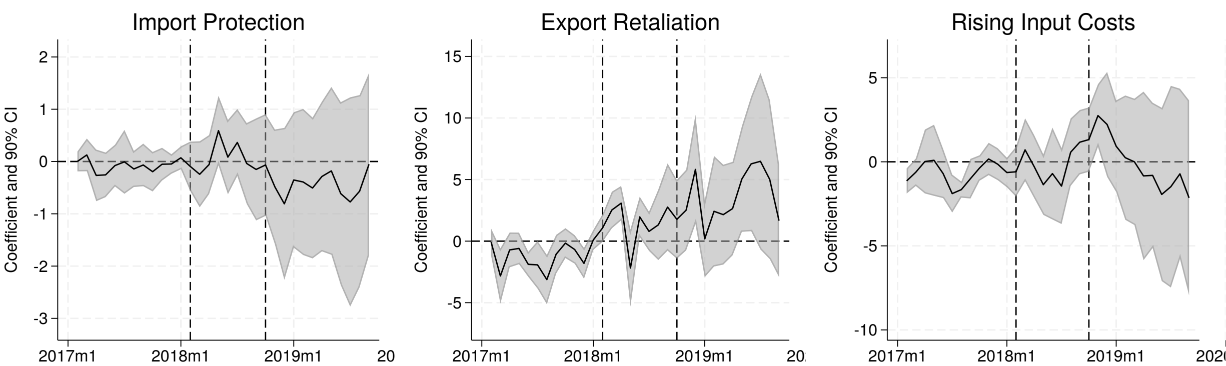
Notes: Each panel displays results of a separate regression for the noted dependent variable, with each column corresponding to the three tariff channels in equation (6). Solid lines indicate coefficient estimates and shaded areas represent 90 percent confidence intervals. The two vertical dashed lines are at February 2018 and September 2018, the times of the first and last waves of 2018 tariffs we study. Estimates for employment are weighted by December 2017 employment and estimates for industrial production and producer prices are weighted by December 2017 value added. Standard errors are clustered at the three-digit NAICS level.

Figure 4: Effects of Cumulative Tariffs (Detrended)

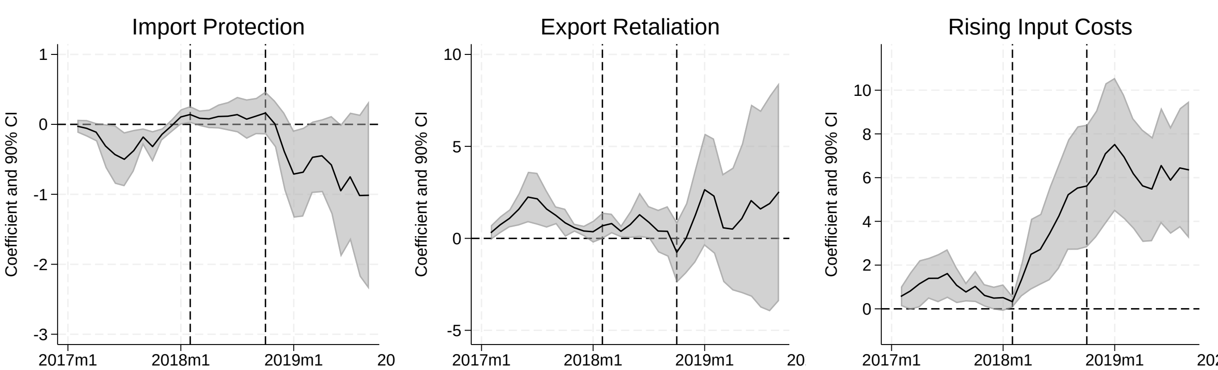
(a) Employment



(b) Industrial Production (Output)



(c) Producer Price Index



Sources: Federal Reserve Board (FRB), U.S. Department of Labor, Bureau of Labor Statistics; authors' calculations.

Notes: Each panel displays results of a separate regression for the noted detrended dependent variable, with each column corresponding to the three tariff channels in equation (6). Solid lines indicate coefficient estimates and shaded areas represent 90 percent confidence intervals. The two vertical dashed lines are at February 2018 and September 2018, the times of the first and last waves of new 2018 tariffs. Results are weighted by December 2017 employment (for employment regression) or value added (for IP and producer prices). Standard errors are clustered at the three-digit NAICS level.