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Abstract

This paper introduces a new measure of tariff evasion through rerouting and applies it to the 2018 U.S.–China trade war, focusing on Vietnam as a transit country. We use transaction-level trade data and define rerouting as the flow of a granular eight-digit HS product from China, through Vietnam, to the United States within a given quarter. We consider several levels of geographic aggregation – country, province, and firm – which yield increasingly conservative estimates of rerouting. To examine how rerouting responded to the trade war, we exploit product-level variation in tariff exposure as well as the timing of tariff implementation. For the average product-level tariff increase, rerouting rises by 3.6 percentage points at the country level, 2.5 at the province level, and 1.4 at the firm level. These treatment effects represent a 21.1% increase in country-level rerouting, a 20.5% increase at the province level, and a 14.3% increase at the firm level compared to pre-trade war values. We also find that rerouting was largely driven by new establishments and Chinese-owned enterprises. Finally, our results indicate that the trade war raised revenue and profits among firms in Vietnam and altered their input composition in ways consistent with increased rerouting – specifically, reducing labor and increasing materials as a share of output.

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1 Introduction

Countries worldwide are increasingly turning to protectionist trade policies, including origin-specific tariffs. Perhaps the preeminent example of this trend is the 2018 US–China trade war, which consisted of multiple waves of US tariffs on Chinese exports and retaliatory Chinese tariffs (Bown, 2021). At the time, economists and policymakers expressed concerns that Chinese firms could circumvent origin-specific tariffs by shipping through third-party countries (Shi and Liu, 2019; Kyo Kitazume and Cho, 2019). These conjectures continue to inform trade policy today (In- vestment Monitor, 2025). It is, therefore, essential to accurately measure rerouting to understand the consequences of the 2018-2019 trade war and similar policies.

Existing rerouting measures use two approaches. In the first, aggregate trade flows are used to infer the behavior: for example, an increase in exports from a tariff-targeted country to a third country and a concurrent increase in exports from the third country to the tariff-imposing country are taken as evidence of rerouting (DeBarros and Hayashi, 2023; Hayakawa and Sudsawasd, 2024). In the second, scholars estimate rerouting using the correlation between imports of third-country firms from the tariff-targeted country and exports of third-country firms to the tariff-sending coun- try (Rotunno et al., 2013; Liu and Shi, 2019). Recent work by Freund (2025) uses a refined hybrid strategy combining these two approaches to define rerouting as product flows that satisfy several characteristics, including that their aggregate flows through the third country are consistent with rerouting and that the third country's imports of a rerouted product comprise more than three- quarters of that country's exports to the US in that product.

These existing measures have several strengths, including the ability to detect evasive behavior, tractability, and generalizability across places and time. We view our approach as complementary to these efforts and capable of addressing some of their drawbacks. One drawback of aggregate measures is that they may overestimate the true extent of rerouting by conflating it with other le- gitimate activities also stimulated by tariffs, such as exporting from new foreign entrants into the third country (Shira, 2019; Wu, 2023) and increased consumption of imports of third-country con- sumers unrelated to export. Moreover, aggregate measures

cannot reveal what places, industries,

or firms perform rerouting. While the correlational approach does not overestimate rerouting, it cannot yield estimates of total rerouting levels, complicating downstream analyses of the economic impact of the behavior.

In this paper, we propose a measure of rerouting that leverages transaction-level trade data to resolve the flaws in previous attempts. First, our measure provides a more accurate estimate of the total level of rerouting activity and sheds light on the amount that aggregate measures likely overstate true rerouting. Second, it allows us to identify probable rerouting behavior at granular levels, including within specific industries, locations, and even particular firms. We implement our measure for Vietnam during the US–China trade war.

We focus on Vietnam as a transit (or third) country for two reasons. First, prior work on the circumvention of trade barriers suggests that Chinese evasion is more likely to occur through coun- tries that have relatively strong ties with China, such as geographic contiguity, a culturally prox- imate population, and similar economic and political institutions (Rotunno et al., 2013; Liu and Shi, 2019). Vietnam's matches on these dimensions make it a compelling candidate for rerouting. Secondly, of all US import partners, Vietnam was the most significant beneficiary of the decline in US–China trade. Previous research found that Vietnam replaced almost half of China's lost market share in US imports between 2017 and 2022 (Alfaro and Chor, 2023), and its total exports to the US rose from 42 billion in 2017 to 109 billion by 2022(US Census Bureau, 2024). Vietnam has also witnessed a substantial rise in sourcing from China. During the same period, China's share of Vietnam's imports increased by 5.5 percentage points, the highest increase of all its source country partners (Alfaro and Chor, 2023). Thus, unsurprisingly, Vietnam has figured prominently in pub- lic debates about rerouting (Chau and Boudreau, 2019), and is, therefore, an important setting to investigate the extent of rerouting.

We implement three parallel empirical definitions of rerouting that differ in their conservatism, in the sense of categorizing smaller amounts of trade as rerouting. All conceptually capture the movement of a specific product from China through Vietnam to the US within a quarter.[1] In the

[1] We consider different time frames in Section 4.

least conservative measure, we define all flows of a given 8-digit Harmonized System (HS) product through Vietnam to be rerouting. In an intermediate measure, we consider only such flows through a single Vietnamese province. This province-level measure can capture the coordinated activities of multiple firms. Finally, our most conservative measure defines as rerouting only flows through a single firm operating in Vietnam.

We use information from two micro datasets: firm outcomes from the Vietnam Enterprise Sur- vey (VES) and trade transactions from S&P Global's Panjiva Supply Chain Intelligence Database (Panjiva). The VES, covering 2000 to 2021, provides data on firm investment and production out- comes, including capital, employment, and revenue. Panjiva's Vietnam Trade Data, spanning 2018 to 2021, details all trade transactions into and out of Vietnam at the 8-digit HS product level.

We validate our measure by testing whether flagged rerouters fulfill *a priori* expectations. Specifically, we test whether (1) rerouters produce more exports per employee, (2) industry capital share is correlated with more rerouting, and (3) rerouting is more prevalent in higher-tariff industries.

Next, we estimate the causal impact of the US–China trade war on rerouting using temporal variation in tariff implementation, product variation in tariff intensity, and destination variation in tariff targeting. As expected, we find that rerouting increases in response to trade war tariffs. Furthermore, we find that for the average tariff increase on Chinese exports, 12.48%, country-level rerouting increased by 3.6 percentage points, province-level rerouting increased by 2.5 percent- age points, and firm-level rerouting increased by 1.4 percentage points. Given the 2018 averages of these values, 17.5%, 12.2%, and 9.8%, these treatment effects represent a 21.1% increase in country-level rerouting, a 20.5% increase in province-level rerouting, and a 14.3% increase in firm-level rerouting.

We then leverage our granular measures to answer critical questions about the characteristics and behaviors of rerouters. First, how did rerouting differ by firm ownership? We find that more than half of trade-war-induced rerouting was performed by Chinese-owned firms. Second, we con- sider whether incumbent firms or new entrants drove the rerouting increase. We find that

nearly the

entire increase was due to newly established firms, suggesting that the trade war spurred companies to start new operations in Vietnam. Finally, we provide evidence on how the trade war affected firms in Vietnam. We find that, while tariffs were a boon to firm profitability and output, they also decreased the labor share of output and increased the materials share of output, all consistent with a meaningful increase in rerouting.

This paper makes two main contributions. First, we propose a general, replicable rerouting measure that enables us to estimate total rerouting levels, provide upper and lower bounds on rerouting levels, document its response to the US–China trade war, and identify the characteristics of rerouters. These properties complement existing rerouting studies, which find evidence of rerouting in response to the trade war without relying on transaction-level trade data Freund (2025); Liu and Shi (2019). More broadly, our work adds to the large and growing literature on the US–China trade war,[2] which has found near complete pass-through to US prices (Amiti et al., 2019, 2020b; Fajgelbaum et al., 2020; Flaaen et al., 2020; Cavallo et al., 2021; Chang et al., 2021; Ma et al., 2021) and negative effects on economic activity in both countries (Amiti et al., 2020a; Benguria and Saffie, 2020; Handley et al., 2025; Benguria et al., 2022; Chor and Li, 2024). An- other segment of the literature documents the reallocation of supply chains and trade (Fajgelbaum et al., 2024; Alfaro and Chor, 2023; Grossman et al., 2024; Freund et al., 2023), largely finding that direct linkages between China and the U.S. have declined, but indirect exposure through supply chains increased (Peng et al., 2024).

Second, we make a methodological contribution to the literature on trade barrier circumvention by demonstrating the importance of firm-level data in examining this phenomenon. Much of the previous literature has provided evidence using bilateral trade data. Fisman et al. (2008) found that China was more likely to import goods through Hong Kong if it had higher import tariffs on the rest of the world, and posited tariff evasion as part of the rationale for indirect trade. Stoyanov (2012) also documented evidence of tariff evasion by showing that goods with greater preferential treat- ment under the Canada–US Free Trade Agreement were more likely to be transshipped through

[2] See Fajgelbaum and Khandelwal (2022) for a review.

the US to Canada, suggesting violations of rules of origin requirements. Rerouting from China to the US has been examined in the context of quotas and anti-dumping duties. Rotunno et al. (2013) showed that African countries' imports from China and exports to the US were highly correlated for apparel products for which they had duty- and quota-free access to the US market through the African Growth and Opportunity Act (AGOA). Liu and Shi (2019) similarly found an increase in the correlation between Chinese imports and US exports in third countries for products subject to US anti-dumping duties on Chinese products. However, these studies typically relied on country- level data, which potentially overstated the extent of rerouting if there was unobserved value-added activity within a product code. Our more granular approach refines rerouting measurements and demonstrates that such refinements are substantively important.

The remainder of the paper is organized as follows: Section 2 presents background information on the trade war and Vietnamese trade. Section 3 introduces our main data sources and Section 4 presents our empirical rerouting measures. Section 5 presents our strategy for estimating the causal response of rerouting to trade war tariffs, and Section 6 presents results from these analyses, alongside further validation exercises. Section 7 explores heterogeneity in firm rerouting behavior, and Section 8 documents the effect of tariffs and rerouting on firms in Vietnam. Finally, Section 9 concludes.

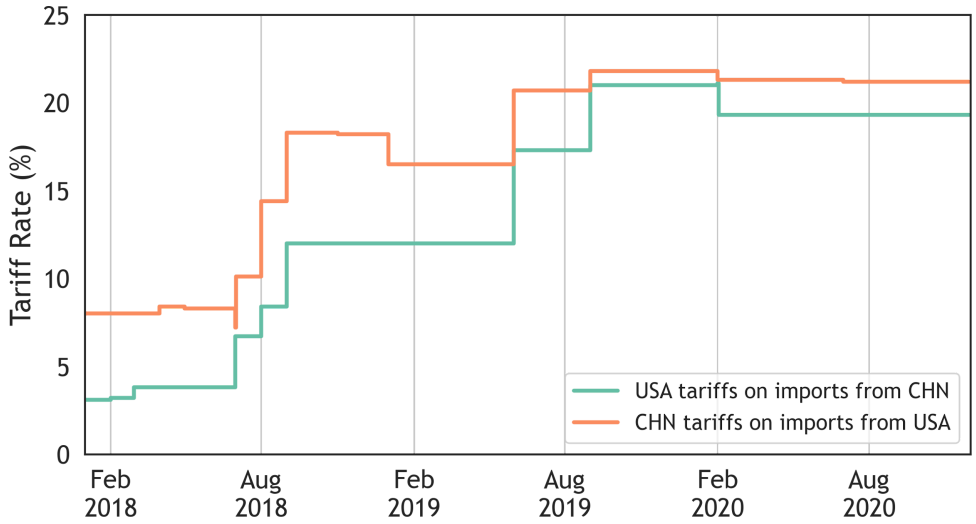
2 Background

2.1 The US–China Trade War

The US–China trade war began in February 2018 when the United States imposed tariffs on wash- ing machines and solar panels. These products were chosen because the US International Trade Committee found that their imports had harmed US producers. The US then levied tariffs on steel and aluminum following conclusions from a US Department of Commerce investigation. While both sets of tariffs applied to many countries, then-President Donald Trump

communicated that the ultimate target was China.

Figure 1: US–China Trade-War Timeline



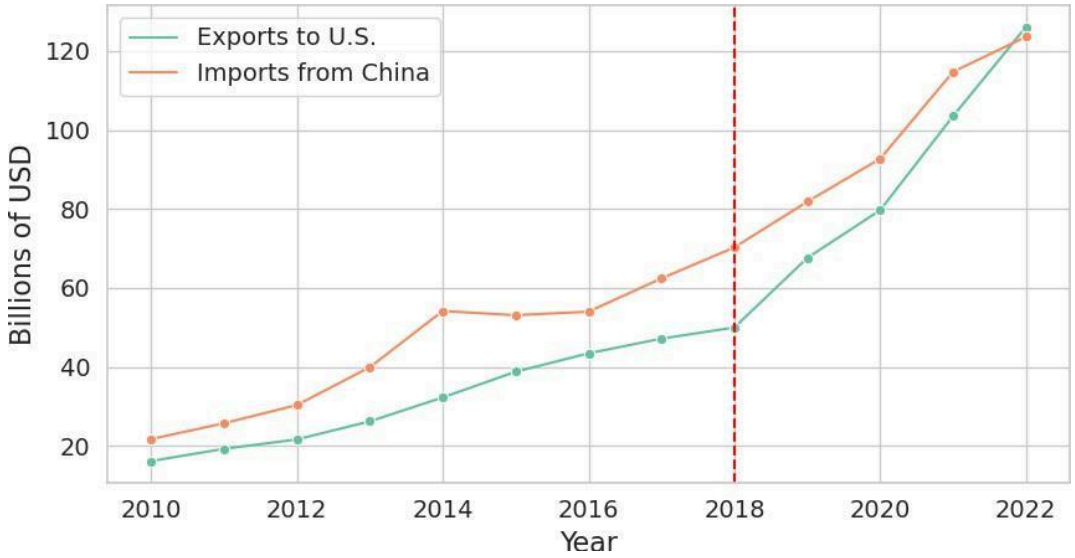
Source: Bown (2021).

The trade war grew more targeted on June 15, 2018, when President Trump exerted his author- ity under Section 301 of the 1974 Trade Act to issue across-the-board retaliatory 10 percent tariffs on a wide range of Chinese products (Bown, 2021). President Trump justified the tariff decision by arguing that China's sizable trade surplus with the United States was largely the result of unfair trade practices and currency manipulation. Throughout 2018 and 2019, the US levied five waves of tariffs on a variety of Chinese products. In response to each wave, China raised tariffs on its imports from the United States. The US tariffs affected an estimated $350 billion worth of im- ports, and China's retaliatory tariffs targeted around $100 billion worth of US exports (Fajgelbaum and Khandelwal, 2022). In 2020, the two countries signed an agreement that paused further tariff increases in exchange for concessions. However, the existing tariffs remained in place and have not been repealed as of early 2025.[3] To illustrate the conflict's trajectory over time, Figure 1 plots average tariff rates during different phases of the trade war

(Bown, 2021).

[3]In fact, in May 2024, the Biden administration announced further tariff increases for select products (Boak et al., 2024).

Figure 2: Vietnamese Exports to the US and Imports from China - Total Value



Source: CEPII BACI Dataset, 2010 - 2022.

2.2 Vietnamese Trade

In Vietnam, these tariffs were greeted with marked enthusiasm, as some expected them to boost Vietnamese exports to the United States and further integrate Vietnamese companies into global value chains. Indeed, in the wake of the US tariffs, Vietnam significantly increased its exports to the United States. Total Vietnamese exports to the United States in April 2018 were $3.8 billion. By April 2019, exports had risen $5.1 billion, an impressive 25% year-on-year change (US Census Bureau, 2024). Figure 2 displays the value of Vietnam's total imports from China and exports to the United States over time. The vertical line marks the onset of the trade war, after which Vietnam's imports from China and exports to the US rose at a higher rate, reaching over 120 billion USD in 2022 (US Census Bureau, 2024).

While these patterns may circumstantially suggest rerouting, the evidence is far from conclusive. First, Vietnamese exports to the US were already increasing before 2018. The increase was driven by policies such as the US–Vietnam Bilateral Trade Agreement (BTA) in 2001 and Vietnam's entry into the World Trade Organization in 2007. At the same time, Vietnamese purchases

of Chinese consumption goods, construction materials, and intermediate components in manufac- tured goods were growing rapidly (McCaig and Pavcnik, 2018; McCaig et al., 2022).

Second, the tariffs may have increased production by firms with pre-existing affiliates in Viet- nam. Many foreign-owned firms in Vietnam (especially Japanese, Korean, and Taiwanese firms) employed a China-Plus-One strategy. These firms located most of their global value chains in China but, to address possible uncertainty associated with China, located some operations in Viet- nam (Shira, 2019). For the most part, the Vietnamese affiliates were involved in the less skill- intensive portions of the supply chain, engaging in either final assembly or providing the least technologically intensive inputs (Ha, 2019). However, US tariffs against Chinese products offered opportunities to shift this balance toward Vietnam, prompting industrial upgrading (Amiti et al., 2019) and expansion of labor and capital (Wu, 2023).

Third, MNCs in China also began to increase new investments in Vietnam, building new fac- tories and hiring new workers in the country. As early as 2019, Japanese and Korean firms with operations in China began visiting Vietnam to consider investments there. Some MNCs opened new factories and located higher value-added elements of their supply chains in Vietnam. Anec- dotal evidence includes Taiwanese companies that migrated to Vietnam to increase the production of tablets and smartphones as part of Apple's supply chain (Reuters, 2024). At the same time, existing foreign investors, such as Samsung and Intel, deepened and expanded their operations. These new operations continued to source raw materials and inputs from China, but added value to the products in Vietnam, activities that supply-chain experts have labeled as a *China Thru One* strategy (Gatehouse Consulting, 2024).

The Foreign Investment Agency under the Ministry of Planning and Investment of Vietnam shows that pledged and disbursed foreign direct investments (FDI) in Vietnam achieved ten-year highs in 2019, immediately after the tariffs. The amount of FDI licensed to enter the country grew 7.2% to 38 billion USD, including nearly 3,900 new projects. New and existing investors disbursed

20.4 billion USD among approved FDI projects, representing a 7 percent increase. The ratio of disbursed to approved and pledged investments stood at 54%, one of the highest proportions

during

Vietnam's reform era. Notably, foreign investments in science and technology surged sharply, ranking among the fastest-growing sectors in the country's FDI attraction. The surging foreign investment growth continued after the tariffs, with new highs reached in 2022 and 2023.

These two patterns are fundamentally different from rerouting, as they imply increased invest- ment and labor market activity of the economic actors. With rerouting, a company imports the product into Vietnam and exports the same product out. No manufacturing labor or facilities are needed as this activity is simply logistical. Increasing investment in existing facilities and new in- vestments, however, implies the hiring of new workers, the purchase or lease of business premises, and expenditures in manufacturing new products. Critically, these businesses are likely still con- nected to supply chains in China and may continue to import raw materials, intermediate goods, and potentially machinery from China for production. Below, we seek to distinguish rerouting behavior from these non-evasive activities.

3 Data

Tariffs. We obtain HS6-digit country-month tariff values from Bown (2021).[4] These data report monthly changes in US import tariffs at the product and trade partner level for 2017 through 2019. The data also contain monthly retaliatory tariffs implemented by US trade partners, which we control for in robustness checks.

In this study, we focus on tariffs applied by the US exclusively on Chinese goods.[5] We assign the HS6-digit tariff to each of its 8-digit subcategories. Most 8-digit Vietnamese products were ultimately affected, constituting 91% of exported products and 90% of imported products. Figure 3 displays the cumulative share of affected 8-digit products over time.

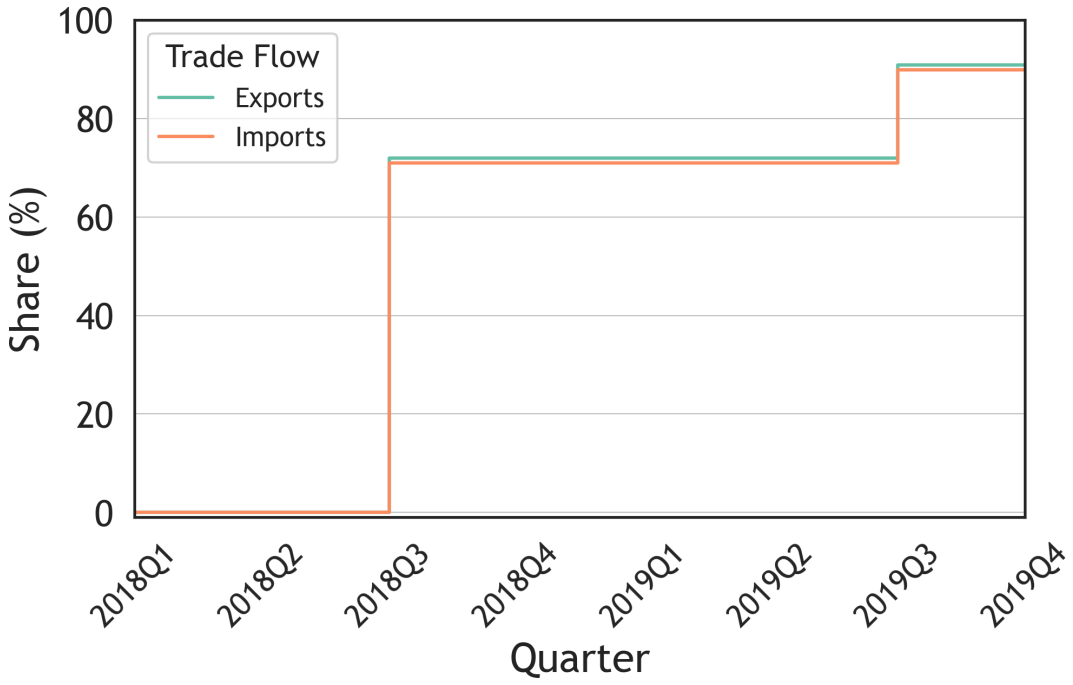
Trade Flows. We obtain transaction-level bill of lading data from S&P Global Panjiva.[6] The

[4]Although US tariffs are generally set at the 8-digit level, we match with Vietnamese trade data on the 6-digit codes because this is the most disaggregated level at which product codes are comparable across countries.

[5]In the benchmark specification, we exclude US Section 201 tariffs on solar panels and washing machines and Section 232 tariffs on steel and aluminum because they applied to countries other than China, including Vietnam.

[6]Bills of lading are legal documents that confirm when shipments reach their destinations. In Vietnam, they are regulated and collected by Vietnam Customs.

Figure 3: Targeted Share of Vietnamese HS 8-digit Products



data cover over one billion international trade shipments and 17 total countries. In this project, we focus on inflows and outflows from Vietnam from January 2018 through 2021. The key variables we use are the unique shipment ID, the arrival date, the shipment value, the seller ID, the buyer ID, the shipper's country, the destination country, and the 8-digit HS code. Importantly, Panjiva reports each individual (foreign or domestic) firm's domestic tax ID.

Firms Operating in Vietnam. We obtain characteristics of firms from the Vietnam Enterprise Survey (VES). Our data includes annual information for more than 1.2 million unique firms from 2000 to 2021. We observe balance sheets and income statement items, such as revenue, profit, employment, and fixed assets. The VES also provides detailed information about firm owner- ship, such as whether each firm is domestically-owned, foreign-owned, or a joint venture. Among foreign-owned firms, we also observe the top three foreign capital source countries. We merge the VES with Panjiva using firms' Vietnamese tax IDs.

4 Measurement

4.1 Definitions

Country-level Rerouting We define several increasingly strict measures of rerouting behavior. The first measure, which we call the country-level measure, captures the maximum flow of the same product from China to the US through Vietnam during one quarter. Specifically, for each 8-digit HS product, we can compute:

$$L_{pct} = \frac{\min\left(x^{US}_{pHS8t}, m_{pHS8ct}\right)}{x^{US}_{pHS8t}}.$$

In this equation, p_{HS8} indexes HS 8-digit products, c indexes partner countries, and t indexes quarters. x^{US} are Vietnamese exports to the US, and m_{pHS8ct} are Vietnamese imports from the source country c. When c is set to China, L_{pHS8ct} , our country-level measure of rerouting, captures the maximum possible value of product p_{HS8} flowing from China to the US through Vietnam, normalized by Vietnamese exports of that product to the US.[7]

Province-Level Rerouting Next, we define a more restrictive measure. Instead of considering flows in and out of Vietnam as a whole, we only define 8-digit product flows through the same province as rerouting. This measure accounts for coordinated rerouting performed by networks of firms within the same geographical vicinity. Specifically, we compute:

$$L_{vpct} = \frac{\min\left(x^{US}_{vpHS8t}, m_{vpHS8ct}\right)}{x^{US}_{vpHS8t}}.$$

In this equation, v indexes Vietnamese provinces, p_{HS8} indexes HS 8-digit products, c indexes partner countries, and t indexes quarters. x^{US} are Vietnamese exports to the US, and m_{pct} are Vietnamese imports from source country c. By setting c to China, we arrive at our province-level measure.

[7]This would ideally be measured in traded quantities such as kilograms or volumes. However, we use value due to data limitations; quantities are not reported in standard units of measurement in the bill of lading data. Given that export prices tend to exceed import prices, our measure likely underestimates the share of exports rerouted.

Firm-Level Rerouting Finally, we use one last measure and our most restrictive. It considers only product flows through a single firm in one quarter as rerouting. This approach eliminates a large share of legitimate churn in trade, as it is conceptually much less likely that the same firm imports and exports the same product for domestic consumption and foreign sales. For each firm and HS8 product pair, we compute:

$$L_{ip}{}^{ct} = \sum_{HS8} \min\left(x^{US}_{ipHS8t}, m_{ipHS8ct} \right)$$

In this expression, i indexes firms, p_{HS8} indexes HS 8-digit products, c indexes partner countries, and t indexes quarters. x^{US} are Vietnamese exports to the US, and $m_{ip^{HS8}ct}$ are Vietnamese imports from source country c. When c is set to China, $L_{ip^{HS8}ct}$ captures the maximum possible value of product p_{HS8} flowing from China to the US through Vietnam, normalized by Vietnamese exports of that product to the US, all within a single firm.

4.2 Discussion

Thus far, we have defined rerouting as imports from China and exports to the US within the same HS 8-digit product and quarter. However, we could have chosen alternative granularities of products and time for more or less conservative rerouting measures. For example, using coarser product categories or longer time periods would mechanically identify more trade flows as rerouting.

To explore how much these parameters matter, we compute the share of Vietnam's US exports flagged as rerouting using nine parameter combinations of three product categories: HS 4-, 6-, and 8-digit, and three periods: year, quarter, and month. We sum each measure to the country- year level for comparability. For the expressions below, we use $p \in \{HS4, HS6, HS8\}$ and $t \in \{year, quarter, month\}$. We set the source country c equal to China and suppress the index for brevity. For the country-level measures, we obtain:

$$\frac{\sum_t \sum_p L_{pt} x^{US}}{\sum_t \sum_p x^{US}} \qquad \frac{\sum_t \sum_p \min\{x^{US},\ m_{pt}\}}{\sum_t \sum_p x^{US}} \qquad =$$

For the province-level measures, we obtain:

$$\frac{\sum_t \sum_p \sum_v L_{vpt} x^{US}}{\sum_t \sum_p \sum_v x^{US}} = \frac{\sum_t \sum_p \sum_v \min\{x^{US}, m_{vpt}\}}{\sum_t \sum_p \sum_v x^{US}} \quad vpt$$

For the firm-level measures, we obtain:

$$\frac{\sum_t \sum_p \sum_i L_{ipt} x^{US}}{\sum_t \sum_p \sum_i x^{US}} = \frac{\sum_t \sum_p \sum_i \min\{x^{US}, m_{ipt}\}}{\sum_t \sum_p \sum_i x^{US}} \quad ipt$$

Table 1 displays the values for 2018 and 2021. Panel A presents country-level rerouting as a percent of total Vietnamese exports to the US. For 2018, we find a range of 13.19 to 21.87 percent, from the most granular measure at the HS 8-digit and month level to the coarsest measure at the HS 4-digit and year level. These values correspond to between 6.28 and 10.41 billion USD in rerouted goods.[8] Three years later, after the onset of the trade war, the estimated rerouting share grew to between 15.72 to 41.96 percent, or between 15.14 and 40.41 billion USD.[9] As expected, the firm-level measures are much smaller. In 2018, firm-level rerouting fell between 1.19 and 3.61 percent, equivalent to 0.57 and 1.72 billion USD. In 2021, this value increased to between 1.55 and 6.02 percent, equivalent to 1.49 and 5.80 billion USD.

Overall, Table 1 demonstrates several points. First, the granularity of the product measure has a significant effect on the extent of estimated rerouting. For example, in Panel A, the HS 4-digit estimates are 1.5 to 2.4 times larger than their HS 8-digit counterparts. Similarly, in Panels B and C, this ratio ranges from 2.0 to 3.4 and 2.1 to 3.5. This pattern likely emerges because intermediate and final goods often share the same 4-digit category. For instance, a refrigerator manufacturer that imports condensers and evaporators (HS code 8418.99.10) from China and exports refrigerated display cases (8418.50.99) would be misclassified as a rerouter at the 4-digit but not the 6- or 8-digit level. To avoid this form of misclassification, we focus on HS 8-digit products for the remainder of this paper.

Next, we consider alternative time periods. Table 1 shows that this dimension matters less

[8]Vietnam exported 47.6 billion current USD in goods to the US in 2018.

[9]Vietnam exported 96.3 billion current USD in goods to the US in 2021.

for capturing rerouting. Specifically, across all product and geographic levels, the highest ratio between the yearly and monthly estimates was 1.4, corresponding to 0.47 percentage points. For brevity, we use quarters for the remainder of this paper.

Finally, we consider how geography impacts our rerouting measure. Comparing Table 1 Panel A with Panel C, the country-level measures are between 6.1 and 11.1 times larger than their firm- level counterparts. One major driver of this difference is that country-level measures include le- gitimate value-added activities. For example, combed wool yarn (HS code 5107.10.00) imported from China in 2021 mostly went to apparel manufacturers in Nam Dinh and Tay Ninh, while most exports of this product to the US in that year were by a Swiss-owned worsted yarn manufacturer in Lam Dong province. This flow would be misclassified as rerouting under the country-level definition but not the firm or province-level measures.

The rest of the paper will focus on the province-level measure. We make this choice for several reasons. While the country-level measure is an upper bound for rerouting that transits Vietnam,[10] it is likely a considerable overestimate of true rerouting behavior, as in the bicycle tire example. At the same time, the firm-level rerouting estimate may be too conservative. Anecdotally, many ex- amples of rerouting take place through multiple firms in Vietnam, which would not be included in the firm-level numbers. For instance, in 2022, the U.S. Customs and Border Protection found that BGI group (a.k.a. US Cabinet Depot) was evading tariffs by transshipping ready-made cabinets by purchasing products from a network of Chinese companies.[11] However, such chains are likely within the same province, as rerouters seek to keep transportation costs low, even within Vietnam. For instance, in the BGI case above, the Chinese rerouters, including HOCA Vietnam and Panasia, were located in Long An province.

To summarize, the remainder of the paper will present results for our HS 8-digit, quarter-level, province-level rerouting measure.

[10]This measure is not an upper bound for rerouting that transits multiple intermediate countries. However, rerouting through multiple intermediate countries is conceptually unlikely and anecdotally uncommon, as shipment costs would rise by adding another intermediary without offering additional benefits.

[11]https://www.cbp.gov/document/publications/eapa-case-7603-bgi-group-inc-dba-us-cabinet-depot-notice-initiation.

Table 1: Alternative Product and Period Aggregations

	2018			2021		
	Year	Quarter	Month	Year	Quarter	Month
	Panel A: Country-Level Rerouting (%)					
HS 4-digit	21.87	21.52	20.99	41.96	37.75	36.85
HS 6-digit	16.52	16.18	15.4	20.74	19.85	19.1
HS 8-digit	14.59	14.05	13.19	17.49	16.49	15.72
	Panel B: Province-Level Rerouting (%)					
HS 4-digit	12.17	11.25	10.14	23.01	21.5	20.52
HS 6-digit	6.96	6.45	5.9	8.76	8.4	7.87
HS 8-digit	5.98	5.3	4.78	6.84	6.52	6.07
	Panel C: Firm-Level Rerouting (%)					
HS 4-digit	3.61	2.97	2.46	6.02	5.75	5.42
HS 6-digit	1.94	1.65	1.54	2.21	2.06	1.91
HS 8-digit	1.66	1.34	1.19	1.77	1.65	1.55

Note: This table reports the percent of total Vietnamese exports to the US in 2018 and 2021 flagged as rerouting using each set of product, spatial and time aggregations.

4.3 Validation

We validate our novel measure of rerouting by providing evidence that it is correlated with characteristics that we would *a priori* expect. Specifically, we examine whether (1) rerouters produce higher exports per worker, (2) industries with a higher share of capital of production experience more rerouting, and (3) rerouting is more prevalent in higher-tariff industries.

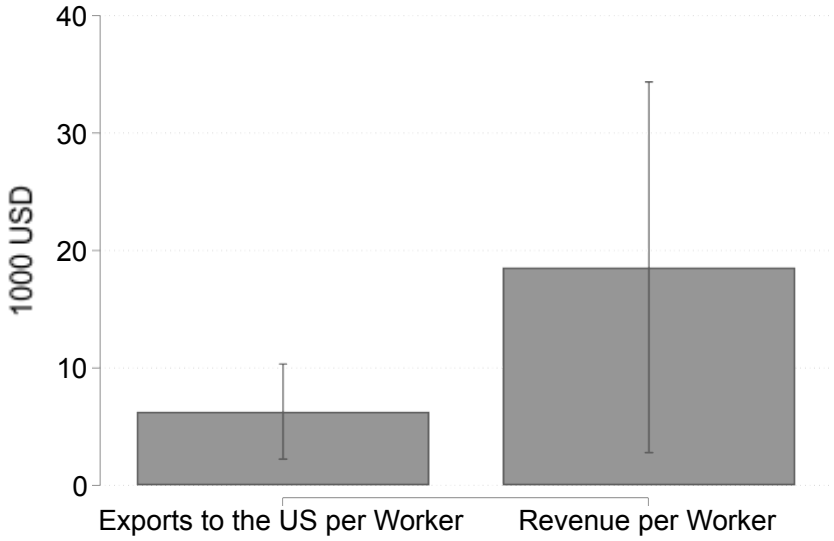
Because relabeling is less labor-intensive than value-added production, one important sense check for our rerouting measure is that flagged firms should have higher exports per worker and higher revenues per worker. To test whether the data bears out this pattern, we regress:

$$y_{i\,jt} = \alpha + \beta\, Rerouter_{it} + \gamma_t + \lambda_j + \varepsilon_{i\,jt}. \tag{1}$$

Here, i indexes firms, j indexes ISIC 4-digit industries from the VES, and t indexes years. The outcomes $y_{i\,jt}$ we consider at exports to the US per worker in thousands of USD and

revenues per

Figure 4: Coefficient Estimates of Exports and Revenue per Worker by Rerouter



Note: Data from the Vietnam Enterprise Survey, 2018-2021.

worker in thousands of USD. We regress these values onto an indicator for whether the firm is flagged as a rerouter in a given year, $Rerouter_{it}$, as well as year fixed effects and industry fixed effects. Our expectation is that β should be positive for both outcomes.

Figure 4 plots the two coefficients. We find that rerouters produce \$6, 286 more exports to the US per worker and \$18, 569 more revenue per worker. Both coefficients are statistically significant with $p = 0.011$ and $p = 0.053$ respectively. This exercise bolsters the idea that rerouting is relatively less labor-intensive than legitimate value-added production.

Another validation exercise relies on the logic that production requiring many fixed assets will be harder to relocate. Thus, we expect more rerouting activity in sectors with more capital as a share of sales. We construct a measure of the capital share of production using the Annual Survey of Industrial Production collected by China's National Bureau of Statistics. We compute each industry's median capital share from 2000-2008. We then use a crosswalk to match Chinese Indus- trial Codes to HS 6-digit products. Finally, we produce a binned scatterplot of our province-level rerouting share for each HS 6-digit product against our computed capital shares, using rerouting

measures for 2018 and 2019. Subfigure 5a displays the results. We observe a strong positive correlation, as we would expect.

To quantify this relationship, we then estimate:

$$L_{pt} = \alpha + \beta k_p + \gamma_t + \varepsilon_{pt}. \quad (2)$$

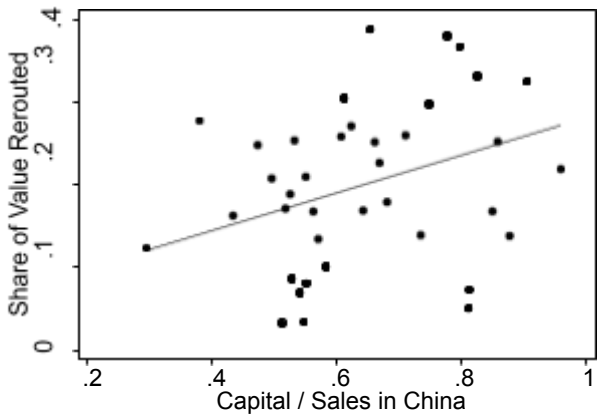
Here, p_{HS6} indexes HS 6-digit products and t indexes years. The outcome variable, L_{pt}, is the percent of total Vietnamese exports to the US flagged by our province-level rerouting measure. Capital share at the HS 6-digit level from the Chinese data is given by k_p. Finally, we control for year fixed effects and cluster standard errors at the HS 6-digit level. The coefficient β represents the correlation between our rerouting measure and equals 0.228 and $p = 6.9e-8$. This magnitude implies that moving from the 25th to 75th percentile value of capital share (0.53 to 0.71) would lead to a 4.1 percentage point increase in the rerouted share of export value to the US.

In another validation check, we leverage the intuition that rerouting through Vietnam should be higher for products with high US tariffs on Chinese goods. To test this idea, we produce a binned scatterplot of rerouting value against product-level tariffs in Subfigure 5b. Specifically, we sum our province-level rerouting measure to the HS 6-digit level and plot this value against the average tariff level on each HS 6-digit product for the years 2018 and 2019. Reassuringly, we find a strong positive relationship between these two objects. We also run a regression analogous to Equation 2, with the average HS 6-digit tariff in the place of k_p. We obtain $\beta = 0.209$ with $p = 0.033$.

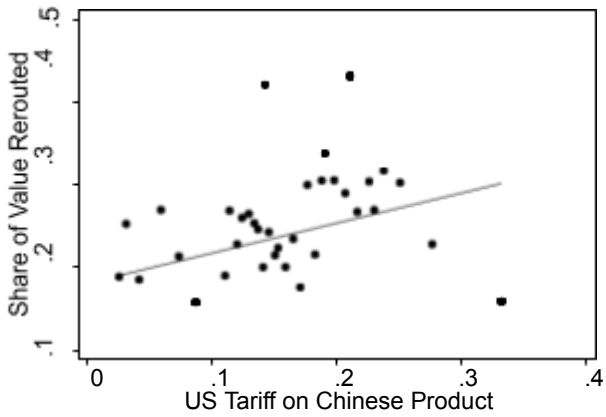
Taken together, these validation exercises reassure us that our rerouting measure behaves as one would *a priori* expect.

Figure 5: Rerouting Is Associated with Lower Capital Shares and Higher Tariffs

(a) Capital Share



(b) US Tariffs on China



Note: These binned scatterplots use data at the HS 6-digit product level. The y-axis represents the share of total export value to the U.S. identified as province-level rerouting. Capital share is calculated using China's Annual Survey of Industrial Production from 2000 to 2008.

5 Empirical Strategy

We use a difference-in-differences approach to estimate the causal effect of the trade war tariffs on rerouting behavior. Conceptually, we compare the rerouting share before and after initial tariff increases for targeted (China) and untargeted (rest of the world) source countries. As discussed in Subsection 4.2, we focus on province-level rerouting. As our variation in tariff exposure is at the HS 6-digit level, we aggregate the rerouting measure to the HS 6-digit and quarter level. We compute:

$$L_{p_{HS6}ct} = \frac{\sum_{pHS8 \in \Omega_{pHS6}} \sum_{v} \min\{x_{US_{vpHS8}t}, m_{vp_{HS8}ct}\}}{\sum_{pHS8 \in \Omega_{p_{HS6}}} \sum_{x} x_{US_{vpHS8t}}}, \tag{3}$$

where v is the province, p is the product, c is the source country, t is the quarter, x is the value of exports, and m is the value of imports. Ω_{pHS6} is the set of HS 8-digit products with the same HS 6-digit product code. We estimate:

$$_{pHS6ct} = \sum_{j=-4}^{16} \beta_j \Delta\tau_{pHS6} \; _c \times I\{t - s_{pHS6} \; _c = j\} + \; _t + \alpha \; _{pHS6} \; _c + \varepsilon \; _{pHS6} \; _{ct}. \quad (4)$$

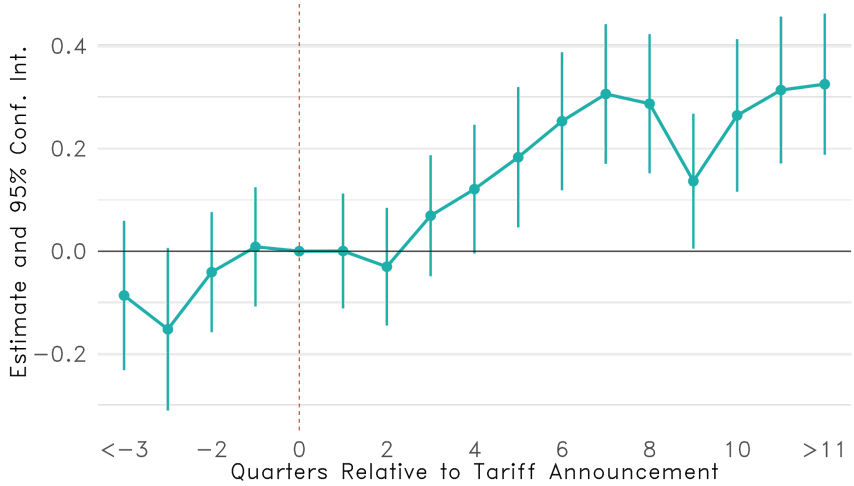
In this equation, p_{HS6} indexes HS 6-digit products, c indexes source countries, and t indexes quarters. The term $\Delta\tau_{pHS6c}$ is the tariff increase on product p from origin c levied by the US during the trade war in percentage points. Since we only include China-specific origin tariffs, $\Delta\tau_{pc} = 0$ for all source countries other than China. We use the first increase for each product with s_{pHS6c} denoting the quarter of the tariff announcement. We focus on the first tariff increase for each product as subsequent changes may have been anticipated, violating the parallel trends assumption. We cluster standard errors at the source country-HS6 product level since that is the underlying level of tariff variation.

To document pre-trends and dynamic effects, we interact $\Delta\tau_{pHS6c}$ with indicators for quarters before and after the tariff announcements. We express these indicators as $I\{t - s_{pHS6c} = j\}$ for integers $j \in [-4, 16]$ with binning at the end-points. The specification includes product-quarter fixed effects to account for product-specific but partner-invariant changes in Vietnam's import demand over time. We also include source country-product fixed effects to control for the fact that some countries always trade more in certain products with Vietnam. As most products are treated at the 6-digit level, the main identifying variation comes from comparing China with other source countries for those products, rather than comparing treated to untreated products. The coefficient β_j represents the difference in rerouting share between China and untreated source countries, in quarter j relative to tariff implementation. If $\beta_j > 0$ for $j > 0$, this suggests that the trade war increased the rerouting of products through Vietnam.

To more easily interpret the magnitude of the post-tariff increase, we also estimate a version of Equation 4 using one post-announcement period. In this equation, $I_{t \geq s}$ is an indicator that equals one on or after the announcement of a given product's tariff. Again, we cluster standard errors at the HS 6-digit product-source country level, as this is the underlying level of tariff variation.

$$L_{pHS6ct} = \beta \, \Delta\tau_{pHS6c} \times I\{t \geq s_{pHS6c}\} + \alpha_{pHS6t} + \alpha_{pHS6c} + \varepsilon_{pHS6ct} \quad (5)$$

Figure 6: Province-level Rerouting



Note: These figures report coefficients from Equation 4.

6 Results

Figure 1b displays estimates of β_j from Equation 4 for province-level rerouting. Again, we find that rerouting increases in response to tariffs, with a steady increase in province-level rerouting starting three to seven quarters after a tariff announcement and a peak after the eleventh quarter. We produce the analogous figures for country- and firm-level rerouting in Appendix Figure 1, Sub- figures 1a and 1c. Each of our country-, province-, and firm-level rerouting measures increase in response to trade war tariff hikes, exactly as one would expect. We take these results as further validation of our proposed rerouting measures.

To assess the increase in rerouting resulting from the trade war, we apply Equation 5 across three different measures of rerouting and summarize the outcomes in Table 2. In Column (1), the country-level rerouting coefficient is reported at 0.2932 with statistical significance ($p = 4.25e-12$). To interpret this coefficient's magnitude, we multiply it by the average tariff increase on Chinese exports during this period, which is 12.48%. Consequently, country-level rerouting increases by approximately $0.2932 \times 12.48 = 3.7$ percentage points. This effect signifies a 21% increase in country-level rerouting since 2018.[12]

[12]The average product's country-level rerouting percentage in the first half of 2018 was 17.5; hence $3.7/17.5 \approx 0.21$.

Table 2: The Response of Rerouting to Trade War Tariffs: Difference-in-Differences Estimates

Rerouting Granularity	Rerouted Share of Exports to USA		
	Country	Province	Firm
	(1)	(2)	(3)
Tariff × Post = 1	0.2932***	0.2016***	0.1161***
	(0.0418)	(0.0381)	(0.0343)
Observations	373,264	373,264	373,264
R^2	0.59521	0.50249	0.45441
Within R^2	0.00040	0.00024	9.39×10^{-5}
Product-Origin fixed effects	✓	✓	✓
Product-Quarter-Year fixed effects	✓	✓	✓

Column (2) reports the province-level coefficient of 0.2016 with $p = 1.49e-7$. This coefficient translates to a $0.2016 \times 12.48 = 2.5$ percentage point increase in province-level rerouting for the average increase in tariffs at the HS 6-digit product level. The change indicates a 20.5% increase in province-level rerouting since 2018.[13] Finally, column (3) shows that firm-level rerouting had a coefficient of 0.1161 with $p = 7.4e-4$. For the average tariff increase, country-level rerouting increased by $0.1161 \times 12.48 = 1.4$ percentage points. This treatment effect represents a 14.3% increase in country-level rerouting since 2018.[14]

Overall, these results support several conclusions. First, the trade war tariffs increased rerouting through Vietnam. Second, the rerouting response persisted for at least four years after tariff implementation. Third, the size of the response depends strongly on the aggregation at which rerouting is defined, and finer measures yield smaller tariff responses.

6.1 Robustness

One concern with our baseline specification is that the tariff announcements were anticipated once the first wave was implemented. To address this possibility, instead of using the quarter of the first

[13]The average product's province-level rerouting percentage in the first half of 2018 was 12.2; hence $2.5/12.2 \approx 0.205$.

[14]The average product's firm-level rerouting percentage in the first half of 2018 was 9.8; hence $1.4/9.8 \approx 0.143$.

tariff announcement as the treatment for each HS 6-digit product, we define the treatment time as Q3 of 2018 for all products. The results are qualitatively and quantitatively robust to this change, as demonstrated in Appendix Figure 2 and Table 2.

7 Heterogeneity

In this section, we explore heterogeneity in the rerouting response for several variables of interest. To do so, we compute the province-level rerouted share of total exports to the US at the HS8- quarter level for each firm and province. Then, we calculate the rerouted share of exports to the US at the HS6 product-quarter level by firms with each characteristic:

$$\frac{\sum_i I\{h_i = h\} \min\{x^{US}_{ipt}, m_{ipct}\}}{\sum_i x^{US}_{ipt}}, \quad (6)$$

where $I\{h_i = h\}$ is an indicator equal to one if a firm possesses the characteristic of interest. It is important to note that the denominator in this analysis represents the total exports of that product to the US, not merely the exports of firms with the characteristic of interest.

One desirable property of this measure is that summing across all sub-groups defined by a characteristic yields the total headline rerouting amount. Mathematically, for firm-level rerouting, this property can be expressed as:

$$L^F_{pct} = \sum_{h \in H} L^{Fh}_{pct}, \quad (7)$$

for any partition $H = \{h\}$ of firms.

7.1 Ownership

A significant concern emerged in the policy debate surrounding rerouting strategies: Chinese-owned firms might dominate the rerouting activities, potentially undermining the effectiveness of tariffs intended to curb Chinese industrial output. To explore this issue, we disaggregate the results in Section 6 by country of ownership. Our default definition of ownership is the foreign country that contributes the most capital to a firm, which is asked annually in the Vietnam Enterprise Survey.

Table 3 reports the results. We note that the coefficients mechanically sum to the firm-level rerouting response reported in Table 2. Overall, we observe several patterns. First, rerouting increases the most in Chinese-owned firms with a coefficient of 0.0739, which implies a 0.92[15] percentage point increase in province-level rerouting at the mean tariff increase. This is nearly twice as large as the increase among the next-most responsive group, domestically-owned Vietnamese firms, which increase their rerouting by 0.52[16] percentage points. Both Hong Kong and Taiwan increase their rerouting by approximately one-quarter of a percentage point. We do not observe a large change among Japanese and U.S.-owned firms.

Interestingly, rerouting among Korean firms declines by about 0.7 percentage points at the mean tariff increase. We believe this decline could be due to the fact that South Korean firms, such as Samsung, had been in the process of shifting their supply chains to Vietnam before the tariffs, and their incumbent firms were in an excellent position to take advantage of the tariffs by increasing output in these operations after 2018. Four Samsung cell phone factories in northern Vietnam accounted for 70% of the chaebol's production and 30% of the global sales revenue in 2023 (Cyrill, 2025; An, 2025).

[15] $0.0739 \times 0.1248 \approx 0.92$.

[16] $0.0417 \times 0.1248 \approx 0.52$.

Ownership	Domestic (1)	CHN (2)	TWN (3)	HKG (4)	JPN (5)	KOR (6)	USA (7)	Other Foreign (8)
Tariff × Post = 1	0.0417**	0.0739***	0.0264**	0.0263***	0.0100	-0.0566***	0.0081	-0.0128
	(0.0173)	(0.0088)	(0.0115)	(0.0074)	(0.0095)	(0.0148)	(0.0126)	(0.0209)
Observations	373,264	373,264	373,264	373,264	373,264	373,264	373,264	373,264

Table 3: Firm Ownership

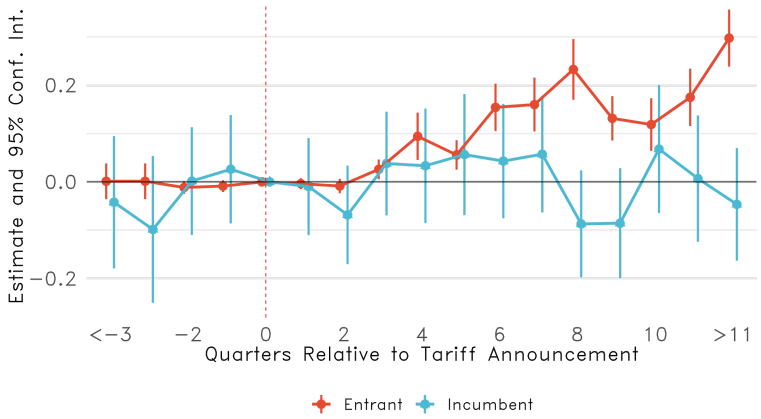
Rerouted Share of Exports to USA

Within R^2	5.14×10^{-5}	0.00094	8.49×10^{-5}	0.00017	6.53×10^{-6}	0.00024	4.7×10^{-6}	2.64×10^{-6}
Product-Origin fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
Product-Quarter-Year fixed effects	✓	✓	✓	✓	✓	✓	✓	✓

0.39341 0.34039 0.36513 0.28902 0.48657 0.37808 0.42358 0.42306

R^2

Figure 7: Entrants vs. Incumbents



7.2 Firm Age

Another key policy question was whether new firms were opened specifically to engage in rerout- ing. To understand whether new entrants drove the rerouting increase, we define new entrants as firms that did not appear in the VES prior to 2018. Firms that enter the dataset before then are defined as incumbents.

Figure 7 displays the event study results. We find that the increase in rerouting is almost entirely driven by new entrants rather than incumbent firms. Specifically, the coefficient for each post-treatment period for incumbent firms is not statistically significant, whereas the treatment effect for entrant firms mirrors that displayed in Appendix Subfigure 1c. Table 4 displays the single-post period estimate and further underscores this finding: the coefficient for rerouting in entrants is statistically significant with $p = 4.396e-24$, whereas the coefficient for incumbents is not statistically significant and has a very small magnitude. This finding is consistent with new investors entering Vietnam to begin rerouting in response to the trade war.

7.3 Extensive versus Intensive Margin

For the firm- and province-level measures, we also examine a related question: Was the increase in rerouting primarily driven by firms shifting from no rerouting to some, or by pre-existing rerouters

expanding their operations? To answer this question, we define the following objects E^F and

Table 4: Entrants vs. Incumbents

	Rerouted Share of Exports to USA	
Incumbent	Entrant	Incumbent
	(1)	(2)
Tariff × Post = 1	0.1164***	0.0007
	(0.0112)	(0.0337)
Observations	373,264	373,264
R^2	0.33551	0.45106
Within R^2	0.00144	3.21×10^{-9}
Product-Origin fixed effects	✓	✓
Product-Quarter-Year fixed effects	✓	✓

E^V_{pct} , capturing the share of firms and provinces with value rerouted above a given threshold $\ell \in \{0, 0.1, 0.5\}$. For example, E^F_{pct} for $\ell = 0.1$ is the share of all firms whose rerouting was more than 10% of their total exports to the US.

$$E^F_{pct} = \frac{\sum_i I\{L_{ipct} > \ell\}}{\sum_i I\{x^{US}_{ipt} > 0\}}, \tag{8}$$

$$E^V_{pct} = \frac{\sum_v I\{L_{vpct} > \ell\}}{\sum_v I\{x^{US}_{vpt} > 0\}}. \tag{9}$$

We then re-estimate Equation 5 with these objects as the dependent variables. Table 5 reports the coefficients for the firm- and province-rerouting measures, respectively. In both panels, the coefficients decrease as the threshold increases, suggesting that the trade-war-induced rise in rerouting was driven more by firms with little to no pre-existing rerouting rather than those already engaging in it at high levels. This finding further bolsters the idea that many firms started rerouting due to the trade war.

Table 5: Extensive Margin Estimates

Rerouting Threshold	Panel A. Rerouting Share of Exporting Firms Any (1)	 > 10% (2)	 > 50% (3)
Tariff × Post = 1	0.3320***	0.2196***	0.1747***
	(0.0413)	(0.0365)	(0.0336)
Observations	373,264	373,264	373,264
R^2	0.48418	0.48516	0.47037
Within R^2	0.00045	0.00027	0.00021
Rerouting Threshold	Panel B. Rerouting Share of Exporting Provinces Any (1)	 > 10% (2)	 > 50% (3)
Tariff × Post = 1	0.4288***	0.2918***	0.2314***
	(0.0433)	(0.0386)	(0.0365)
Observations	373,264	373,264	373,264
R^2	0.54343	0.53500	0.51682
Within R^2	0.00065	0.00042	0.00031
Product-Origin fixed effects	✓	✓	✓
Product-Quarter-Year fixed effects	✓	✓	✓

8 Firm Outcomes

Finally, we test whether the trade war helped or hurt firms in Vietnam and the Vietnamese economy more generally. We do so for two reasons: first, the question is of inherent policy and scholarly interest, and second, we will use these results to infer how rerouting affected firm performance. We study the response of sales, profits, employment, fixed assets, and materials using VES data.

One key difference between these data and those from Panjiva is that the VES is annual and runs through 2021. Furthermore, as the Panjiva data begins in January 2018, this exercise can only take place at the annual level from 2018-2021. As a result, we cannot leverage pre- and post-trade war variation at the quarter level, as we do in Equations 4 and 5. Instead, we use the

change in tariff levels for each industry from 2017 to 2019 as the treatment, which we call the "tariff change."

The key identifying assumption is that the tariff change is not correlated with factors that affect firm performance for reasons unrelated to the trade war. We estimate:

$$\Delta Outcome_{v\,j} = \beta\,\Delta\tau_j + \alpha_v + \nu_{v\,j}, \tag{10}$$

where v indexes Vietnamese provinces and j indexes ISIC 4-digit industries. $\Delta Outcome_{v\,j}$ is the difference in outcome between 2018 and 2021, and $\Delta\tau_j$ is the average US import tariff change in 2017-2019 for a given ISIC4 sector.[17] We control for province fixed effects, α_v, to account for the possibility that firms in different provinces had different average performance due, for example, to local shocks. Standard errors are clustered at the ISIC4 level. The coefficient of interest, β , captures the difference in firm performance for industries that experienced large tariff increases relative to those with small tariff increases within a given province.

Table 6 reports the results. In Panel A, we consider the logged values of total sales (Y), the num- ber of employees (L), fixed assets (K), material inputs (M), and profits (π). In Panel B, columns

(2) through (5), we report estimates for the corresponding outcome variables as shares of sales.

Overall, Panel A informs us that larger tariff increases drove more growth in key firm outcomes: sales, fixed assets, and materials. The coefficient of 4.024 in column (1) implies that for the average increase in tariffs (10.86%), firm sales increased by 0.43 log points (54%).[18] The value of 3.882 in column (3) implies that for the average increase in tariffs, fixed assets increased by 0.42 log points (52%).[19] Finally, the coefficient of 4.338 in column (4) implies that for the average increase in tariffs, material inputs increased by 0.47 log points (60%).[20]

Next, we examine how profit rates and input shares responded to the trade war. We do so for two reasons. First, to understand whether profitability went up, and second, to understand whether trade-war-induced growth in firms was biased in favor of certain inputs, which would

[17] $\Delta\tau_j \equiv \#$ [illegible] $\sum_{p\in\Omega_j}\Delta\tau_p$.

[18] $e^{0.43} - 1 \approx 0.54$.

[19] $e^{0.42} - 1 \approx 0.52$.

[20] $e^{0.47} - 1 \approx 0.60$.

be the case if rerouting activity comprised an economically meaningful share of the response. Specifically, we postulate that rerouting requires less labor and more materials relative to true value-added activities. Theoretically, rerouting constitutes purchasing the final good, re-labeling, and re-shipment. The purchase of the final good should show up on the firm balance sheet as material inputs. On the other hand, value-added production requires more labor.

We observe this exact pattern in Panel B of Table 6. We observe that larger increases in tariffs drove larger decreases in employment as a share of sales, but larger increases in material inputs as

a share of sales. The coefficient of -0.348 in column (2) implies that a product with the average

increase in tariffs saw a -0.037 decrease in the employment share, 21% of the pre-period average.[21] The coefficient of 0.291 in column (4) implies a 0.031 increase in the material input share, 2.7% of the pre-period average.[22] This finding suggests that rerouters benefit Vietnamese labor less per unit of investment than other firm activities.

While the results in Panel B of Table 6 suggest that rerouting shaped the aggregate economic impact of the trade war for firms in Vietnam, we perform an additional test of this idea. We focus on industries exposed to above-median tariff changes, conceptually creating a sample of highly-exposed industries. Then, among this group, we regress firm outcomes on observed rerouting. Thus, we can capture the correlation between firm outcomes and heavy rerouters while controlling for high exposure to the trade war. In Panel A, rerouting is associated with improved firm perfor- mance among heavily exposed firms. In Panel B, we find that rerouting is negatively correlated with labor share but positively correlated with material share among heavily exposed firms, exactly as expected.

[21]Average employment share in 2018 is 0.17; hence $-0.037/0.17 \approx -0.21$.

[22]Average material share in 2018 is 1.14; hence $0.031/1.14 \approx 0.027$.

Table 6: The Relationship Between Changes in Tariffs Firm Outcomes

	Panel A. Outcomes in Level				
	$\Delta \log Y$	$\Delta \log L$	$\Delta \log K$	$\Delta \log M$	$\Delta \log \pi$
	(1)	(2)	(3)	(4)	(5)
$\Delta \tau\_j$	4.024**	0.805	3.882**	4.338**	3.098
	(1.800)	(1.545)	(1.868)	(1.822)	(2.046)
Observations	3611	3611	3611	3611	2086
R^2	0.212	0.184	0.170	0.210	0.233
	Panel B. Outcomes in Share				
		$\Delta L/Y$	$\Delta K/Y$	$\Delta M/Y$	$\Delta \pi/Y$
	(1)	(2)	(3)	(4)	(5)
$\Delta \tau\_j$		-0.348***	-0.711	0.291***	0.143
		(0.105)	(1.275)	(0.102)	(0.095)
Observations		3611	3611	3611	3611
R^2		0.069	0.030	0.035	0.032
Tariff Mean			0.109		
Tariff Median			0.124		
Tariff SD			0.076		

Note: This table reports the estimates of β in equation (10) for aggregate production outcomes. All columns control for province-year fixed effects. Standard errors are clustered at the ISIC4 sector level.

Table 7: Rerouting and Firm Outcomes Among Above-Median Tariff Changes

	Panel A. Outcomes in Levels				
	log Y	log L	log K	log M	log π
	(1)	(2)	(3)	(4)	(5)
L_{vjt}	0.783***	0.674***	0.906***	0.829***	1.104***
	(0.246)	(0.202)	(0.238)	(0.253)	(0.277)
Observations	8576	8576	8576	8576	5183
R^2	0.241	0.221	0.219	0.239	0.296
	Panel B. Outcomes in Shares				
		L/Y	K/Y	M/Y	π/Y
	(1)	(2)	(3)	(4)	(5)
L_{vjt}		-0.018*	0.033	0.032**	0.008
		(0.011)	(0.186)	(0.014)	(0.011)
Observations		8576	8576	8576	8576
R^2		0.083	0.081	0.165	0.048
Tariff Mean			0.109		
Tariff Median			0.124		
Tariff SD			0.076		

9 Conclusion

As the 2024 Trump administration experiments with tariffs as a tool of economic statecraft, the implications for the US and target countries remain unclear. How effective will such policies be at achieving their desired goals? And will there be downstream and potentially pernicious effects on global trade and welfare? In particular, will target countries be able to avoid the harshest consequences of tariffs by encouraging their firms to re-route products through third countries? To help answer these questions, we returned to the Trump 2018 trade war with China, the last time tariffs were implemented on such a wide scale, focusing on the scale of rerouting through the third country of Vietnam.

To study this question, we implement a new empirical approach that will contribute to further research on rerouting and transshipment. First, we develop a more precise measure of the activity based on bill of lading data that enables us to observe imports and exports through third-party countries. We define likely rerouting as the same eight-digit product entering and exiting the same country, the same province, or even a single firm, in a third country within one quarter. Second, we aggregate these measures to produce upper- and lower-end headline measures of rerouting through Vietnam, since the country, province, and firm measures provide increasingly conservative definitions of rerouting. Our three approaches can offer reasonable bounds in future work. Third, by exploiting the exogenous shock of the 2018-2019 tariffs, we identify the impact of rerouting on rerouting behavior and the Vietnamese economy more generally.

Ultimately, we find that rerouting did increase as a result of the 2018 trade war, ranging from a 21% increase in country-level estimates to a 14% increase in firm-level estimates. Heterogeneity analysis demonstrates that the most likely rerouters were new investors from China, who relocated to Vietnam to re-brand Chinese-made products as Vietnamese. Importantly, many exports from Vietnam were generated by activities that may have used imports from China but added new value to the exports before shipping them - an activity vital to the Vietnamese economy's growth.

Furthermore, tariff increases drove larger growth firms' sales, fixed assets, and materials,

indi- cating that more-exposed firms did better than their counterparts. We also find that rerouting was

an economically meaningful share of these responses, as labor shares declined and material input shares increased among more-exposed firms. To isolate the effect of rerouting itself, rather than tariffs as a whole, on firm behavior, we then focus on the sample of more-exposed firms. We find that, among this sample, more rerouting was associated with higher sales, profits, and input usage. As expected, more rerouting was also associated with lower labor as a share of sales and higher materials as a share of sales. In essence, while profitable businesses, rerouters are not necessarily contributing to broad-based prosperity via employment.

The findings of our paper have important policy implications for tariff-sending and third-party transit countries. For tariff initiators, the substantive size and fast growth in the rerouting of Chi- nese firms indicate that the tariffs can be easily circumvented and are, therefore, less effective at achieving their goals. For government negotiators, it is clear that rerouting undermines efforts to manipulate behavior and achieve policy objectives in target countries. For tariff-sending country consumers, rerouting likely keeps price levels on targeted goods down even amid tariffs. For third- party transit countries, the presence of rerouting creates a global political tightrope walk. On the one hand, countries like Vietnam receive capital and labor growth boosts due to rerouting, but the net effect is clearly higher for increased value-added investors. On the other hand, encouraging or tolerating rerouting could redirect punitive measures from the tariff-sending country at them. How can third-party countries retain the spillover benefits from tariffs while avoiding being targets themselves? The most fruitful route is likely to be the policy of encouraging openness to foreign investment and foreign exporting activities that is balanced by greater regulation and enforcement of rules of origin, thereby keeping the beneficial investments while discouraging transshipment.

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10 Appendix

10.1 Types of Rerouting

After the onset of the trade war, we observe that Vietnamese exports to the US increased substantially. This paper's central goal is to identify the share of that increase that is likely tariff evasion via rerouting. To do so, we need to provide a classification of Vietnamese exports and propose ways to measure rerouting empirically. Our ultimate goal is to estimate how these types of exports responded to the US–China trade war.

We present our classification Table 8. The most important distinction is between exports that evade tariffs (type A) and exports that do not (type B). In our context, tariff evasion involves the movement of finished goods from China into Vietnam, where the origin country is re-labeled. Then, the finished goods are exported from Vietnam to the United States. We refer to this behavior as "rerouting."

Rerouting can occur within pre-existing firms that predate the trade war and new firms created after it. Both pre-existing and new firms can be either domestically- or foreign-owned. In our data, we distinguish between these four groups and estimate the size of flows A1, A2, A3, and A4. These flows may have different economic and policy implications: for example, profits from foreign- owned companies may not stay in Vietnam, whereas profits from re-labeled goods in Vietnamese companies may be reinvested in the local economy.

In contrast, exports genuinely produced in Vietnam do not constitute tariff evasion (type B). For simplicity, we will call these "value-added" flows, since their main difference from re-labeled flows is that some or all of their value was produced within Vietnamese borders. Value-added flows can originate from either pre-existing or new firms and either domestically- or foreign-owned firms. Again, the effects on the Vietnamese economy may differ across these four types, B1, B2, B3, and B4.

Other distinctions within value-added flows are useful to understand, and we will also try to distinguish them in the data. First, value-added flows could also come from infra-marginal reallo-

Table 8: Types of Vietnamese Exports to the US

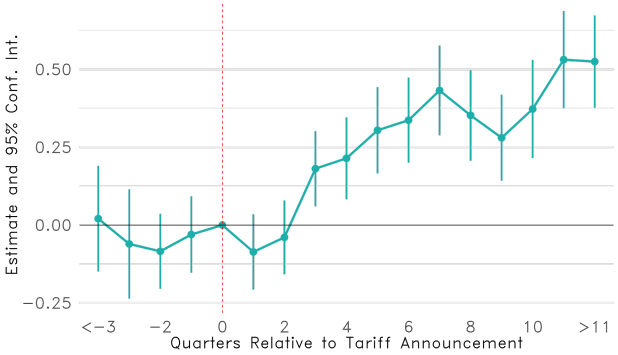
Exports to the U.S.	
A	Tariff Evasion: Re-Routing
A1	Incumbent Domestically-owned
A2	Incumbent Foreign-owned
A3	New Domestically-owned
A4	New Foreign-owned
B	Not Tariff Evasion: Value-Added
B1	Incumbent Domestically-owned
B2	Incumbent Foreign-owned
B3	New Domestically-owned
B4	New Foreign-owned

cation of exports from other destinations to the US, or intensive-margin increases in total production.

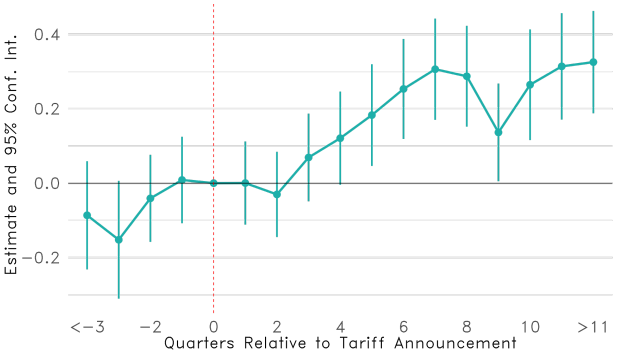
Second, value-added flows could use intermediate inputs from China, or use intermediate inputs from elsewhere. The share of inputs from China affects how much China still benefits from value-added flows. This possibility also means that the increase in Vietnamese imports of Chinese goods observed in Figure 2 may not all be tariff evasion: some of those flows could be part of legitimate changes in global supply chains.

Figure 1: The Response of Rerouting to Tariff Intensity

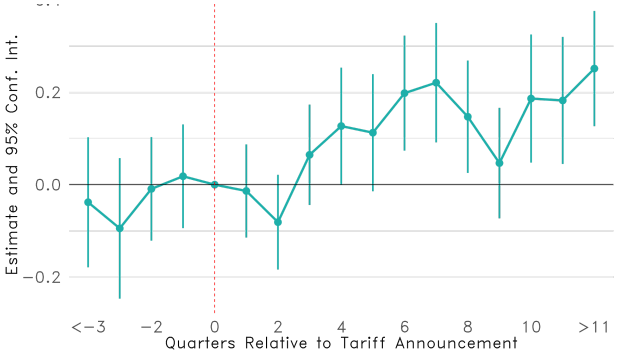
(a) Country-level Rerouting



(b) Province-level Rerouting



(c) Firm-level Rerouting



Note: These figures report coefficients from Equation 4.

Table 1: The Response of Rerouting to Trade War Tariffs: Event-Study Coefficients

Rerouting Granularity	Rerouted Share of Exports to USA		
	Country	Province	Firm
	(1)	(2)	(3)
Tariff × Quarters to announcement = <-3	0.0207	-0.0863	-0.0381
	(0.0866)	(0.0742)	(0.0718)
Tariff × Quarters to announcement = -3	-0.0606	-0.1522*	-0.0946
	(0.0897)	(0.0808)	(0.0777)
Tariff × Quarters to announcement = -2	-0.0843	-0.0408	-0.0091
	(0.0615)	(0.0597)	(0.0572)
Tariff × Quarters to announcement = -1	-0.0303	0.0085	0.0182
	(0.0627)	(0.0593)	(0.0573)
Tariff × Quarters to announcement = 1	-0.0862	0.0003	-0.0136
	(0.0617)	(0.0570)	(0.0515)
Tariff × Quarters to announcement = 2	-0.0394	-0.0303	-0.0812
	(0.0604)	(0.0584)	(0.0523)
Tariff × Quarters to announcement = 3	0.1811***	0.0691	0.0646
	(0.0616)	(0.0601)	(0.0554)
Tariff × Quarters to announcement = 4	0.2145***	0.1208*	0.1269**
	(0.0672)	(0.0639)	(0.0645)
Tariff × Quarters to announcement = 5	0.3044***	0.1830***	0.1126*
	(0.0708)	(0.0698)	(0.0647)
Tariff × Quarters to announcement = 6	0.3368***	0.2532***	0.1982***
	(0.0697)	(0.0686)	(0.0635)
Tariff × Quarters to announcement = 7	0.4323***	0.3062***	0.2209***
	(0.0735)	(0.0694)	(0.0659)
Tariff × Quarters to announcement = 8	0.3523***	0.2874***	0.1471**
	(0.0744)	(0.0691)	(0.0621)
Tariff × Quarters to announcement = 9	0.2804***	0.1364**	0.0467
	(0.0706)	(0.0671)	(0.0610)
Tariff × Quarters to announcement = 10	0.3727***	0.2645***	0.1865***
	(0.0804)	(0.0759)	(0.0708)
Tariff × Quarters to announcement = 11	0.5312***	0.3139***	0.1824***
	(0.0798)	(0.0730)	(0.0702)
Tariff × Quarters to announcement = >11	0.5251***	0.3253***	0.2514***
	(0.0757)	(0.0702)	(0.0636)

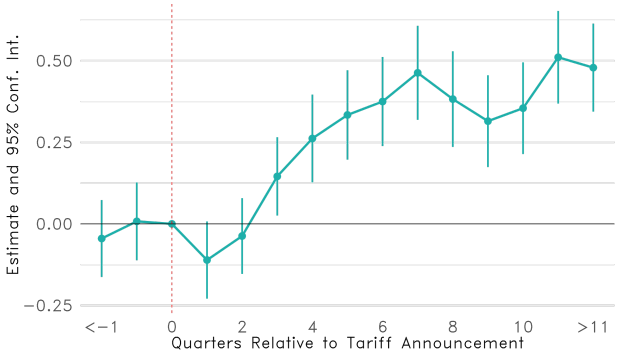
Observations	373,264	373,264	373,264
R^2	0.59565	0.50278	0.45464
Within R^2	0.00147	0.00083	0.00051
Product-Origin fixed effects	✓	✓	✓
Product-Quarter-Year fixed effects	✓	✓	✓

Table 2: Robustness to Uniform Treatment Date of Q3 2018

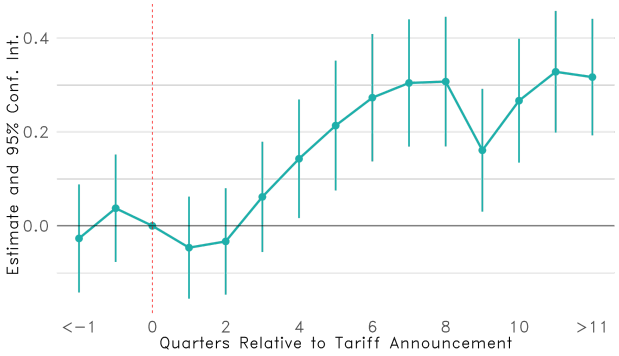
Rerouting Granularity	Rerouted Share of Exports to USA		
	Country	Province	Firm
	(1)	(2)	(3)
Tariff × Post = 1	0.2932***	0.2016***	0.1161***
	(0.0418)	(0.0381)	(0.0343)
Observations	373,264	373,264	373,264
R^2	0.59521	0.50249	0.45441
Within R^2	0.00040	0.00024	9.39×10^{-5}
Product-Origin fixed effects	✓	✓	✓
Product-Quarter-Year fixed effects	✓	✓	✓

Figure 2: The Response of Rerouting to Tariff Intensity

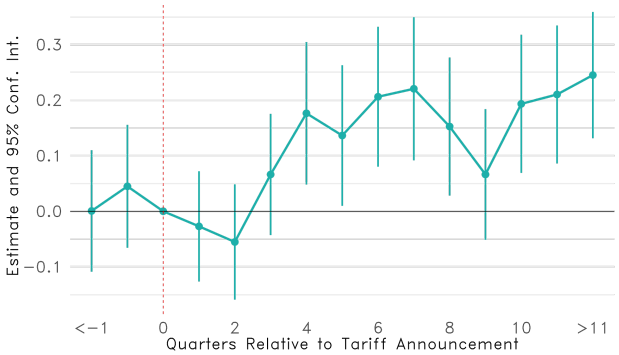
(a) Country-level Rerouting



(b) Province-level Rerouting



(c) Firm-level Rerouting



Note: These figures report coefficients from Equation 4 using Q3 2018 as the treatment date for all products.