Importers Big and Small: The Heterogeneous Impacts of U.S.-China Tariffs on Sourcing and Prices*

Beata Javorcik†

Justin Pierce‡

Emily Wisniewski§

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Abstract

This paper studies how importing firms adjust to the 2018-19 U.S. tariffs on Chinese goods. Rather than focusing solely on imports the U.S. continues to source from China, our approach captures changes in unit values and sourcing behavior as heterogeneous importers reallocate purchases across countries. After an initial tariff-driven increase in unit values for all importers, the higher costs persist only for small importers, while prices paid by big importers fall below pre-tariff levels. The more benign adjustment for big importers is driven by lower unit values in arm's-length imports from China and by less costly reallocation to alternative source countries, reflecting their broader supplier networks and more established international operations.

JEL classifications: F13, F14, F15

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†University of Oxford, European Bank for Reconstruction and Development, and CEPR; beata.javorcik@economics.ox.ac.uk

‡Federal Reserve Board; justin.r.pierce@frb.gov

§U.S. Census Bureau; emily.m.wisniewski@census.gov

1 Introduction

The 2018-19 U.S. tariffs on Chinese goods generated a large and sudden disruption to global supply chains. A growing literature has documented their effects on trade flows and prices. Initial studies focus on changes in the price of imports from China and find a somewhat puzzling result: Despite the scale of the shock, there is little evidence that pre-tariff import prices declined, suggesting limited scope for foreign exporters to absorb the tariff burden (see the literature review by Fajgelbaum and Khandelwal, 2022). This finding is difficult to reconcile with standard models in which large importing countries exert market power in international trade.

In this paper, we revisit this puzzle through the lens of firm heterogeneity. We argue that the aggregate evidence masks substantial differences across importing firms in their ability to adjust prices and sourcing in response to tariffs. Using firm-product-level data covering the universe of U.S. imports, we examine how firms adjust along multiple dimensions—prices, sourcing patterns, and trade volume—and how these responses vary with a firm's importance in the import market for a given product. Specifically, we distinguish between firms that account for a large share of imports of a product (big importers, hereafter) and those that do not (small importers, hereafter), capturing differences in sourcing behavior at the firm-product level rather than the overall firm size. Thus, our approach aligns with the emerging literature that uses disaggregated data to more finely estimate effects of changes in Chinese import prices due to tariffs (Alviarez et al., 2023; Ignatenko, 2026; Ganapati and Hottman, 2026; Flaaen et al., 2025), but we extend this work by considering how firms adjust their sourcing across countries and take steps to mitigate risks in their supply chains. We argue that differences in supply chain reallocation are an important feature of heterogeneous responses to tariffs, and that they contribute to the observed changes in prices.

Moreover, we point out that the effects of tariffs on import prices are not captured by the effects on Chinese import prices alone, which are necessarily identified from trade flows that U.S. importers choose to continue to source from China. A novel contribution of our paper is an examination of changes in *overall* import prices as tariff-exposed importers shift sourcing away from China toward other, potentially higher-cost source countries. With the substantial reallocation in U.S. imports from China toward other countries, like Vietnam and Mexico, a firm may pay higher unit values for its overall imports before tariffs, even if prices from any given country remain the same. To our knowledge, our paper is the first to provide estimates of the effects of this type of reallocation, while also providing a detailed picture of how importers' cross-country sourcing behavior adapts over time in response to tariffs.

Our empirical strategy exploits variation in tariff exposure across firms importing a

given product (firm-product pairs, or simply pairs, hereafter) arising from differences in pre-tariff reliance on Chinese imports and product-level tariff changes. Focusing on within-pair changes over time and controlling for product-specific shocks, we isolate the impact of tariffs on prices and sourcing decisions. The granularity of the data allows us to distinguish firms by their importance in overall U.S. product-level imports—i.e. big versus small importers—as well as between arm's-length and intra-firm transactions, alleviating concerns related to transfer pricing.

Our starting point is the response of import prices, measured by average unit values at the firm-product-year or firm-product-country-year level.[1] Immediately after the tariffs are imposed, both big and small importers experience an initial increase in overall tariff-exclusive unit values during a period of abrupt changes in source countries that we refer to as "the scramble." After the scramble, the paths of big and small importers quickly diverge, with big importers adapting to the high-tariff environment more quickly and completely than small importers. In particular, unit values drop to *below* pre-tariff levels for big importers, while remaining *persistently elevated* for small importers.

This gap arises partially from big importers paying lower tariff-exclusive prices on imports from China—consistent with larger importers exercising bargaining power over suppliers—and partially because smaller importers have to pay higher prices as they shift imports to non-tariffed countries. Big importers do not experience these price increases on imports from non-tariffed countries, likely because of their more extensive sourcing networks. We show that big importers already sourced the average product from multiple countries, whereas the average small importer sourced a given product from a single country prior to the tariff increase.

The finding of persistently higher tariff-exclusive unit values for small importers highlights a cost of tariffs that has not been discussed in the pass-through literature: Not only do small importers' tariff-exclusive prices on imports from China fail to decline, their overall tariff-exclusive unit values across all countries actually rise. Thus, trade-policy shocks do not merely change sourcing, they also redistribute competitive advantage toward dominant firms.

When we zoom in on firms' sourcing decisions, we find substantial reallocation of imports away from China and toward other countries, particularly in Asia and Latin America, consistent with the findings of prior work. In addition, exploiting our granular data, we show that

[1] We use the terms prices and unit values interchangeably for ease of exposition, but there are important differences between the two. Unit values can change due to shifts in the composition of varieties of a given product, even if prices of individual varieties do not change. Relative to studies using aggregate public data (Amiti et al., 2019; Fajgelbaum et al., 2020), our focus on the varieties of a given ten-digit Harmonized Tariff Schedule product imported by a given firm are less prone to changes in variety composition over time. However, they are not as finely measured as the detailed prices of varieties used in papers such as Flaaen et al. (2025) or Cavallo et al. (2025).

this reallocation is accompanied by increased diversification of sourcing at the firm-product-level. However, these aggregate patterns again mask important differences across firms. Big importers expand their set of sourcing countries and reduce concentration across suppliers, while maintaining—or even slightly lowering—their overall unit values. Small importers primarily reallocate across a limited set of countries, without expanding their sourcing base, leading to higher average unit values.

These adjustments have other costs. We document a decline in the overall value of imports in response to tariffs, indicating that trade destruction accompanies trade diversion. In other words, the reallocation of trade shares toward other countries in response to tariffs does not fully offset the decline in imports from China. Moreover, small importers are more likely to cease importing from China altogether, consistent with tariffs imposing binding constraints on their sourcing strategies. Taken together, the evidence suggests that while tariffs induce firms to diversify their supply chains, the costs of adjustment fall disproportionately on smaller importers.

Our paper contributes to the growing literature on the implications of the 2018-19 U.S.-China trade tensions. First, our work relates to the foundational studies of the pass-through of tariffs to import prices by Amiti et al. (2019), Fajgelbaum et al. (2020), and Cavallo et al. (2021), which are reviewed by Fajgelbaum and Khandelwal (2022). Those papers, which use more aggregated country-product-level data find that U.S. firms and consumers bore the full burden of the tariffs. We contribute to this strand of research by showing that while, in aggregate, there was no medium-term response of unit values to the tariff shock, big and small importers adjust differently, with big importers able to obtain lower prices from Chinese suppliers and easily shift imports to other source countries, neither of which small importers were able to do.

In this sense, our analysis is closely related to a more recent set of papers that use disaggregated data or different estimation strategies to estimate pass-through to Chinese import prices. These papers have typically found incomplete pass-through once a variety of product, firm, or transaction-level factors are considered. Ganapati and Hottman (2026) highlight the role of quantity discounts in transaction-level prices and note that tariffs have been associated with smaller transaction sizes. As a result, when adjusting for the loss of transaction-level scale economies, they estimate that "scale-free" pass-through was around 60 percent, on average. One possible explanation for the differential results for big and small importers we find is that larger importers maintain larger transaction sizes, thus maintaining quantity discounts. But this is not the whole story, as we find that big importers are better able to diversify their supplier base than small importers, with significant implications for the prices they pay. Flaaen et al. (2025) focus on the case of the U.S. wine market, and when considering narrowly defined products with precisely measured prices, they find incomplete—

though still substantial—pass-through at the border of around 80 percent.[2] Soderbery and Tobias (2025) separate products into "regimes" of pass-through, documenting heterogeneity across products. Our approach, by contrast, highlights the role of importer heterogeneity within products.[3]

Among these papers, Alviarez et al. (2023) is most closely related to our own. In that paper, the authors develop a framework of bargaining in firm-to-firm trade in which two-sided market power affects markups and pass-through elasticities. A key aspect of the framework in Alviarez et al. (2023) is that buyer and seller market power is based on their share of purchases or sales *within a fixed buyer-seller network*. That is, a buyer has greater market power, and hence lower pass-through, when it accounts for a larger share of a supplier's sales.[4]

Several important features set our paper apart from Alviarez et al. (2023). First, in our setting, an importer's size—and whether we characterize it as big or small—is determined by an importer's share of the overall U.S. import market for a good. Thus, it represents the presence of market power that is likely to persist even if the buyer-seller network changes.[5] In this sense, our finding that big importers see incomplete pass-through indicates that buyers' market power can come from their importance in the overall U.S. market, not only their importance in their existing supplier network. Second, our focus on responses of changes in overall unit values paid by buyers as they shift imports across suppliers and source countries provides estimates of broader effects of tariffs on import prices that cannot be captured by a narrow focus on pass-through of tariffs for imports that continue to come from China. Third, we provide estimates of the dynamic response of importers for a broad range of sourcing activities as they adapt to tariffs over time, whereas the fixed network approach in Alviarez et al. (2023) is more amenable to estimating short-term static pass-through elasticities.

Our paper also speaks to the literature documenting the massive reallocation of U.S. imports across source countries and supplier firms since tariffs began to be imposed (Nicita,

[2] A group of papers also document differences in pass-through from the border to retail prices (Flaaen et al., 2020; Cavallo et al., 2021; Alvarez-Blaser et al., 2025; Flaaen et al., 2025; Amiti et al., 2026).

[3] Other papers, including Berman et al. (2012) and Freeman et al. (2025), document heterogeneity in responses of firms of different productivity levels or sizes to changes in exchange rates and Brexit, respectively, with the latter finding that large firms tended to be less harmed by the effects of leaving the EU's single market and customs union.

[4] A foundational group of papers provides a deep exploration of other aspects of buyer-seller market power in international trade, including Morlacco (2019) (the relevance of buyer productivity and size in exercising market power as French manufacturers purchase inputs), Ignatenko (2026) (price discrimination by sellers against buyers with fewer outside options, using data for Paraguay), and Alviarez et al. (2025) (appropriate measures of concentration to capture market power in Colombian trade data).

[5] Another way of thinking about this difference is that holding the buyer-seller network fixed captures market power over the short run, if costs of switching buyers and sellers are substantial (Monarch, 2022; Heise, 2024). Our measure based on the share of overall market size captures a longer-run concept of market power.

2019; Bown, 2022; Freund et al., 2024; Alfaro and Chor, 2023; Handley et al., 2024).[6] Alfaro et al. (2025) examines the role of specialized banks in aiding reallocation and expansion across countries and suppliers, and Graziano et al. (2024) examine the extent to which Chinese multinationals have moved production to other countries in response to tariffs. Our contribution to this body of work lies in examining diversification in supply patterns at the firm-product level, using the universe of US trade transactions. The greater detail available in our data also allows us to document differential adjustments made by small and big importers, thus pointing out distributional consequences of tariffs across firms of different sizes.

Lastly, our paper also relates to the broader literature on the implications of the 2018-19 tariffs for the US economy. Flaaen and Pierce (2026) investigate the impact of the tariffs on manufacturing employment at the industry level and find that the US tariffs on China are associated with relative declines in US manufacturing employment due to rising imported input costs and export retaliation, which more than offset the gains from import protection. They also document an increase in domestic producer prices due to tariffs that is again driven by higher input costs. Javorcik et al. (2025) find evidence that both tariffs on imported inputs and retaliatory tariffs lead to a relative decline in online job postings in affected commuting zones. The effects of imported input tariffs are stronger for lower skilled postings than for higher skill postings and for part-time than full-time jobs. They do not find any evidence of positive impacts of import protection on job openings. Their estimates suggest that the tariffs led to a combined effect of 137,000 fewer job postings in 2018, or 0.5 percent of the US total. These patterns are echoed in the work of Goswami (2020), who shows that commuting zones subject to higher retaliatory tariffs experience lower employment growth, with no effects found from import protection, and in the work of Waugh (2019), who concentrates specifically on the retaliatory Chinese tariffs and shows that retaliatory tariffs lower sales of motor vehicles in affected areas.[7] A complementary strand investigates the impacts of the tariffs on firms' financial performance, finding negative effects for stock returns and investment (see Huang et al., 2023; Amiti et al., 2020).[8]

The remainder of the paper proceeds as follows. Section 2 describes the evolution of U.S. tariffs on imports from China, and outlines the data and empirical strategy. Section 3 presents the main results highlighting differences between big and small importers. Section 4 reports aggregate import-value-weighted estimates, Section 5 discusses a series of robustness checks, and Section 6 concludes.

[6] By contrast, Grouws et al. (2026) examines the reallocation of Chinese exports and its implications for import prices in bystander countries.

[7] Blanchard et al. (2024) and Autor et al. (2024) examine the effect of the 2018-19 tariffs on elections, with the latter considering the employment effects of both U.S. import and retaliatory tariffs.

[8] On the China side, Chor and Li (2021) also show how the U.S. tariffs lowered industrial activity of Chinese firms.

2 Background, Data, and Empirical Strategy

This section discusses the rollout of the 2018-19 U.S. tariffs on China, describes the data we use in our analysis, and presents our empirical strategy.

2.1 Background and Data on US-China Trade Tensions and Tariffs

Following a Section 301 investigation into intellectual property and technology transfer practices in China, the U.S. began imposing historically large tariffs on imports from China, starting in 2018. New 25 percent tariffs covering around 50 billion dollars of imports were imposed in July and August of that year, with new 10 percent tariffs covering 200 billion dollars of imports imposed in September following Chinese retaliation. As U.S.-China trade tensions continued into 2019, rates on the previous September's round of tariffs were boosted to 25 percent in May, and an additional 160 billion dollars of goods were subjected to new 15 percent tariffs in September 2019. The "Phase One" agreement between the U.S. and China in February 2020 lowered rates on the September 2019 tranche of tariffs to 7.5 percent, and halted new tariffs, while leaving existing tariffs in place. See Flaaen and Pierce (2026) for additional details.

We use product-level tariff data collected by Bown and Kolb (2025), augmented with information from Flaaen and Pierce (2026) and Javorcik et al. (2025) to track new U.S. tariffs on imports from China over time. As discussed in Section 2.3, these data measure variation in tariffs across products and over time, which allows us to capture the longer-term adjustment of U.S. importers to tariffs.

2.2 Data

2.2.1 Primary Sources

Our primary dataset is the U.S. Census Bureau's (Census) Longitudinal Foreign Trade Transaction Database (LFTTD), which captures the universe of U.S. international trade transactions. Our focus is on the U.S. import data, which record the value, quantity, ten-digit Harmonized Tariff Schedule (HTS) product code, country of origin, related party status, and, importantly, a longitudinal identifier for the importing firm. The data begin in 1992, and our data extend through 2021.

We link the LFTTD trade data with Census's Longitudinal Business Database (LBD), which records the six-digit NAICS industry code, employment, and payroll for the establishments of essentially all U.S. private employers.[9] We use data from the LBD to classify firms by their primary sector of operation.

[9]The LBD excludes employment in agriculture and forestry. For industry classification, we use the time-consistent NAICS codes from (Fort and Klimek, 2016).

Our unit of analysis is a firm-product pair, which is the level of aggregation best suited to examining the implications for firms' sourcing activities as they reallocate imports across countries in response to tariffs. Products are defined at the ten-digit HTS level (HTS10). Because HTS10 codes change over time, we use an updated version of the concordances from Pierce and Schott (2012) to create time-consistent product codes.[10]

2.2.2 Measures of Pair-Level Sourcing Behavior

In the empirical analysis that follows, we examine the relationship between tariffs and a range of measures of firm-product level (hereafter, referred to as pair) sourcing behavior. Here, we define these measures of sourcing behavior, which we categorize into several groups. Summary statistics for all variables are provided in Section A of the appendix.

Unit values: The first group of measures captures the Average Unit Value (AUV) a given importer pays for its imports of a particular product:

$$AUV_{fht} = \frac{imp_{fht}}{qty_{fht}} \tag{1}$$

where imp_{fht} is the value of imports for firm f importing product h at time t and qty_{fht} is the quantity imported. This proxy for price is useful for determining tariff pass-through and shedding light on whether a pair must pay higher unit values as it reallocates trade away from China in response to tariffs. We note that AUV_{fht} is defined exclusive of tariffs.

We will also consider several AUV measures distinguishing between related-party and arm's-length transactions and separately considering imports coming from China and the ROW.

Reallocation: The second group of measures examines the extent of reallocation of U.S. imports across source countries in response to tariffs. These measures are simply the share of a pair's imports coming from particular countries or sets of countries (e.g. the share of imports from China, Asia excluding China, etc.):

$$Country\ Share^{c}_{fht} = \frac{imp_{fhct}}{\sum_{c \in C} imp_{fhct}}. \tag{2}$$

[10]Without incorporating these time-consistent product codes, there can be discrete jumps in measures of firms' sourcing behavior at the time of revisions to the U.S. Harmonized Tariff Schedule or to the World Customs Organization's six-digit Harmonized System product classifications.

Risk Reduction: The third group of measures of sourcing behavior pertains to activities that might be associated with reducing risk in firms' supply chains or increasing supply chain resilience. This group includes a Herfindahl index of pairs' imports across source countries:

$$Herf_{fht} = \sum_{c \in C} (\frac{imp_{fhct}}{imp_{fht}})^2. \tag{3}$$

This traditional measure is useful for measuring the extent of a pair's concentration or diversification across source countries, and therefore the extent to which a pair's sourcing may be subject to risk of tariffs on a particular country.[11]

Another risk reduction measure is the share of imports coming from "related parties," i.e. from overseas affiliates. Census considers firms to be related if either party owns, controls, or holds voting power equivalent to 6 percent of the outstanding voting stocks or shares of the other firm (Heise et al., 2025). Importing from affiliates may become more desirable given the possibility of tariffs if imports from affiliates are easier or faster to adjust or less subject to disruption than imports from unaffiliated "arm's length" suppliers. In addition, importing more from affiliates may allow for greater leeway to use transfer pricing to reduce tariff burden. We measure a pair's involvement in related party trade as the share of its imports sourced from related parties:

$$Related\ Party\ Share_{fht} = \frac{imp^{rp}_{fht}}{imp_{fht}}. \tag{4}$$

A third measure of "risk reduction" activities is simply the count of the number of countries from which a pair sources an input. Increasing the number of countries increases the possibility of avoiding country-specific tariffs. It provides a measure of extensive margin diversification that complements the Herfindahl measure of equation 3, which captures both extensive and intensive margin diversification.

Broader effects: The final measure is the total value of imports for the pair. Examining effects on the total value of imports shows whether any reallocation away from China simply leads to a diversion of trade or instead leads to trade destruction (Bown and Crowley, 2007).

[11] Note that this measure of source country concentration differs from that used by Handley et al. (2024), which is based on the number of supplier firms, across all countries, aggregated across all U.S. importers of a given product. That measure offers a general measure of the risk associated with the failure of a single supplier. Our measure (equation 3), by contrast, measures risks of source-country-specific factors, like tariffs, and is defined at much more disaggregated level, i.e. for each firm importing each product. In addition, we treat our measure as a decision variable that could be influenced by tariffs.

2.2.3 *Defining Importers Big and Small*

We define a firm importing a given product as a big importer if its import value in 2017 is at or above the 90th percentile of firms importing the product. Small importers are those whose 2017 import values are below the 90th percentile. We note three features of this definition. First, this measure is an indicator for a firm's importance in the import market for a given product, which is the relevant measure of interest for our research questions, particularly when we examine the possibility of importers exercising market power with their foreign suppliers. While this measure may be correlated with firm size, it is not necessarily the case that big importers are large firms in terms of their U.S. employment, revenue, profit, etc. Second, and relatedly, because the measure is defined based on a firm's importance in product-level imports—rather than overall firm level imports—a firm may be a big importer of one product, but a small importer of another. Third, the 90th percentile threshold is necessarily somewhat arbitrary, but we show below that our estimates are robust to changes in this cutoff in either direction.

2.3 Empirical Strategy

To examine how U.S. importers' sourcing behavior responds to the imposition of tariffs, our baseline estimating equation is a straightforward long-differenced specification,

$$\Delta y_{fh,2017:t} = \alpha + \beta \Delta Tariff_{fh,2017:t} + \gamma_h + \epsilon_{fh}, \tag{5}$$

where the dependent variable is the change, from 2017 to year t, in one of the pair-level (specific to firm f and product h) measures of sourcing behavior described above. We estimate this equation separately for t=2018,..., 2021 to capture responses and adaptations to tariffs over increasingly longer time horizons. The independent variable of interest is the change, over the same period, in the import-value-weighted average tariff across all countries from which firm f imports product h in year t. While the tariffs themselves are time varying, the weights are based on product and mix of source countries in 2017:

$$Tariff_{fht} = \sum_{c \in C} \frac{imp_{fhc,2017}}{imp_{fh,2017}} * Tariff_{cht}. \tag{6}$$

This continuous "treatment" variable increases in the tariff applicable to a given product and the firm's reliance on importing this product from China in the pre-tariffs period. Thus, to experience an increase in tariffs, a firm must have imported a given product from China in 2017 (the year before the tariffs were put in place) and the product must be covered by

U.S. Section 301 tariffs.

While our estimating equation is simple, it controls for many potential confounding factors. The within-pair long differences net out any time-invariant characteristics associated with a particular firm's sourcing of a particular product. Product-level fixed effects, γ_h, control for shocks that have common effects on the sourcing characteristics of all firms importing a given product in the period considered. Key among these are demand shocks associated with the Covid-19 pandemic, which occurs during our sample period. It's well known that the pandemic led to substantial changes in the composition of goods demanded, and that high demand combined with constrained supply for certain products led to changes in firms' sourcing patterns (Arriola et al., 2021). Product fixed effects control for these changes in demand across products. In addition, changes in sourcing patterns that are common to all products, such as changes in technology that allow for easier coordination of imports across countries are captured in the constant. Splitting the sample between big and small importers, as we do in a large portion of this analysis, further allows each of these effects and controls to differ across importer size.

There are important differences between our approach and those used in the canonical papers examining the effects of tariffs on import prices (Amiti et al., 2019; Fajgelbaum et al., 2020). First, we focus on a different level of aggregation—the firm-product-level—rather than the country-product-level, though we will consider firm-product level outcomes pertaining to imports coming from China and from the rest of the world separately. Second, because our measure of tariff-exposure is based on a firm-product-pair's distribution of imports across countries in 2017, it accounts only for effects on unit values of continuing pairs; we separately examine the relationship between tariffs and exit, both overall and from specific markets. The third key difference is that we are able to distinguish between within-firm and arm's-length transactions, which allows us to examine transactions that are uncontaminated by transfer pricing.

3 Results

In this section, we present our primary empirical results from estimating equation 5. We begin with an examination of the relationship between tariff exposure and the average unit values paid by U.S. importers of different sizes, followed by complementary analysis of the supply chain readjustment associated with tariffs.

3.1 Unit values: Importers Big and Small

Among papers studying U.S. tariffs imposed since 2018, the effect on U.S. import prices has received the most attention, which is unsurprising given its importance to determining

effects on country-level welfare and its overall relevance to policymakers, firms, and households. The first generation of papers estimating this tariff pass-through uncovered a puzzling finding (Amiti et al., 2019; Fajgelbaum et al., 2020): Despite the massive size of the U.S. market, tariff-exclusive import prices did not fall with tariffs, implying that tariffs were fully passed through to U.S. firms and consumers. This paper is part of a more recent generation (Alviarez et al., 2025; Ganapati and Hottman, 2026; Flaaen et al., 2025) that focuses on more disaggregated firm-level data, which allows for finer measurement and consideration of different variation in the data.

Several features of our approach offer information about the effects of tariffs on import prices that is not available elsewhere, including in this more recent generation of papers. First, we begin by estimating the relationship between an importer's tariff exposure and the overall average unit value it pays on imports from all source countries. This focus accounts for the effect of an importer switching away from China to a potentially higher-cost source country, in order to avoid tariffs, and it differs from the existing literature, which focuses on the change in prices for goods that importers continue to source from China. It also represents an important distinction given the substantial reallocation of U.S. imports away from China and toward other sources, which we discuss further below. Second, we use the information on related party status in our confidential data to determine the extent to which changes in import prices are due to related party transactions—which may be influenced by transfer pricing—versus arm's length transactions. And third, we revisit the standard results on pass-through of tariffs to Chinese import prices through the lens of firm heterogeneity, focusing on an aspect of heterogeneity—importer size—that is central to many aspects of firm behavior in international trade (Bernard and Jensen, 1999; Bernard et al., 2003; Melitz, 2003). Namely, we posit that firms importing large volumes of a particular product would have seen a different evolution of prices than smaller importing firms.

3.1.1 Overall AUVs

Panel (a) of Figure 1 reports estimates of the relationship between tariff changes and the overall average unit value at which a given firm imports a particular product from all of its source countries. In each panel of this and subsequent figures, we denote the results for the subsample of big versus small importers with red and blue, respectively. As we consider, separately, changes between 2017 and each of the subsequent years, the estimates depicted in Figure 1 capture cumulative effects.

The trajectory of the response is quite striking: the overall average unit values *excluding tariffs* see a very large upward jump immediately after the introduction of tariffs, both for big and small importers. In particular, a one standard deviation increase in tariffs—11 percentage points—is associated with an increase in tariff-exclusive average unit values in

2018 of 10 percent for small importers and 3.5 percent for big importers.[12] As we will discuss further below, these estimates are characteristic of an initial period of drastic changes by U.S. importers in terms of source countries and diversification across sources that we refer to as "the scramble." The relatively large standard errors for the 2018 estimates—though still signaling statistical significance—may also be due to the fact that the tariffs came into effect only in the second half of the year, with the largest wave of tariffs being introduced in September.

It's worth pausing here to consider the takeaway from this positive relationship between tariffs and overall tariff-exclusive unit values. The canonical literature on tariff pass-through highlights welfare losses accruing to the U.S. because tariff-exclusive unit values on imports from China did not change, implying that tariffs were being paid by U.S. firms and households. Our results indicate a further cost of tariffs: Tariffs also led to a reallocation of U.S. imports toward likely higher-cost source countries, such that overall tariff-exclusive average unit values actually *rise*. This implication of tariffs cannot be observed with the data and empirical approaches used in other studies of tariff pass-through.

Returning to the figure, and examining estimates for subsequent years, the differing magnitudes for big and small importers provide the first indication of heterogeneous effects by importer type: Small importers see price increases due to tariffs that are nearly three times as large as those faced by their bigger counterparts. While average unit values drop substantially for both types after the scramble period, the difference between them persists. Average unit values dip slightly *below* pre-tariff levels in the big importer subsample, while remaining elevated in the small importer subsample.

While the confidence intervals for big and small importers do not overlap in any year in the top panel of Figure 1, indicating that they are likely statistically different from one another, these estimates are from separate samples of big and small importers. To formally test for whether the responses to tariffs of big and small importers are statistically different, Appendix Section C also reports estimates based on the full sample and estimation of an equation with an additional interaction term of an indicator for big importers and the change in tariffs:

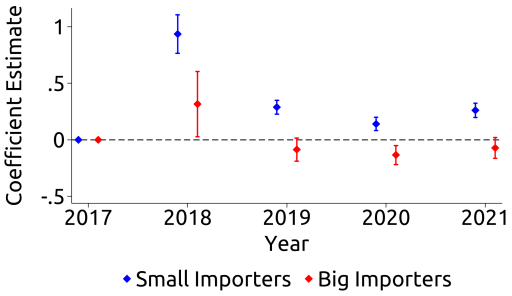
$$\Delta y_{fh,2017:t} = \alpha + \beta \Delta Tariff_{fh,2017:t} + \phi \Delta Tariff_{fh,2017:t} * Big_{fh} + \gamma_h + \epsilon_{fh}. \tag{7}$$

As shown in Figure C1, estimates for big and small importers in panels (a) and (c) of Figure 1 are, indeed, statistically different from one another, as evidenced by the coefficient on the interaction term being negative and statistically significant at the 1 percent level over

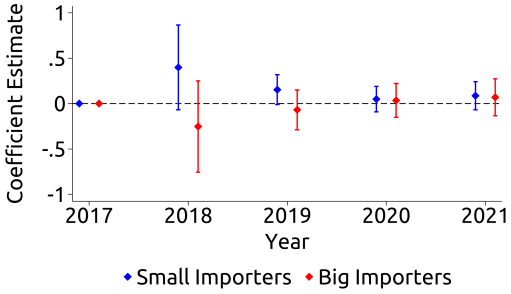
[12]The standard deviations of tariff exposure for the big and small importer sub-samples are 10.9 percent and 11.0 percent, and their means are 6.7 percent and 5.9 percent, respectively.

every interval.

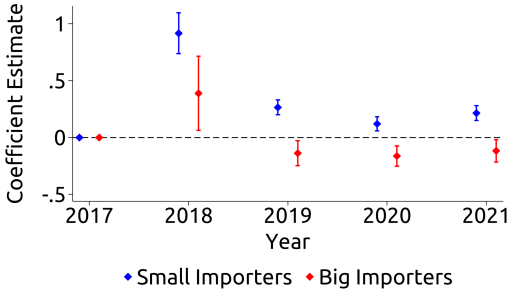
Figure 1: Average Unit Values: Big vs. Small Importers



(a) Average Unit Value



(b) Related Party AUV



(c) Arm's Length AUV

Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays unweighted OLS coefficient estimates and 95 percent confidence intervals for the change in the noted dependent variable on firm-product-pair-level exposure to tariffs for big (red) and small (blue) importers. Each end year for a given dependent variable and importer size is a separate regression. Regressions include product fixed effects and standard errors are clustered at the product-level.

Next, we examine how the relationship between tariffs and average unit values differs between related or arm's length transactions for each type of importer. This question is interesting in its own right, as it sheds light on the role foreign affiliates play in redirecting trade. The additional advantage of this analysis is the ability to distinguish between the type of transactions that may be affected by transfer pricing undertaken to alleviate the tariff burden (related party) versus transactions that are unlikely to be affected by transfer pricing (arm's length). As evident from panel (b) of Figure 1, unit values in related-party transactions do not respond to the tariffs, and there is no difference in this respect between the two groups. The picture changes considerably when we consider the trajectory of unit values in arm's-length transactions (panel c). These transactions mirror the evolution of the overall unit values, with a large jump in response to the tariffs during the scramble period followed by AUVs for big importers returning to their pre-tariff levels, while those for small

importers remain elevated. These results, therefore, largely rule out the possibility that differences in AUV responses for big and small importers could be driven by differences in the ability to mitigate tariffs through transfer pricing.

Next, we investigate the source of the difference in AUV response for big and small importers by disaggregating unit values into those pertaining to imports from China (Figure 2) and those pertaining to imports from the rest of the world (Figure 3). The results indicate that big importers experience advantages relative to their smaller counterparts from each of these groups of source countries and provide indications of the nature of those advantages.

3.1.2 Chinese AUVs

Our estimates for unit values on imports from China in Figure 2 have some conceptual similarities with the pass-through regressions considered in most of the literature, in that they focus on responses of Chinese unit values to tariffs. That said, the level of aggregation and definition of tariff exposure are novel, and thus the variation used for identification differs from earlier studies.[13]

We find that part of the relative advantage for big importers uncovered in the overall AUV estimates arises from differences in the response of Chinese import prices. In particular, panel (a) of Figure 2 shows that, for big importers, the pre-tariff prices they pay to their Chinese suppliers decline after the scramble period, implying incomplete pass-through. In particular, estimates of tariff pass-through range from 60-65 percent for big importers for the years 2019-2021. Small importers, by contrast, see complete pass-through—AUV responses that are not statistically different from zero—in all years except 2020.[14] Panel (c) indicates that, as was the case for overall AUVs, the action is driven by arm's-length transactions that are unlikely to be affected by transfer pricing. This decline in AUVs associated with tariffs is consistent with big importers being able to exercise their market power *vis a vis* suppliers in a particular product market.[15]

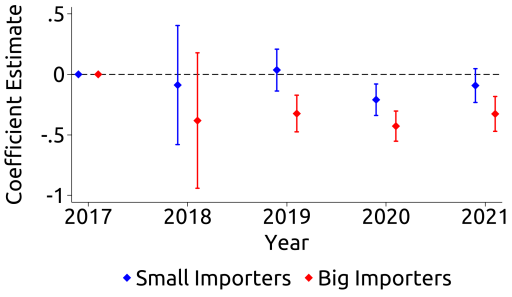
These results are broadly consistent with Alviarez et al. (2023)'s findings that higher buyer market power is associated with lower tariff pass-through. The difference is that the

[13]Existing research (Amiti et al., 2019; Fajgelbaum et al., 2020; Alviarez et al., 2023; Ganapati and Hottman, 2026) defines tariff exposure at the product-country-time level. Our definition is defined at the firm-product-time level—the same level as our unit of analysis—drawing on variation in the pre-tariff distribution of imports across source countries. In addition, our China AUV regressions focus on variation in tariff exposure across pairs importing from China, and imports from countries other than China are not included.

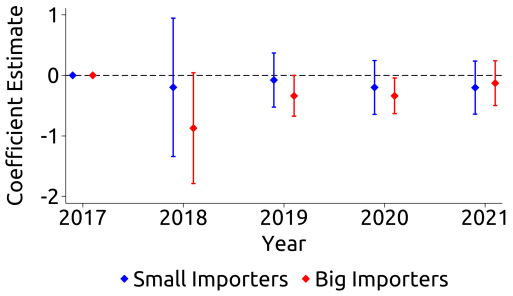
[14]Panel (a) of Appendix Figure C2 reports that estimates for big and small are statistically different from one another at the ten percent level in 2018-2020.

[15]In Appendix Section D, we provide a complementary analysis that interacts exposure to tariffs with a more explicit proxy for a pair's market power, its share of US imports in the pre-tariff period. As reported in Table D1 of that section, declines in Chinese AUVs associated with tariffs are larger for pairs with higher market share over the periods ending in 2019 and 2021. These results provide further evidence for market power being a relevant determinant of changes in Chinese unit values in response to tariffs.

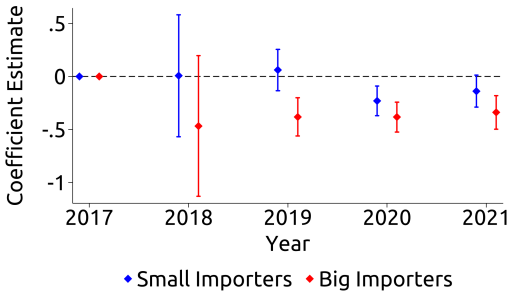
Figure 2: China Average Unit Values: Big vs. Small Importers



(a) China AUV



(b) China RP AUV



(c) China AL AUV

Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays unweighted OLS coefficient estimates and 95 percent confidence intervals for the change in the noted dependent variable on firm-product-pair-level exposure to tariffs for big (red) and small (blue) importers. Each end year for a given dependent variable and importer size is a separate regression. Regressions include product fixed effects and standard errors are clustered at the product-level.

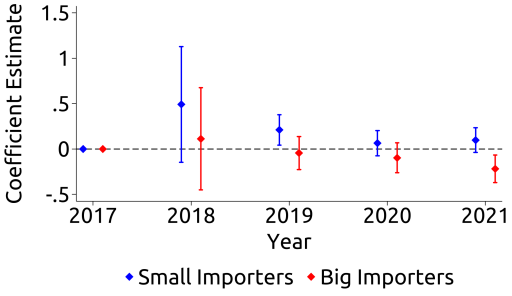
measure of market power in Alviarez et al. (2023) is based on a fixed network of buyers and suppliers, where a buyer's market power is based on its importance to its existing suppliers. Our measure, instead, defines a buyer's size—a determinant of market power—based on its share of overall US imports, and we examine outcomes over a longer time period, allowing buyer-seller relationships to change, as has been documented during the period we study (Handley et al., 2024).

3.1.3 Rest-of-World AUVs

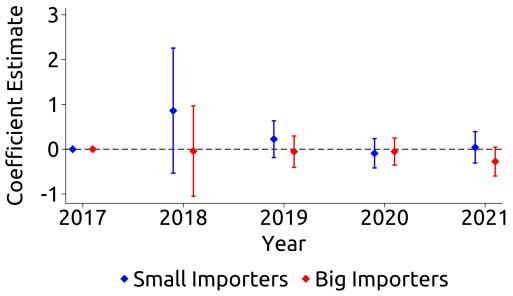
The previous analysis indicates that big importers gain a competitive advantage relative to small due to their ability to obtain reduced tariff-exclusive prices from their Chinese suppliers. But another aspect of price adjustment that has not been examined in the literature is the response of prices on imports from other countries as importers reallocate away from China and toward other non-tariffed countries. Figure 3 indicates that, for small importers,

tariffs are associated with a marginally significant increase in unit values on imports from countries that were not tariffed. Such higher prices are consistent with the presence of poor matches with new suppliers or other importing startup costs (Albornoz et al., 2012; Kamal and Sundaram, 2016; Monarch and Schmidt-Eisenlohr, 2017; Krolikowski and McCallum, 2021; Lenoir et al., 2023). Big importers do not see these price increases on imports from non-tariffed countries. The different responses of rest-of-world unit values for big and small importers is clearest for arm's length transactions (panel c). Here, the imprecisely estimated higher unit values contrast with modest reductions for big importers. The interaction term in Panel (c) of Figure C3 shows that the response for big importers for these purchases is statistically different from small importers at the five percent level for the years 2019-2021. In other words, tariffs are associated with a further improvement in the competitive advantage of big importers *vis a vis* their smaller counterparts.

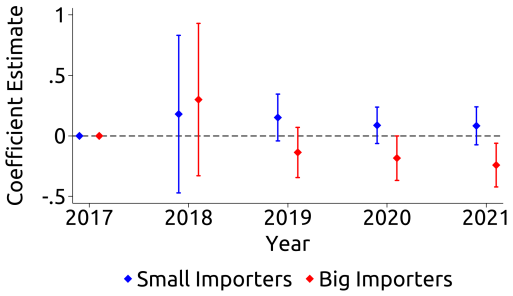
Figure 3: Rest of World Average Unit Values: Big vs. Small Importers



(a) ROW AUV



(b) ROW RP AUV



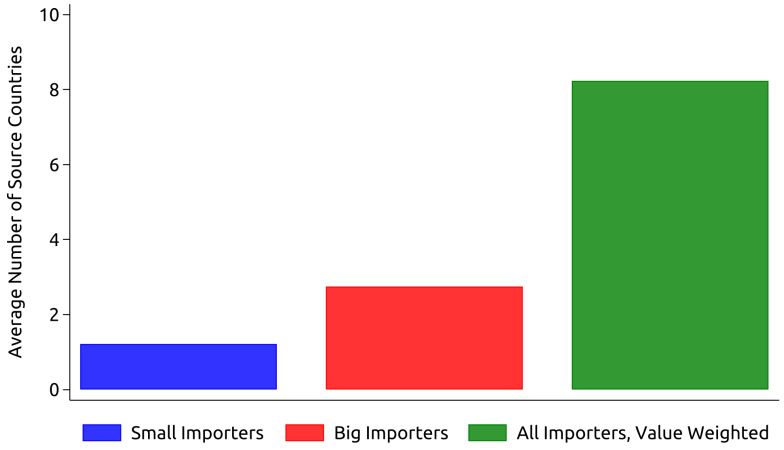
(c) ROW AL AUV

Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays unweighted OLS coefficient estimates and 95 percent confidence intervals for the change in the noted dependent variable on firm-product-pair-level exposure to tariffs for big (red) and small (blue) importers. Each end year for a given dependent variable and importer size is a separate regression. Regressions include product fixed effects and standard errors are clustered at the product-level.

One reason for differential AUV responses as importers reallocate imports to non-tariffed

countries is that big importers came into the tariff period with a big advantage: They were already importing from multiple source countries. Figure 4 shows that while the average small importer sourced a given product from a single country on the eve of the tariffs in 2017, the average big importer (based on our definition) sourced from three countries. The import value-weighted average number of source countries for a given product is around eight, indicating that the largest importers have numerous source countries in place to which they can reallocate imports to escape tariffs.[16] In sum, the figure provides evidence for a reason that big importers did not have to pay higher unit values as they reallocated imports to non-tariffed countries: They had already incurred the search and other startup costs associated with finding suppliers and operating in other countries. We discuss the *further* increases in the number of supplier countries big importers use in response to tariffs, below.

Figure 4: Average Number of Source Countries for Firm-Product Pairs, 2017



Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays the average number of source countries for firm-product pairs as of 2017. The blue bar is the simple average for small importers, the red bar is the simple average for big importers, and the green bar is the import-value weighted average for all importers.

3.2 Supply Chain Adjustment and Risk Reduction

Next, we examine whether importers have responded to tariffs by adjusting key aspects of their supply chains. This information is important because it provides further explanation of why average unit values respond to tariffs and the extent to which supply chain adjustments might reduce risks associated with future tariff shocks. Considering potential tradeoffs

[16] Antràs et al. (2017) discuss the distribution of the number of source countries across firms, noting that the median is one.

between risk-reducing actions and implications for import prices provides novel information for evaluating the welfare and policy implications of tariffs.

3.2.1 Reallocation across Countries: Importers Big and Small

The first aspect of supply chain adjustment we examine is the relationship between tariffs and any subsequent reallocation of imports across countries. Our dependent variable is the share of imports of product h sourced by firm f from each of the following: China, Asian countries other than China, Vietnam and Mexico.

In Figure 5, we focus on reallocation patterns across countries, in each graph denoting the results for the subsample of large versus small importers with a different color. A key takeaway is that both big and small importers reallocate trade away from China and toward other countries in response to tariffs, with the impact on sourcing from other Asian countries being particularly pronounced. This reallocation has been documented with public data in earlier research (Bown, 2022; Alfaro and Chor, 2023, etc.), and our findings of consistent patterns using a different level of data aggregation, different variation, and a different empirical strategy speak to their robustness, while providing confidence in the empirical strategy we employ.[17] In addition, they drive home the relevance of our contribution: While other papers on pass-through focus on the increasingly small share of trade the U.S. continues to import from China, our approach allows for a more holistic examination of the effect of tariff-induced trade shifts on the overall unit values U.S. firms pay to import goods.

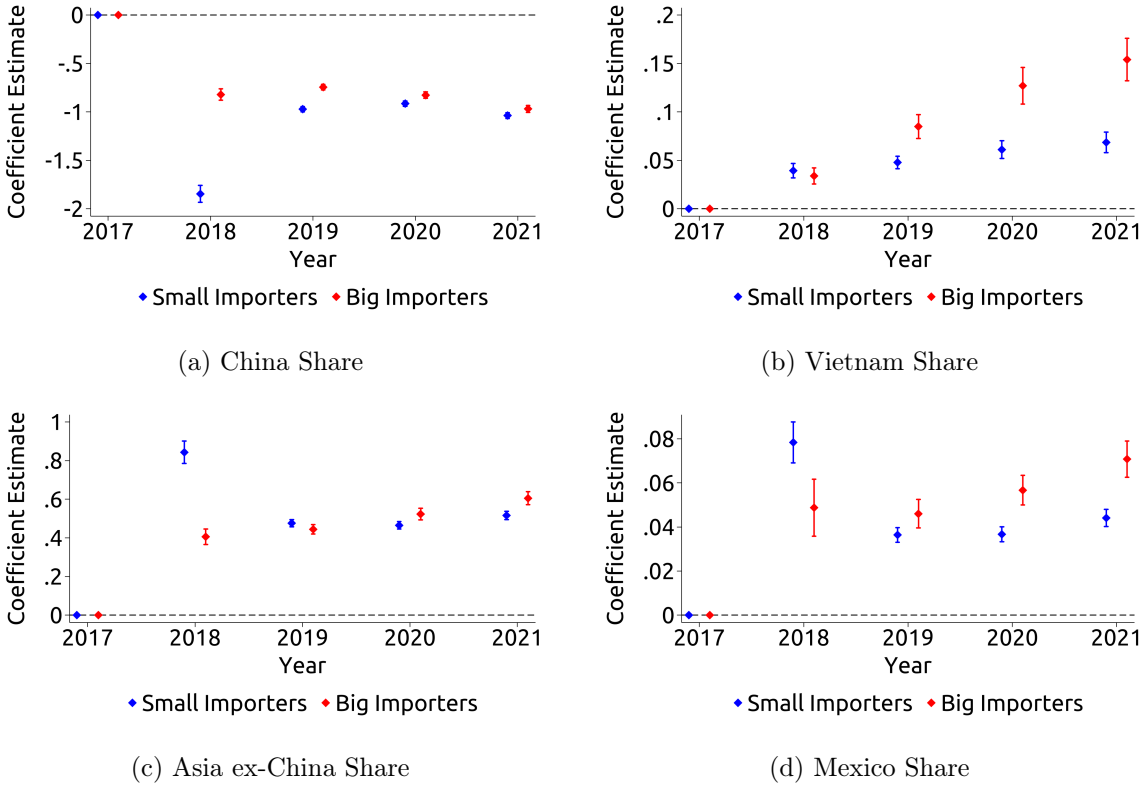
While the general shift of sourcing away from China toward other countries is apparent for both big and small importers, the responses of the two groups differ in two respects. First, small importers seem to "overshoot" in 2018 in terms of their shift away from China and their pivot towards other Asian countries and Mexico. In subsequent years, their response to tariffs adjusts to become comparable to that of big importers. Second, ultimately, big importers tend to respond to the tariff with a greater pivot towards Vietnam and Mexico than smaller importers do.

3.2.2 Risk Reduction in the Supply Chain: Importers Big and Small

There are notable and striking differences between big and small importers when we consider outcomes associated with diversification or risk reduction of the supply chain, with big importers responding more nimbly to tariffs than small importers. First, as shown in the upper left panel of Figure 6, while big importers expand the number of countries they source from in response to the tariff shock, small importers keep the number of source countries

[17] Recall that we find that tariffs are associated with a reduction in importers' overall trade values, i.e. trade destruction. Therefore, the reallocation toward other source countries in terms of the share of imports can come from higher imports from the non-China sources, as well as from lower values of total imports.

Figure 5: Import Shares by Source Country: Big vs. Small Importers



(a) China Share

(b) Vietnam Share

(c) Asia ex-China Share

(d) Mexico Share

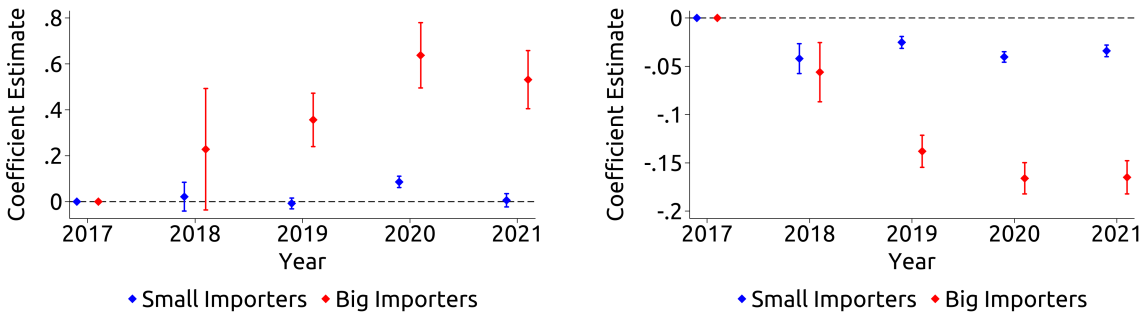
Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays unweighted OLS coefficient estimates and 95 percent confidence intervals for the change in the noted dependent variable on firm-product-pair-level exposure to tariffs for big (red) and small (blue) importers. Each end year for a given dependent variable and importer size is a separate regression. Regressions include product fixed effects and standard errors are clustered at the product-level.

mostly unchanged. This result indicates that not only do big importers enter the tariff period already importing from more countries (recall Figure 4), but they actually further increase their set of source countries in response to tariffs. This diversification means that big importers create more options for responding to future tariff waves, while small importers continue to be tied to a small number of source countries, typically one.

The upper right panel of Figure 6 shows the relationship between exposure to tariffs and the Herfindahl measure of source country diversification introduced in equation 3, which accounts for both reallocation of imports among existing source countries, as well as changes in the number of supplier countries. Here, we see that while both types of importers diversify across source countries in response to tariffs, the shifts are notably larger for big importers, again highlighting the speed and magnitude of big importers' adjustments relative to their smaller counterparts. Lastly, both groups increase reliance on related-party imports in response to tariffs (lower panel), with little difference in responses for big versus small

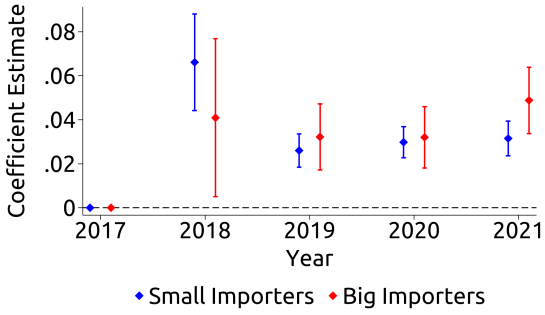
importers.

Figure 6: Risk Reduction and Import Outcomes: Big vs. Small Importers



(a) Count of Supplier Countries

(b) Herf. of Supplier Countries



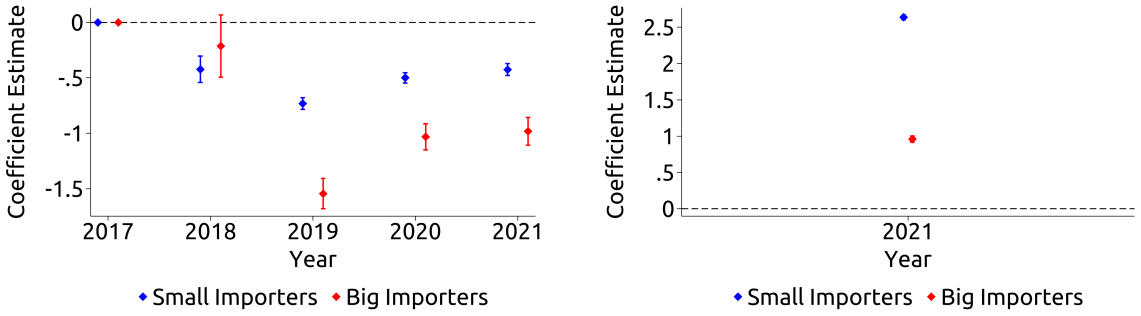
(c) Related Party Share

Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays unweighted OLS coefficient estimates and 95 percent confidence intervals for the change in the noted dependent variable on firm-product-pair-level exposure to tariffs for big (red) and small (blue) importers. Each end year for a given dependent variable and importer size is a separate regression. Regressions include product fixed effects and standard errors are clustered at the product-level.

3.2.3 Trade Destruction: Importers Big and Small

The results so far suggest that in response to tariffs, big importers are making larger adjustments than small importers do. In particular, big importers diversify their supply chain more than small importers do, by increasing the number of countries they source from and lowering concentration of imports across countries. But what about the total volume of imports? We find that the drop in the volume of imports is more responsive to the tariff in the case of big than in the case of small importers (left panel of Figure 7). But it is small importers that are most likely to stop importing from China (right panel). This is intuitive, as their inability to push down the price of imports means that after the application of tariffs, importing may cease to be profitable.

Figure 7: Import Outcomes: Big vs. Small Importers



(a) Value of Imports

(b) Stop Importing from China

Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays unweighted OLS coefficient estimates and 95 percent confidence intervals for the change in the noted dependent variable on firm-product-pair-level exposure to tariffs for big (red) and small (blue) importers. Each end year for a given dependent variable and importer size is a separate regression. Regressions include product fixed effects and standard errors are clustered at the product-level.

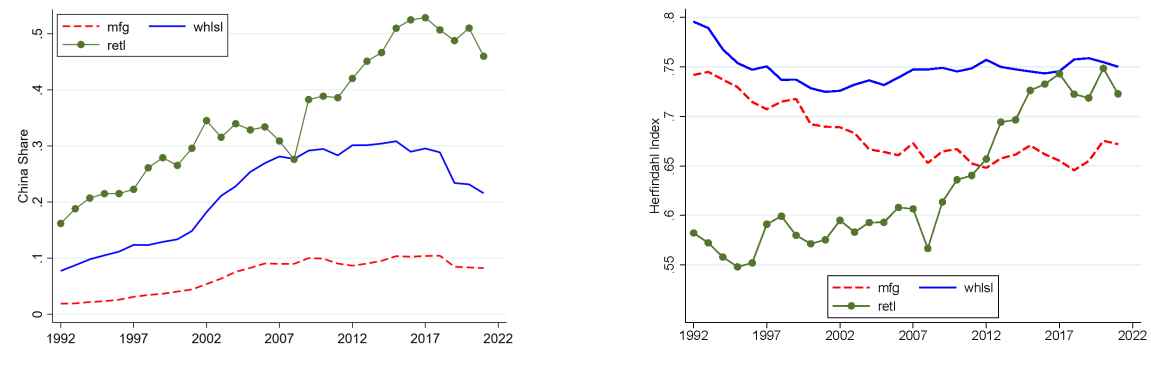
3.2.4 Sector-Level analysis

Are the broad patterns evident in the big and small importer analysis visible in different sectors? For this analysis, we consider the three largest two-digit NAICS industries in terms of the value of U.S. imports, manufacturing (31-33), wholesale trade (42), and retail (44-45). As shown in the left panel of Figure 8, in the decades prior to the introduction of the tariffs, these sectors had substantial differences in their reliance on sourcing from China. Retailers, on average, source the highest share of their imports from China, and they continued to increase that share, leading to steadily higher concentration (right panel), until the tariffs reversed each of these trends. Manufacturers, by contrast, import the lowest share of inputs from China, and had been steadily diversifying across source countries (as shown by the declining Herfindahl), for decades.

Next, we perform a parallel set of analyses for big and small importers within each sector, using the same estimation approach defined in equation 5. Despite the pre-tariff differences just noted, Figure 9 indicates that our results are not driven by a particular sector, as importers in each sector react in similar ways, in terms of overall direction. That is, across sectors, we see that small importers see larger increases in AUVs, smaller increases in the number of countries, and smaller declines in Herfindahl.

That said, across big and small importers, there are interesting differences across sectors. First, it's apparent that retailers adjust their supply chains most drastically in response to tariffs—in terms of number of source countries and Herfindahl—which is intuitive given their much higher pre-tariff reliance on China. Nonetheless, it's manufacturers that see the

Figure 8: Import Behavior, by Sector



(a) Share of imports from China

(b) Herfindahl Index of Countries

Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays share of imports from China and Herfindahl index of supplier countries over time, by major sector of the importer. The unit of observation is a firm-product-pair, with observations weighted by contemporaneous import value. Major sector is the sector that accounts for the largest share of employment at the firm.

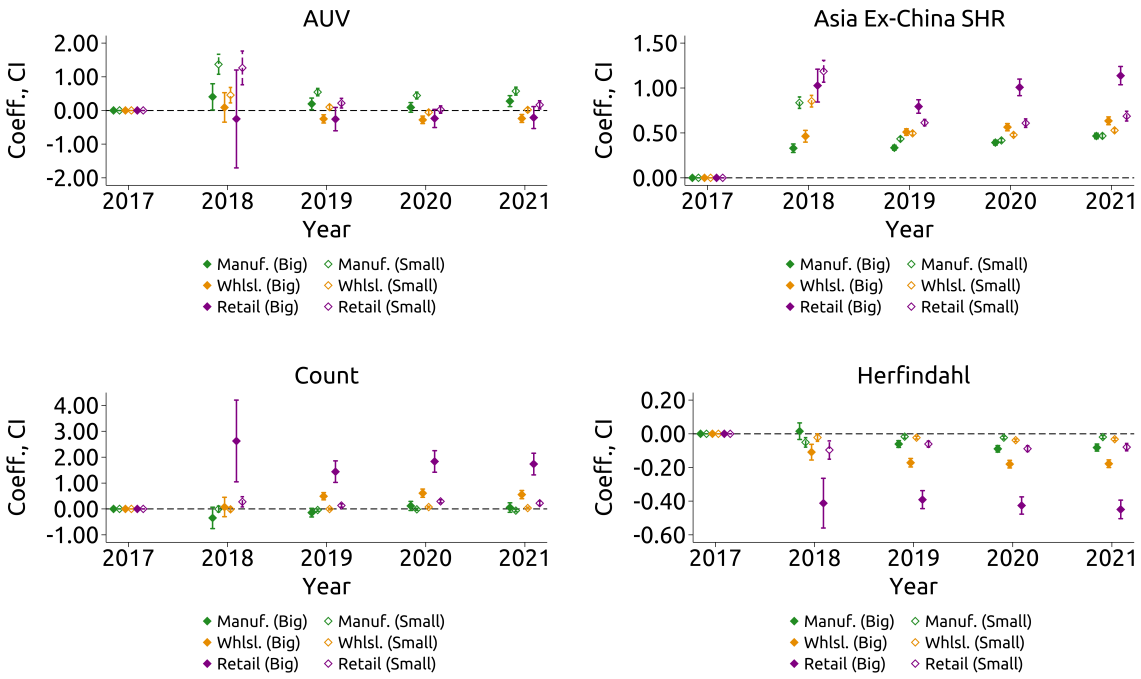
largest increases in AUVs due to tariffs, with both big and small importers recording price increases, potentially due to an inability to substitute source countries for specialized inputs.

4 Aggregate (Import-Value Weighted) Results

The estimates in the previous section were unweighted, in order to provide estimates of effects of tariffs for the average big and small importer. But given the importance of big importers in international trade, in this section we consider the implications of tariffs in regressions that use 2017 import values as weights for each firm-product pair. Therefore, the results in this section report the effects of tariffs for the average dollar of U.S. imports.

We begin by focusing on the relationship between tariffs and unit values using weighted estimates across all importers. Results are reported visually in Figure 10 for overall AUVs (blue), AUVs on imports from China (red), and AUVs on imports from the rest of the world (green). The results are indicative of the well-known outsized role that big firms play in U.S. trade. During the 2018 "scramble" period we find that tariffs are associated with higher overall and rest-of-world unit values, as in our earlier results showing both big and small importers paying higher unit values as they abruptly shift imports away from China to other countries. After the scramble, there is no statistically significant relationship between tariffs and tariff-exclusive overall unit values, consistent with big importers' eventual reallocation and diversification among a large and expanding set of source countries. In terms of Chinese AUVs, we find a negative relationship that is statistically significant only in 2019 when the

Figure 9: Big and Small Importers by Sector



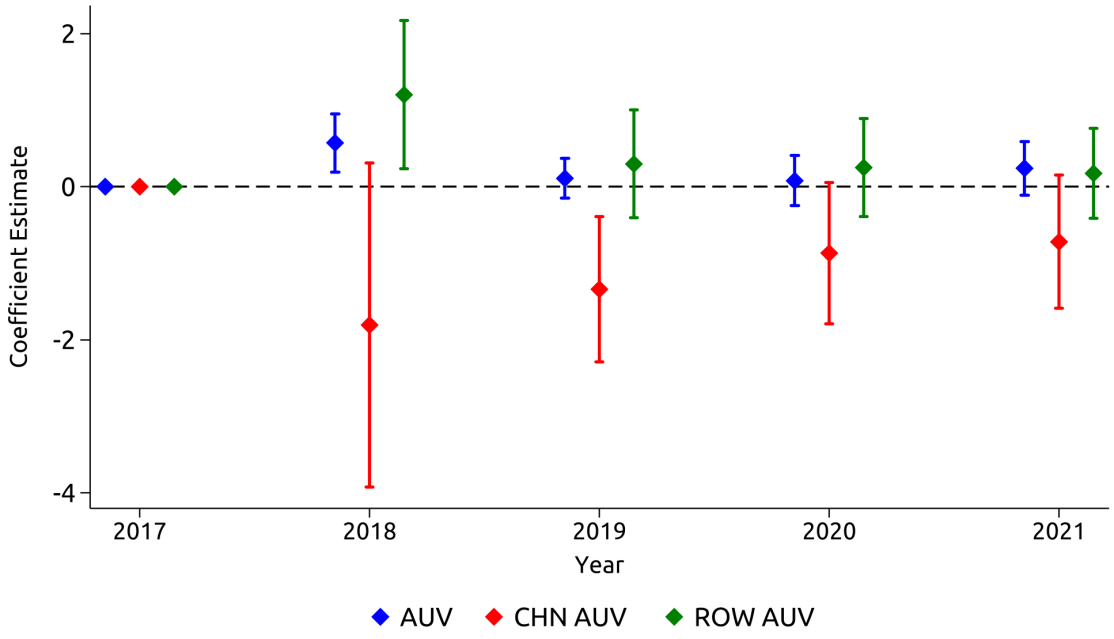
Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays unweighted OLS coefficient estimates and 95 percent confidence intervals for the change in the noted dependent variable on firm-product-pair-level exposure to tariffs for big (solid dot) and small (hollow dot) importers. Results are reported for the manufacturing (green), wholesale (gold), and retail (purple) sectors. Each end year for a given dependent variable and importer size is a separate regression. Regressions include product fixed effects and standard errors are clustered at the product-level.

lower unit values paid by big importers with market power offset the higher prices paid by small importers.

Recall that for the other supply chain adjustment measures we consider, big and small importers tended to react in ways that were similar in direction, albeit at differing magnitudes. As such, weighted estimates of supply chain adjustments are broadly similar to the unweighted estimates. As shown in the upper left panel of Figure 11, weighted estimates of reallocation across countries continue to show sharp declines in the share of imports from China, with a shift to other countries in Asia, consistent with earlier work by Nicita (2019), Bown (2022), Freund et al. (2024) and Alfaro and Chor (2023). Again, a large jump in the share of those imports is visible already in 2018, followed by slower adjustment in subsequent years. The estimates for Vietnam and Mexico are similar to each other, though it is worth noting that Vietnam saw a large increase in exports to the US from a very low base, while Mexico was already a very large supplier prior to the tariff shock.

We also find that higher tariffs are associated with increases in the count of supplier

Figure 10: Average Unit Values (All Importers - Weighted)



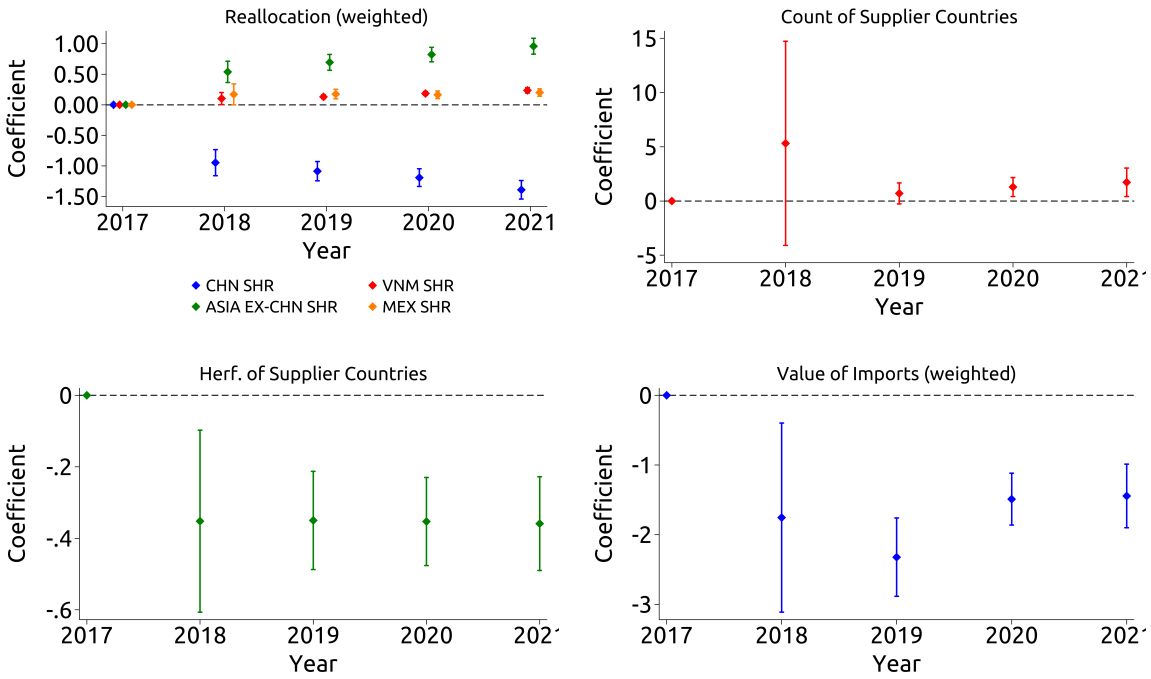
Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays OLS coefficient estimates and 95 percent confidence intervals for the change in the noted dependent variable on firm-product-pair-level exposure to tariffs for all importers, with 2017 import-value weights. Each end year for a given dependent variable is a separate regression. Regressions include product fixed effects and standard errors are clustered at the product-level.

countries (upper right), with a large but noisy increase during the scramble period of 2018 followed by a gradual but precisely estimated increase as importers adjust to the post-tariff environment. The addition of new source countries along with the reallocation of imports across source countries documented above yields a negative relationship between tariffs and a Herfindahl index of source countries (lower left). That is, as tariffs increase, importers diversify their supplier base by making it less concentrated across countries. It is a level effect with the adjustment taking place immediately. Lastly, as shown in the lower right panel, these diversification activities come at the cost of lower overall import values, as was the case for both big and small importers.

5 Robustness Checks

In this section, we describe robustness checks of the estimates for big and small importers and for overall import-value-weighted estimates presented above.

Figure 11: Reallocation and Risk Reduction (All Importers - Weighted)



Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays OLS coefficient estimates and 95 percent confidence intervals for the change in the noted dependent variable on firm-product-pair-level exposure to tariffs for all importers. Regressions are weighted by pre-tariff (2017) import values. Each end year for a given dependent variable is a separate regression. Regressions include product fixed effects and standard errors are clustered at the product-level.

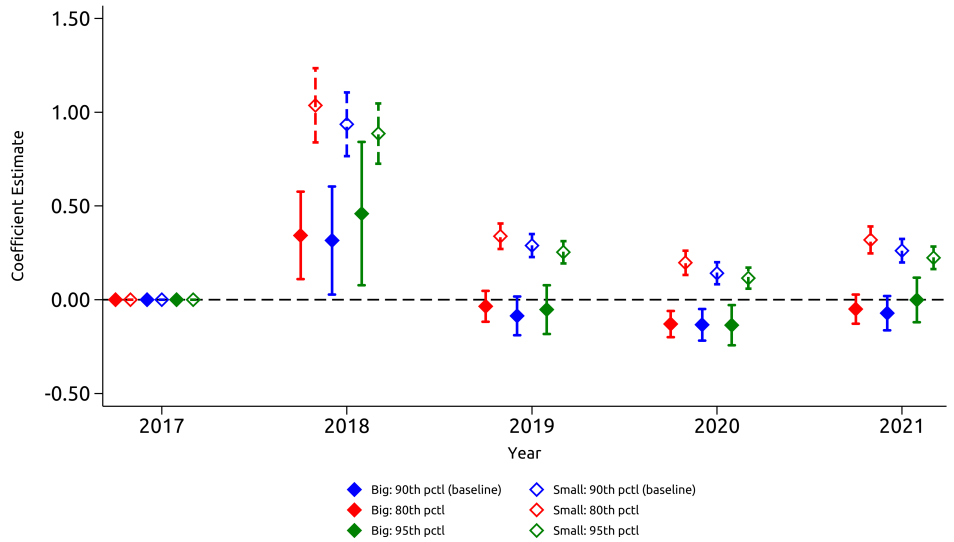
5.1 Alternative cutoffs

Our definition of big importers is based on the 90th percentile cutoff. In a robustness check, we consider two alternative thresholds, namely the 80th and the 95th percentile. As visible from Figure 12, the results for unit values are robust to using the alternative definitions. As one would expect, the results for small importers become less pronounced as the size cutoff increases (meaning that the "small" importers group includes some increasingly large importers). The corresponding results for other outcomes are presented in Appendix E.1.

5.2 Exclusions

Companies were able to seek exclusions from the 2018-19 U.S. tariffs using an administrative process managed by the Office of the US Trade Representative (Flaaen et al., 2021; Chor et al., 2025; Swenson, 2025). One potential explanation for why big importers might have more benign responses to tariffs than small is that big importers may have been more likely to secure exclusions. To check whether these exclusions are the driving force behind our

Figure 12: AUV: Alternative Cutoffs for Big Versus Small



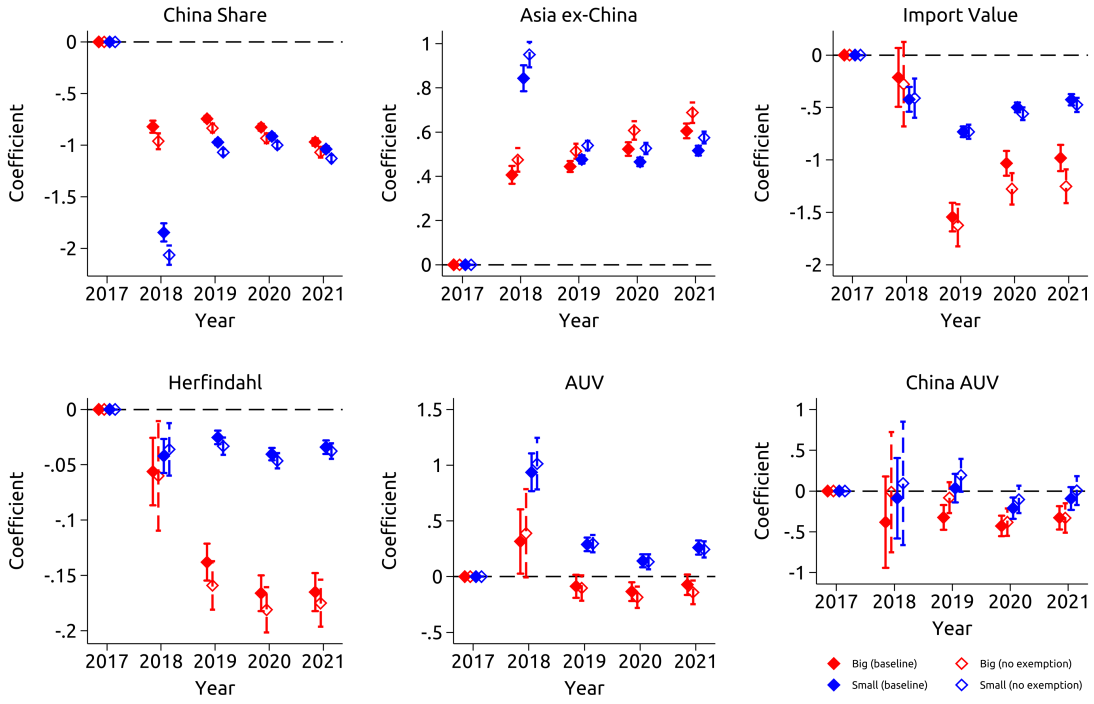
Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays unweighted OLS coefficient estimates and 95 percent confidence intervals for the change in the noted dependent variable on firm-product-pair-level exposure to tariffs for big (solid) and small (dashed) importers, where big and small are defined with three different cutoffs. The cutoffs are for importers with 2017 import values above the 90th percentile baseline (blue), 80th percentile (red), or 95th percentile (green) for a given product. Each end year for a given dependent variable is a separate regression. Regressions include product fixed effects and standard errors are clustered at the product-level.

results, we re-estimate the regressions presented so far, dropping products that ever received exclusions. As visible from Figure 13, our baseline results remain robust. As a result, we are confident that exclusions are not the primary reason for the heterogeneous responses of big and small importers to tariffs that we document.

5.3 Alternative fixed effects

Recall that our baseline specification, equation (5), controls for product fixed effects to capture a variety of global demand or supply shocks. However, it is possible that other unobserved characteristics, particularly those related to the importing firm, could be important in their response to tariffs. Here, we consider a range of alternative fixed effects: (i) none, (ii) firm fixed effects; or (iii) firm fixed effects and product fixed effects, with weighted estimates for selected dependent variables in Figure 14. As evident from the figure, the results are quite robust to these alternative specifications.

Figure 13: No Exclusion Robustness Check: Big vs. Small Importers



Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays unweighted OLS coefficient estimates and 95 percent confidence intervals for the change in the noted dependent variable on firm-product-pair-level exposure to tariffs for all importers. Solid diamonds and bars denote baseline estimates and hollow diamonds and dashed bars denote estimates when excluding any products subject to exclusion requests. Each end year for a given dependent variable is a separate regression. Regressions include product fixed effects and standard errors are clustered at the product-level.

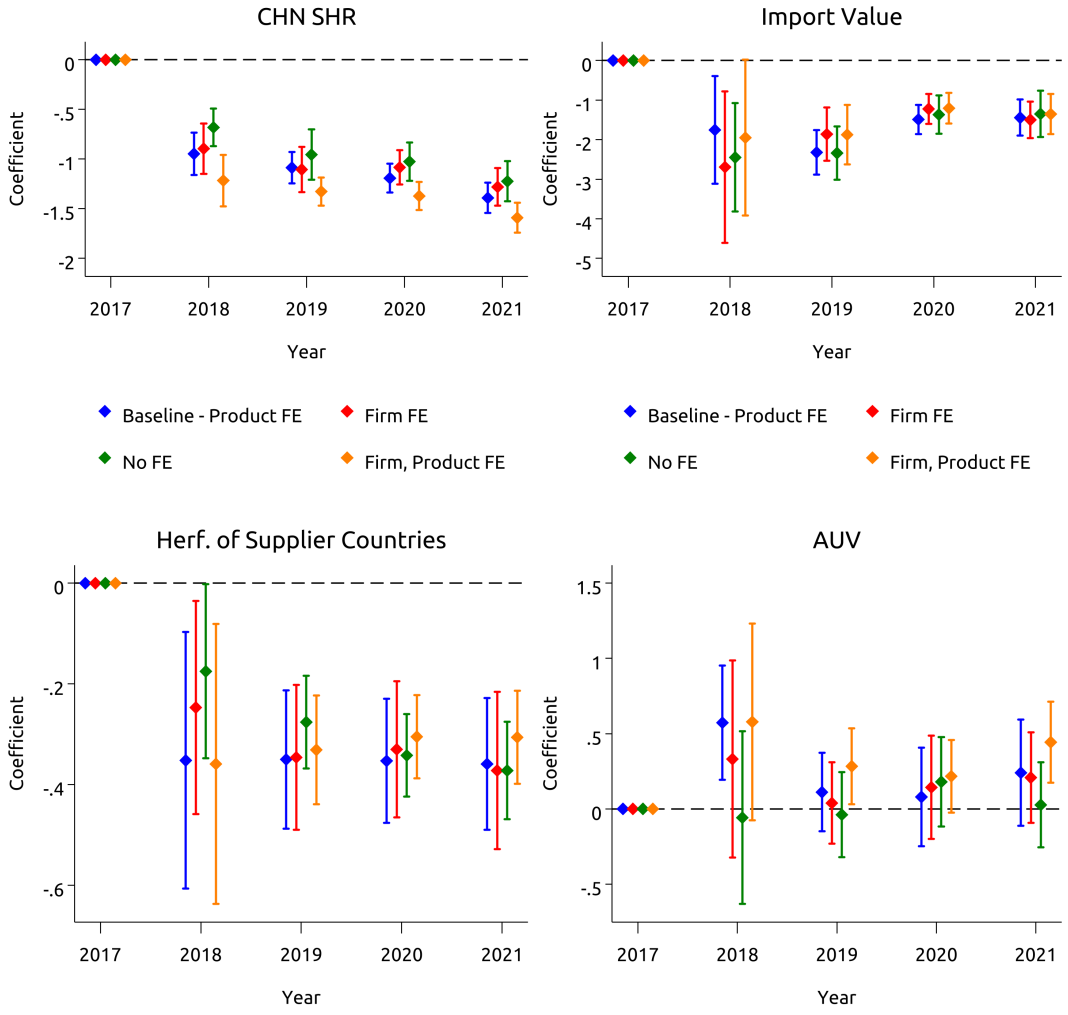
5.4 Panel Regressions

Our baseline specification consists of long-differences regressions with increasingly long durations, allowing us to observe changes in the relationship between tariffs and outcome variables over time. This approach eliminates all time-invariant differences between importers, ensures that all importers for a given regression are observed in the beginning and end year, and focuses on a period during which the six-digit Harmonized System codes set by the World Customs Organization did not change.[18]

As an alternative specification, we consider a panel regression of the measures of trade reallocation (source country import shares) described above. Here, our measure of tar-

[18]U.S. ten-digit Harmonized Tariff Schedule codes did change during this time, which we capture using the concordance from (Pierce and Schott, 2012).

Figure 14: Robustness Checks: Alternative Fixed Effects Specifications (weighted regressions)

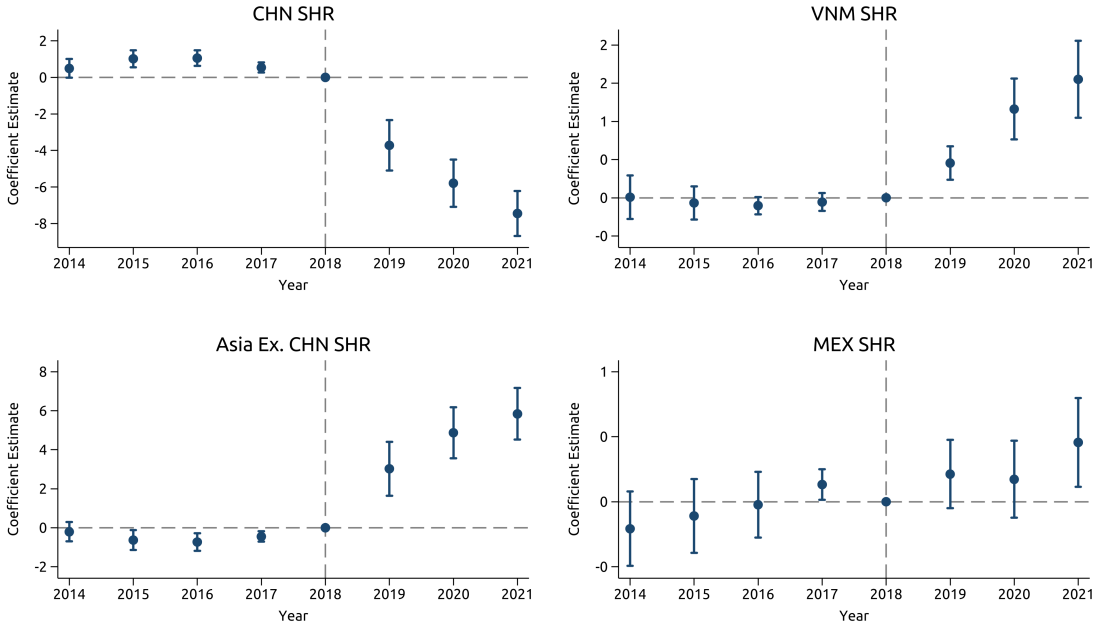


Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays OLS coefficient estimates and 95 percent confidence intervals for the change in the noted dependent variable on firm-product-pair-level exposure to tariffs for all importers, with 2017 import value weights. Estimates are reported for the baseline with product fixed effects (blue), no FE (green), firm FE (red), and firm and product FE (orange). Each end year for a given dependent variable is a separate regression. Standard errors are clustered at the product-level.

iff exposure is interacted with year dummies, the sample is extended backwards to 2013, and product, rather than plant-level fixed effects are used. Like the other aggregate (all importers) regressions reported above, regressions are weighted by 2017 import value. As shown in Figure 15, coefficient estimates move sideways near zero prior to the onset of tariffs, with a clear break in trend at the time that tariffs are imposed, with the share of imports

from China dropping with tariffs as the shares from Vietnam, Asia excluding China, and Mexico rise. These patterns indicate that tariffs served as a shock, and that pairs with differing exposure to tariffs were not on different pre-existing trends prior to tariffs.

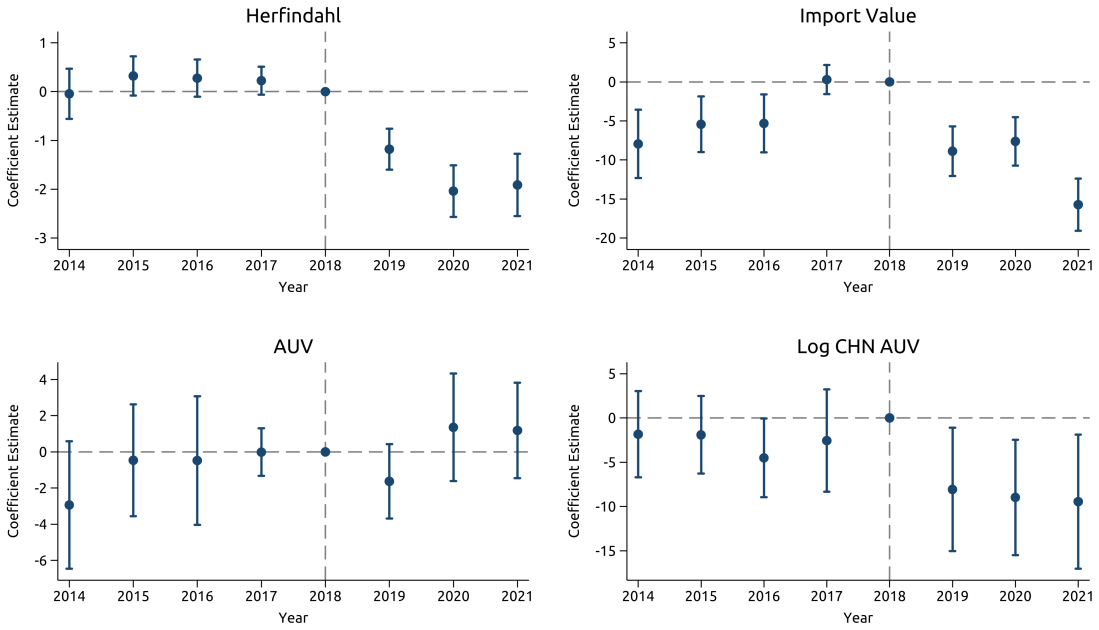
Figure 15: Panel Regression - Reallocation, All Importers



Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays coefficient estimates and 95 percent confidence intervals of annual panel difference-in-differences regressions for noted dependent variables. Regressions are weighted by 2017 import value. Estimates are for interactions of year dummies with firm-product-pair-level tariff exposure. The sample period is 2013-2021. Standard errors are clustered at the product level.

Using the panel regression to examine other variables of interest, we continue to see the presence of tariffs acting as a shock, with further evidence for breaks in trend for outcomes that occur at the time tariffs are imposed. As shown in the upper left panel of Figure 16, the Herfindahl index of supplier countries—our measure of diversification—moves sideways around zero prior to the tariffs and then steps down dramatically after tariffs are put in place. For import value (upper right), an upward trend prior to tariffs abruptly reverses following the imposition of tariffs, as importers reduce the value of their purchases from abroad. In terms of AUVs, we see little response for overall AUV (lower left)—as in our earlier aggregate import-weighted regressions—while CHN AUV steps down modestly following tariffs, again consistent with the aggregate results discussed above.

Figure 16: Panel Regression - Risk Reduction and Broader Effects, All Importers



Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays coefficient estimates and 95 percent confidence intervals of annual panel difference-in-differences regressions for noted dependent variables. Regressions are weighted by 2017 import value. Estimates are for interactions of year dummies with firm-product-pair-level tariff exposure. The sample period is 2013-2021. Standard errors are clustered at the product level.

6 Conclusions

This paper studies how importing firms adjust to large trade policy shocks, focusing on the 2018-19 U.S. tariffs on Chinese goods. Using transaction-level data on the universe of U.S. imports, we document substantial heterogeneity in firms' responses along multiple margins, including prices, sourcing patterns, and trade volumes.

Our main finding is a sharp divergence in import price adjustments across firms. While both big and small importers experience an initial increase in unit values following the tariffs, their subsequent paths differ markedly. Unit values fall to below the pre-tariff levels for big importers but remain persistently elevated for small importers. This divergence is driven by arm's-length imports from China and is consistent with larger importers exercising bargaining power *vis a vis* suppliers. At the same time, import-value-weighted estimates show no significant change in unit values beyond an initial scramble period. The absence of an aggregate price response reflects the dominant role of big importers, which account for the bulk of trade and are able to offset tariff pressures.

We further show that tariffs induce substantial reallocation of sourcing away from China toward alternative suppliers, accompanied by increased diversification and a rise in related-party trade. However, these adjustments differ systematically across firms. Big importers expand their sourcing networks and reduce supplier concentration, while experiencing a decline in tariff-exclusive unit values. In contrast, small importers reallocate across a limited set of suppliers without expanding their sourcing base, resulting in persistently higher import costs. These adjustments are associated with a decline in total import values, indicating that trade destruction accompanies trade diversion.

Taken together, our findings highlight the importance of firm heterogeneity in shaping the incidence of tariffs. While aggregate outcomes suggest limited price adjustment, the underlying firm-level responses reveal meaningful distributional effects. Big importers are better positioned to absorb and mitigate the impact of tariffs, whereas smaller importers face tighter constraints and higher costs.

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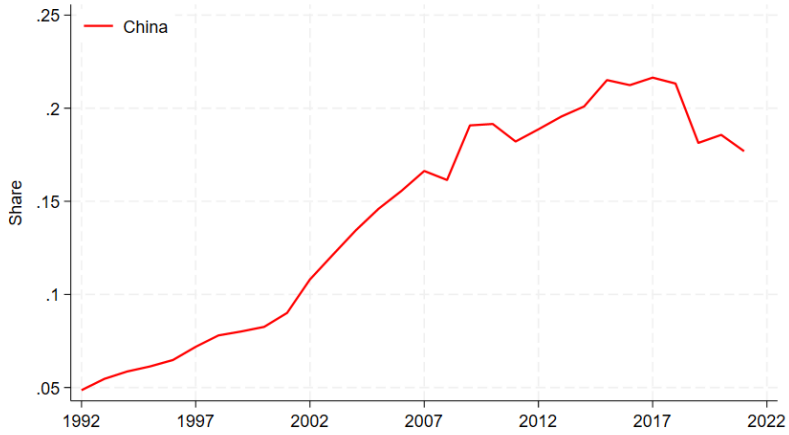
A Summary Statistics

This section presents summary statistics for all variables considered in our empirical analysis. We present means and standard deviations, for all importers (import-value-weighted) and for big and small importers (unweighted).

B The Evolution of Sourcing from China

In this section, we graphically present a set of motivating time series to set the stage for the analysis. As shown in Figure B1, the aggregate share of imports from China rises in the 1990s, increases at a faster pace after China joins the WTO in 2001, and then moves sideways in the years until tariffs are imposed. Once the U.S. begins imposing tariffs in 2018, the share of US imports sourced from China drops considerably (with further declines to come beyond our sample period).

Figure B1: Share of U.S. Imports Sourced from China, All Importers



Source: United States International Trade Commission and Longitudinal Foreign Trade Transaction Database, U.S. Census Bureau.
Notes: This figure displays the value-weighted average share of U.S. imports from China from 1992-2021. The unit of observation is the firm-product pair.

Figure B2 displays the aggregate import-value-weighted Herfindahl index of suppliers. This measure of concentration in supplier countries declines from the 1990s before moving back up following the Global Financial Crisis. This aggregate figure also masks differences across sectors, which are displayed in Figure 8 and discussed in the main text.

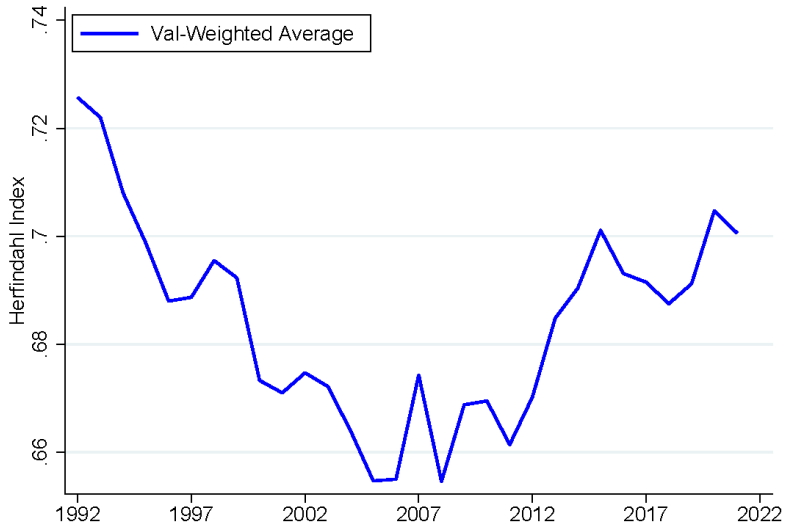
Figure B3 shows the average number of RoW countries (i.e., countries other than China) for firm-product pairs that import from China. The simple average indicates that the typical pair that imports from China imports from between 1 and 2 other countries. The value-weighted average shows that the average dollar of trade is occurring at a pair that imports from 7-8 additional countries.

Table A1: Summary Statistics (2017–2021)

	All Importers		Big Importers		Small Importers	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Tariff Rate						
Δ Tariff Rate	0.030	0.110	0.067	0.109	0.059	0.110
Source Country Shares						
Δ China Share	-0.047	0.272	-0.039	0.248	-0.010	0.277
Δ Vietnam Share	0.017	0.103	0.013	0.122	0.005	0.097
Δ Asia ex-China Share	0.044	0.269	0.034	0.244	0.013	0.275
Δ ROW Share	0.047	0.272	0.039	0.248	0.010	0.277
Δ Mexico Share	0.008	0.120	0.001	0.119	0.002	0.120
Δ Central America ex-Mexico Share	0.001	0.054	0.000	0.050	-0.000	0.055
Supplier Diversification						
Δ Number of Supplier Countries	-0.357	1.354	-0.104	2.109	0.078	1.091
Δ Herfindahl Index	0.002	0.201	-0.003	0.203	-0.005	0.200
Related Party Transactions						
Δ Related Party Share	-0.020	0.280	-0.010	0.259	-0.001	0.285
Start Importing from RP	0.024	0.187	0.058	0.233	0.034	0.181
Import Value						
Δ Log Import Value	-0.450	1.660	-0.621	1.595	0.265	1.629
Import Stopping Indicators						
Stop Importing from CHN	0.182	0.446	0.254	0.435	0.277	0.447
Stop Importing	0.147	0.478	0.290	0.454	0.686	0.464
Average Unit Values						
Δ Log AUV (All)	0.057	1.213	0.047	0.960	0.037	1.266
Δ Log AUV (Related Party)	0.080	1.286	0.064	1.177	0.048	1.338
Δ Log AUV (Arm's Length)	0.119	1.209	0.044	1.043	0.036	1.248
Δ Log AUV (China)	0.006	1.076	0.001	0.951	-0.014	1.120
Δ Log AUV (China RP)	0.074	1.209	0.039	1.242	-0.008	1.174
Δ Log AUV (China AL)	0.012	1.065	-0.001	0.934	-0.013	1.110
Δ Log AUV (ROW)	0.033	1.245	0.062	1.059	0.057	1.289
Δ Log AUV (ROW RP)	0.044	1.290	0.061	1.198	0.059	1.334
Δ Log AUV (ROW AL)	0.114	1.246	0.058	1.161	0.060	1.269

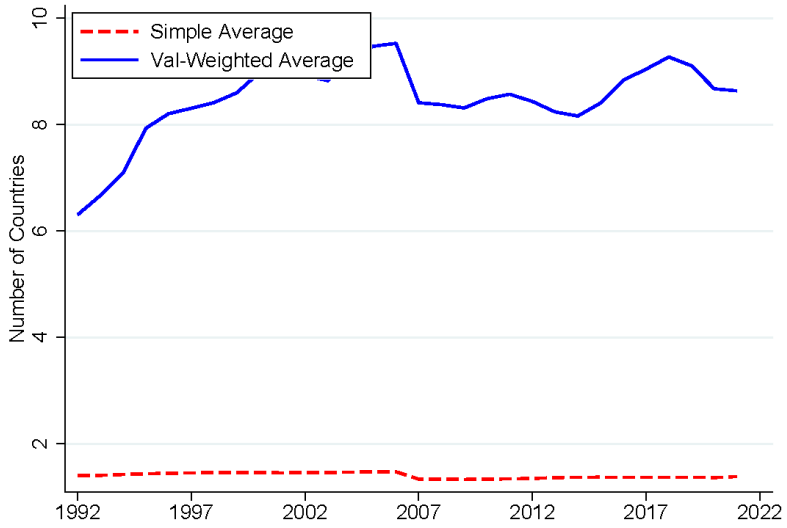
Notes: Summary statistics for changes between 2017 and 2021. All variables are calculated as first differences (2021 minus 2017 values). Summary statistics for all importers are weighted by 2017 import value, while those for big importers and small importers are unweighted. Big importers are firms with import values above the 90th percentile in 2017; small importers are firms below the 90th percentile. RP = Related Party; AL = Arm's Length; ROW = Rest of World; AUV = Average Unit Value; CHN = China.

Figure B2: Herfindahl Index of Supplier Countries, All Importers



Source: Longitudinal Foreign Trade Transaction Database, U.S. Census Bureau.
Notes: This figure displays the value-weighted Herfindahl index of supplier countries from 1992-2021. The unit of observation is the firm-product pair.

Figure B3: Number of "Rest of World" Countries for Firm-Product Pairs Importing from China



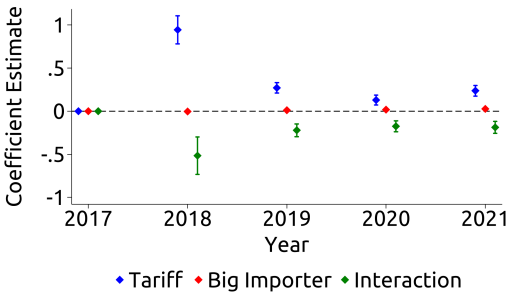
Source: Longitudinal Foreign Trade Transaction Database, U.S. Census Bureau.
Notes: This figure displays the simple and value-weighted average of "rest of world" countries for firm-product pairs that import from China from 1992-2021. The unit of observation is the firm-product pair. The "rest of world" countries are defined as any country other than China.

C Full Sample Regressions with "Big" Interaction

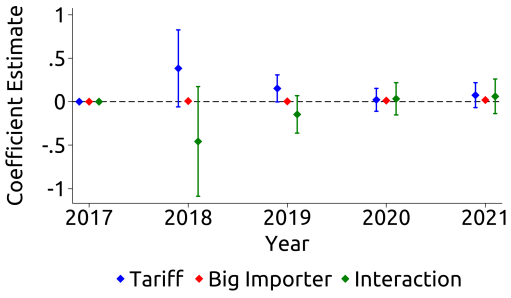
Estimates presented in Section 3 are typically based on separate samples of big and small importers. To test whether the responses of big and small importers are statistically different

from one another, here we present results from estimating equation 7, which includes an additional interaction term of an indicator for big importers with the change in tariffs. We report results for overall AUVs (all, related party, and arm's length), as well as equivalent estimates for CHN AUV and ROW AUV. Results are discussed in the main text.

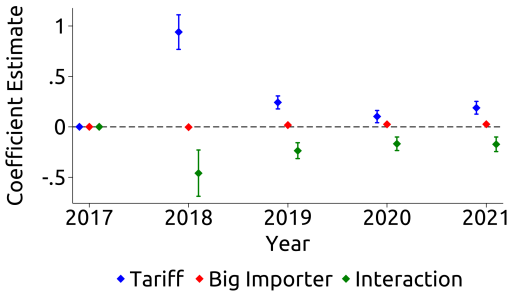
Figure C1: AUV - Big Interaction



(a) Average Unit Value



(b) Related Party AUV



(c) Arm's Length AUV

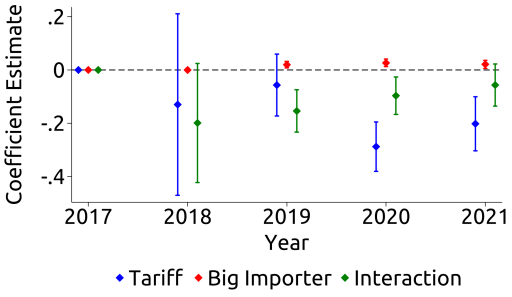
Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays OLS coefficient estimates and 95 percent confidence intervals for the change in the noted dependent variable on firm-product-pair-level exposure to tariffs with interaction term for big importers. Each end year for a given dependent variable is a separate regression. Regressions include product fixed effects and standard errors are clustered at the product-level.

D Market Share and Tariff Effects on China Unit Values

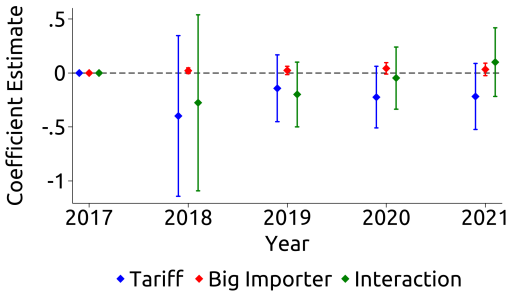
This section examines heterogeneity in the relationship between tariffs and AUVs on U.S. imports from China based on a pair's share of overall U.S. imports of a given product. In particular, we include an additional interaction of the pair's tariff exposure with its market share in U.S. imports:

$$Mkt\ Shr_{fh,2017} = \frac{imp_{fh,2017}}{\sum_{f \in F} imp_{fh,2017}}. \tag{D1}$$

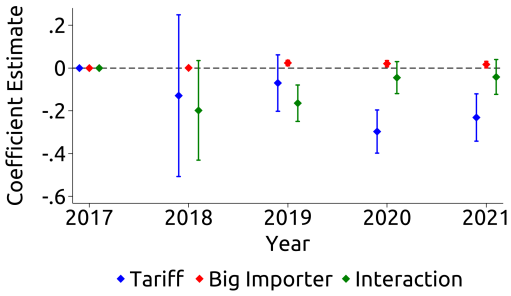
Figure C2: CHN AUV - Big Interaction



(a) China AUV



(b) China RP AUV



(c) China AL AUV

Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays OLS coefficient estimates and 95 percent confidence intervals for the change in the noted dependent variable on firm-product-pair-level exposure to tariffs with interaction term for big importers. Each end year for a given dependent variable is a separate regression. Regressions include product fixed effects and standard errors are clustered at the product-level.

where $imp_{fh,2017}$ is the value of firm f's imports of product h in 2017, and the denominator sums over all firms F importing product h in 2017, i.e. overall U.S. imports of product h.

As shown in Table D1, we find some evidence consistent with market power being a determinant of an importer's change in China AUVs in response to tariffs, as indicated by the negative and statistically significant coefficients on the interaction term for the periods ending in 2019 and 2021.

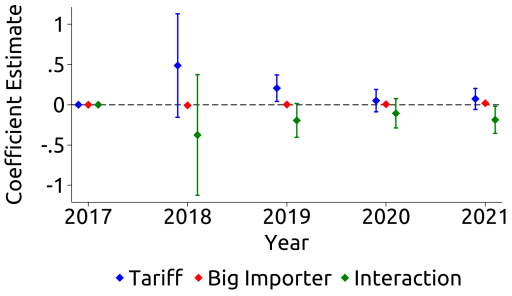
E Additional Robustness Checks

This section provides additional robustness checks not displayed in the main text.

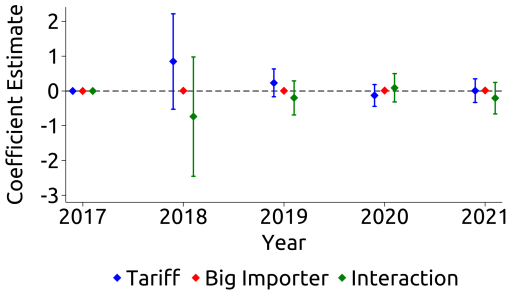
E.1 Robustness to Different Size Cutoffs

This section provides estimates for additional dependent variables exploring the robustness of our results for big versus small importers to different size cutoffs.

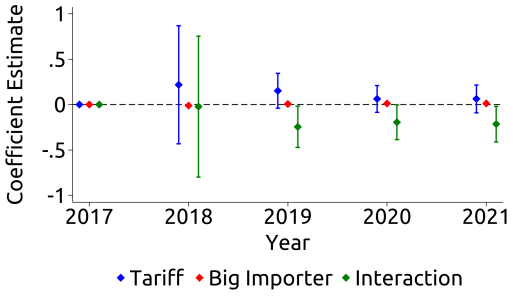
Figure C3: ROW AUV - Big Interaction



(a) ROW AUV



(b) ROW RP AUV



(c) ROW AL AUV

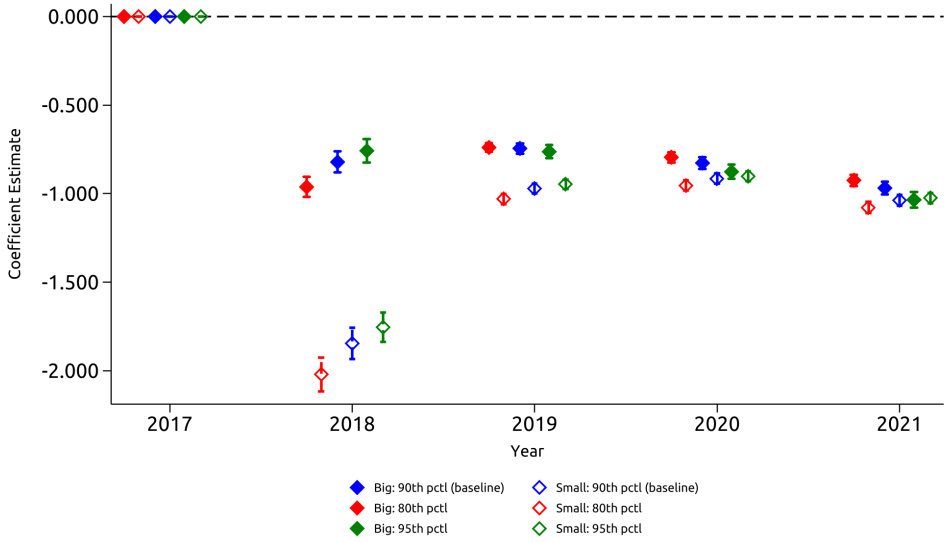
Source: U.S. Census Bureau and authors' calculations.
Notes: Figure displays OLS coefficient estimates and 95 percent confidence intervals for the change in the noted dependent variable on firm-product-pair-level exposure to tariffs with interaction term for big importers. Each end year for a given dependent variable is a separate regression. Regressions include product fixed effects and standard errors are clustered at the product-level.

Table D1: Market Share and Tariff Effects on China Unit Values (CHN AUV)

Year / Variable	CHN AUV
2018	
Tariff	−1.02
	(0.772)
Mkt Shr	0.357
	(0.254)
Tariff x Mkt Shr	−6.373
	(4.259)
N	388,000
R^2	0.305
2019	
Tariff	−0.746***
	(0.285)
Mkt Shr	0.694
	(0.432)
Tariff x Mkt Shr	−7.077**
	(2.890)
N	304,000
R^2	0.265
2020	
Tariff	−0.690**
	(0.281)
Mkt Shr	0.491
	(0.619)
Tariff x Mkt Shr	0.384
	(4.695)
N	243,000
R^2	0.220
2021	
Tariff	−0.084
	(0.449)
Mkt Shr	0.973*
	(0.502)
Tariff x Mkt Shr	−7.680**
	(3.842)
N	225,000
R^2	0.238

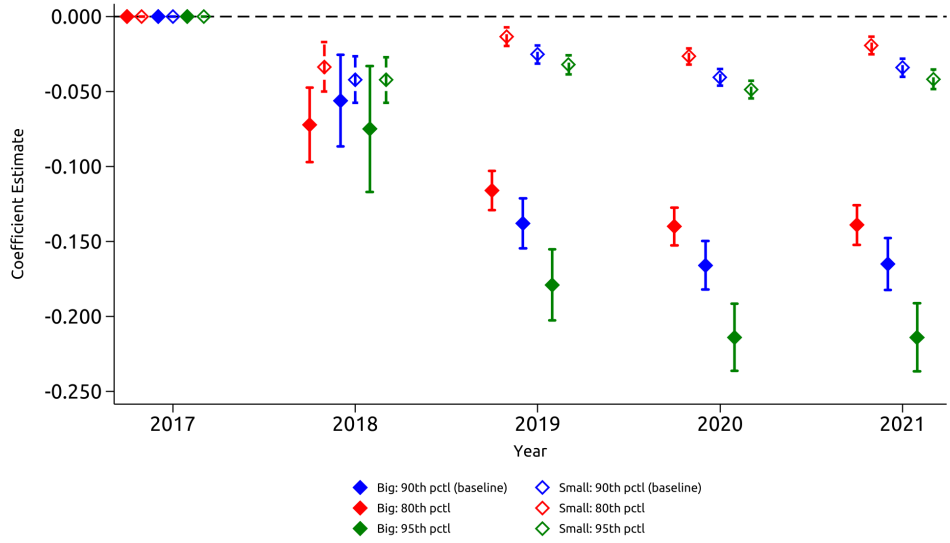
Source: U.S. Census Bureau and authors' calculations. Notes: This table presents coefficient estimates from a regression examining the effects of tariffs, market share, and their interaction on China-sourced average unit values. Each end year is a separate regression. The dependent variable represents log changes in China average unit value. Robust standard errors are shown in parentheses. CHN AUV = China average unit value; Mkt Shr = importer market share; Tariff x Mkt Shr = Interaction between tariff and market share. *** p<0.01, ** p<0.05, * p<0.1.

Figure E1: China Share Robustness to Size Cutoff - Big vs. Small Importers



Source: U.S. Census Bureau and authors' calculations.
Notes: This figure displays coefficient estimates for China Share from unweighted panel regressions with varying size cutoff thresholds. Solid lines and filled markers represent big importers; dashed lines and hollow markers represent small importers. The 90th percentile cutoff (blue) is the baseline specification, with 80th percentile (red) and 95th percentile (green) shown for robustness. Confidence intervals are at the 95% level.

Figure E2: Herfindahl Index Robustness to Size Cutoff - Big vs. Small Importers



Source: U.S. Census Bureau and authors' calculations.
Notes: This figure displays coefficient estimates for Herfindahl Index from unweighted panel regressions with varying size cutoff thresholds. Solid lines and filled markers represent big importers; dashed lines and hollow markers represent small importers. The 90th percentile cutoff (blue) is the baseline specification, with 80th percentile (red) and 95th percentile (green) shown for robustness. Confidence intervals are at the 95% level.