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Abstract: We study how third-country supply chains reconfigure under the 2018-2019 US tariff escalation on Chinese goods, using comprehensive transaction-level trade and domestic business-to-business records for firms in Vietnam. Exploiting exogenous variation in firm-level tariff exposure constructed from pre-treatment export portfolios, we find that both value-added processing and transshipment contribute to triangular trade through Vietnam, but activate on distinct timelines: transshipment responds immediately while processing activates mainly after the May 2019 escalation signals tariff permanence. Supply chain network adjustment precedes trade value expansion, with upstream Chinese supplier diversification beginning first, local intermediate sourcing activating later, and downstream US buyer adjusting last. Opening the third-country supply chain interior, we show that over half of the tariff-induced local sourcing expansion channels Chinese intermediate content, and that local sourcing from China-embedded local suppliers responds at 3.2 times the magnitude of independent local suppliers. These results indicate that global value chains relocation to Vietnam activated processing capacity but extended rather than displaced Chinese supply chain influence in the third country.

Keywords: Trade war; Supply chain reconfiguration; Local sourcing; Vietnam

JEL Classification: F13, F14, F23, L14

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1. Introduction

China dominates US import markets as the world's largest exporter, supplying approximately 22% of US goods imports in 2017. After decades of deepening trade liberalization, this landscape shifted abruptly in 2018, when the US imposed four waves of Section 301 tariffs covering roughly $250 billion in Chinese imports across three tranches, nearly half the value of US imports from China in 2018 (Fajgelbaum, Goldberg, and Kennedy, 2020). In an era of fragmented global production, where goods routinely cross multiple borders before reaching final consumers (Antràs and Chor, 2022), the consequences of US-China tariff contestation extend beyond the bilateral relationship and fundamentally altered the cost structure of global value chains (GVCs) routed through China, creating strong incentives for firms to relocate production to third countries (Alfaro and Chor, 2023; Fajgelbaum et al., 2024; Garred and Yuan, 2025).

Vietnam, geographically proximate to China, embedded in pre-existing cross-border supplier networks, and enjoying reciprocal tariff access to the US, emerged as a particularly prominent venue through which Chinese goods reach the US market (Iyoha et al., 2025). This raises a question: did the US-China trade war accelerate reshoring to Vietnam and does the resulting reconfiguration of GVCs merely transit through Vietnam's borders or reshape its local supply network?

We examine how firms in Vietnam that export to the United States (US) adjust their cross-border and domestic sourcing networks in response to US tariff escalation on Chinese goods. To address this question, we employ firm-level trade data, based on S&P Global Panjiva Supply Chain Intelligence, covering over 52 million records over 2018-2019 across three trade flows: Vietnam's imports from China, Vietnam's exports to the US, and domestic business-to-business transactions between Vietnamese firms. Linking these records at the firm level through unique tax identification numbers (IDs) enables us to observe each firm's upstream Chinese suppliers, downstream US buyers, and local intermediate suppliers within a unified panel. Several studies examine Vietnam's aggregate trade and labor market responses to the tariff escalation (Mayr-Dorn et al., 2023; Rotunno et al., 2023; Lee and Rhee, 2025; Iyoha et al., 2025), but none comprehensively tracks firm networks across cross-border and intranational trade flows.

We construct firm-level tariff exposures based on the pre-treatment export-weighted average US tariff increase on Chinese goods in each firm's product portfolio at the Harmonized System (HS) 6-digit level. To keep a clean identification, our main estimation sample comprises 1,360 firms identified from 2017 US customs records as exporters to the US, matched forward to the 2018-2019 data through tax IDs and firm names. We estimate a generalized difference-in-differences (DD) specification with continuous treatment intensity, controlling for Chinese retaliatory tariff exposure, US tariffs on Vietnamese goods, and baseline firm size interacted with quarter fixed effects.

Our analysis reveals that US tariff escalation on Chinese goods substantially increases both intermediate imports from China and final goods exports to the US among more-tariff-exposed Vietnamese firms. Both flows remain close to their pre-treatment levels through 2018 before surging after the May 2019 escalation extended 25% tariffs to the largest tranche of Chinese goods. On average over the post-treatment period, more-exposed firms increase intermediate imports from China by 85%

and final goods exports to the US by 126% relative to less-exposed firms, with substantially larger peak responses following the May 2019 escalation.

Whether this expansion reflects genuine value-added processing or transshipment of Chinese goods through Vietnam to circumvent US tariffs is a central question for trade policy and trade diversion measurement. We find that both channels contribute to triangular trade, but they display distinct dynamics. Transshipment (re-export of Chinese final goods to US) responds from the first tariff waves in 2018Q3, with 29% increase on the import side and 35% on the export side within matched final product families. Processing is indistinguishable from zero throughout 2018 and activates after the May 2019 escalation, with 66% increase in intermediate imports and 98% increase in final goods exports, within matched product families, by 2019Q3. Processing activity is concentrated in consumer goods, while capital goods show no significant processing response, consistent with limits on rapid productive relocation given Vietnam's manufacturing base.

A further question for tariff policymakers is how rapidly third-country firms reconfigure cross-border buyer-supplier networks. Decomposing each firm's trade network into extensive (number of partners) and intensive (value per existing partner) margins, we find that network reconfiguration precedes trade flows, with dynamics differing systematically across value chain positions. More-tariff-exposed Vietnamese firms expand their Chinese supplier counts from the first tariff waves in 2018Q3, and subsequently deepen commitment with Chinese suppliers, whereas downstream US buyer counts remain flat throughout 2018 and activate after May 2019. Downstream adjustment operates overwhelmingly through scaling existing buyer relationships.

Our findings further extend from cross-border sourcing to local sourcing dynamics. Local intermediate sourcing increases by 48% on average at the interquartile range of tariff exposure, with the expansion concentrated in the later quarters: coefficients rise modestly in 2019Q1-Q2 before surging in 2019Q3. This activation lags upstream Chinese supplier network expansion but before downstream US buyer network activation.

A central question for host-country policymakers is whether tariff-induced local sourcing reflects the development of independent domestic capacity or the territorial extension of Chinese production networks into the host economy. To address this, we construct a firm-level measure of Chinese input content embedded in local sourcing relationships, weighting each local supplier's Chinese import intensity (Cajal-Grossi, Macchiavello and Noguera, 2023) into the firm's local sourcing decision. Over half of the local sourcing expansion reflects Chinese intermediate content flowing through the local supply chain, and sourcing from China-embedded local suppliers responds at 3.2 times the rate of independent local suppliers.

This paper relates to three strands of literature. First, we contribute to the growing work on global trade reallocation following the US-China tariff escalation. A rapidly expanding literature documents that tariffs shifted trade toward third countries (Alfaro and Chor, 2023; Fajgelbaum et al., 2024; Garred and Yuan, 2025; Utar, Zurita, and Ruiz, 2025). Iyoha et al., (2025) further provide aggregate bounds on transshipped versus domestically value-added Vietnamese exports to the US. By tracking firm responses in the third-country across the full 2018-2019 tariff rollout, we extend this evidence to separately identify transshipment and value-added processing channels and show that the two channels activate on distinct timelines, with value-added processing further bounded by the host country's manufacturing base.

Second, we contribute to the literature on firm-level supply chain networks under trade disruption. Recent work documents that trade policy uncertainty reshapes firms' sourcing decisions (Ersahin, Giannetti and Huang, 2024) and that cross-border buyer-supplier relationships carry high switching costs (Monarch, 2022). Utar et al. (2025) extend this inquiry to third-country GVC adjustment, documenting sourcing responses by Mexican firms to the trade war, but their customs-based analysis captures cross-border sourcing adjustments rather than the relative timing of upstream and downstream relationship formation. We introduce a third layer, local intermediate suppliers, into the bilateral upstream-downstream framework and document a sequenced adjustment pattern for third-country firms: Chinese supplier diversification and deepening begins first, local supply chain activates later, and US buyer commitment follows last.

Third, we contribute to the measurement of third-country value-added and Chinese supply chain dependence under trade diversion. Alfaro and Chor (2023) raise the question of whether third-country sourcing shifts genuinely reduce dependence on Chinese supply chains. Existing studies either infer domestic value-added shares from cross-border flows (Iyoha et al., 2025), or document at the country level that supply chains through "connector" countries remain heavily reliant on Chinese content (Freund et al., 2024). We provide a finer lens on Chinese supply chain dependence than cross-border trade shares alone by constructing a supplier-level measure of Chinese input embeddedness that captures the Chinese intermediate content flowing through local supplier networks.

The remainder of the paper proceeds as follows. Section 2 describes the institutional background and tariff timeline. Section 3 introduces the data sources, sample construction, tariff exposure measures, product-family classification, and China-embeddedness identification. Section 4 presents the empirical model. Section 5 reports the main results. Section 6 presents robustness checks. Section 7 concludes.

2. Institutional and tariff background

The US imposed a series of escalating tariffs on Chinese imports between 2018 and 2019 under Sections 201, 232, and 301 of US trade law (see Bown & Kolb, 2023). Table 1 summarizes the timeline. The initial actions in early 2018 targeted specific sectors, solar panels, washing machines, aluminium, and steel, under Sections 201 and 232, covering 836 products worth $56 billion in 2017 import value. These tariffs applied globally, including to Vietnamese exports.

The broader escalation came through Section 301, directed exclusively at China. The first three waves took effect between July and September 2018 at 25% (Lists 1-2) and 10% (List 3). The escalation intensified in May 2019 when the List 3 rate was raised to 25%, and again in September 2019 with the imposition of List 4A at 15%. By September 2019, Section 301 tariffs covered 16,403 products with a trade-weighted average tariff of 21.0%, up from 2.6% (Table 1). China retaliated in parallel across 7,757 products. In December 2019, both sides agreed to halt further escalation ahead of the Phase One agreement, though most existing tariffs remained in place (Bown, 2021).

Table 1: Timeline of tariff increases, 2018-2019

Tariff wave	Date enacted	Products (# HS-10)	2017 imports (mil US$)	(%)	Tariff (%) 2017	Tariff (%) 2018
Panel A: Tariffs on US imports enacted by the US						
Section 201/232 (global, including Vietnam)						
Solar panels	7 Feb 2018	8	5,782	0.2	0	30
Washing machines	7 Feb 2018	8	2,105	0.1	1.3	32.2
Aluminium	Mar-Jun 2018	67	17,685	0.7	2	12
Iron and steel	Mar-Jun 2018	753	30,523	1.3	0	25
Section 301 (China)						
China 1 (List 1)	6 Jul 2018	1,672	33,510	1.4	1.3	26.2
China 2 (List 2)	23 Aug 2018	433	14,101	0.6	2.7	27.0
China 3 (List 3)	24 Sep 2018 raised 10 May 2019	9,102	199,264	8.3	3.3	28.3
China 4A (List 4A)	1 Sep 2019	5,196	105,688	4.4	3.8	18.8
China 4B (List 4B)	15 Dec 2019	888	151,000	6.3	—	suspended
Section 301 total	Jul 2018-Sep 2019	16,403	352,563	14.7	2.6	21.0
Panel B: Retaliatory tariffs on US exports enacted by China						
2017 exports						
China (2018 waves)	Apr-Sep 2018	7,474	92,518	6.0	8.4	18.9
China total	Apr 2018-Sep 2019	7,757	98,016	6.3	8.7	19.5

Notes: Adapted and extended from Fajgelbaum et al. (2020) and Fajgelbaum et al. (2024). Panels display unweighted 10-digit HS country average tariff rates. 2017 tariff rates computed as annual average; post-war rates computed as of December 2019. Total tariff rates represent trade-weighted average of row values. Import/export share denominator is total 2017 annual US$ value of all US imports/exports. Vietnam imposed no retaliatory tariffs on the US during this period. List 4A product count and trade value derived by subtraction from the consolidated January 2020 update. List 4B was suspended ahead of the Phase One agreement. Chinese retaliation dates for 2018: April 2, July 6, and September 24. China raised retaliatory rates on June 1, 2019 and added 283 products on September 1, 2019.

The bilateral consequences of this escalation have been extensively documented, including near-complete tariff pass-through to US import prices (Amiti, Redding, and Weinstein, 2019; Cavallo et al., 2021), contraction of Chinese exports and economic activity (Jiang et al., 2023; Huang et al., 2023; Chor and Li, 2024), and adverse effects on US exporters and workers through input-output linkages (Handley et al., 2025; Javorcik et al., 2025). The consequences also extend to third countries, where employment and output gains have been documented in countries capturing diverted trade (Cavalcanti, Ogeda, and Ornelas, 2026). Our focus is on the supply chain mechanisms underlying these third-country effects.

Vietnam occupied a distinctive position in this tariff escalation. Geographically adjacent to China with established cross-border supplier networks, Vietnam was not subject to Section 301 tariffs and maintained tariff-free or low-tariff access to the US market for most manufactured goods (see Amiti et al., 2019; Fajgelbaum et al., 2020). This asymmetry, rising tariffs on Chinese exports to the US but not on Vietnamese exports, created an arbitrage opportunity for firms positioned between the two markets. Vietnamese firms could source intermediate inputs from Chinese suppliers, perform processing or assembly domestically, and export finished goods to the US at prices below the tariff-inclusive cost of direct Chinese exports (e.g., Utar et al., 2025). Vietnam was not subject to retaliatory tariffs from either side during the sample period.

Figure 1: US tariff on Chinese products and trade flows in Vietnam

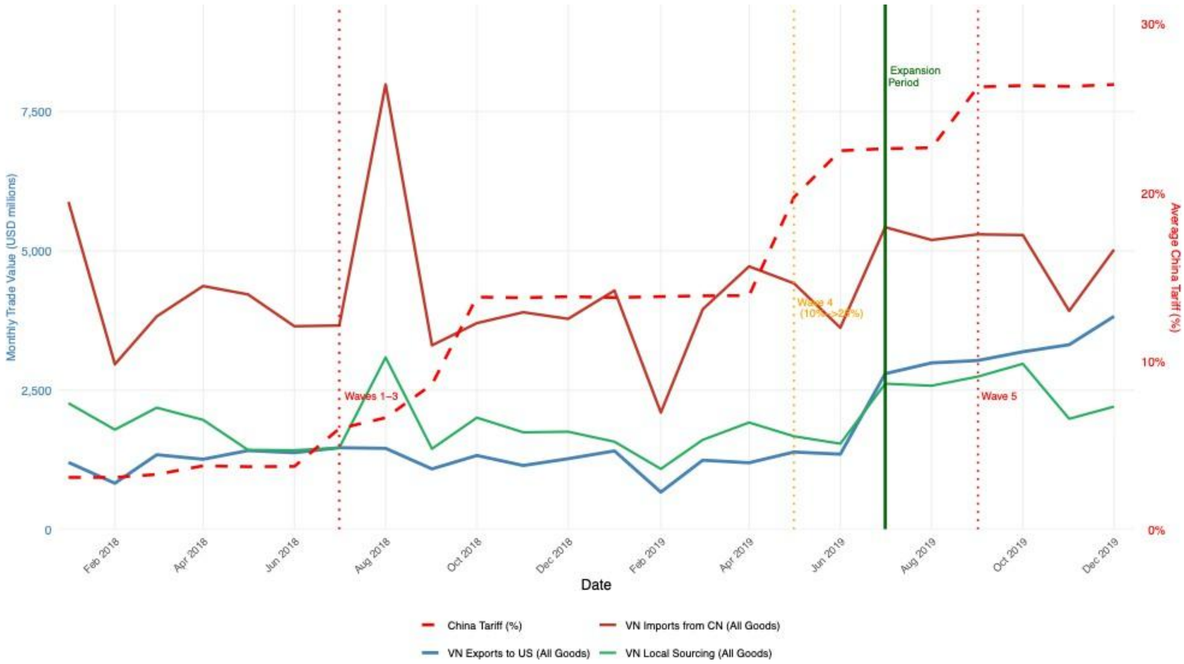


Figure 1 documents the aggregate trade response. Imports from China rose visibly following the first tariff waves in mid-2018, though this early increase was driven primarily by final goods rather than intermediates (see Figure A1 reporting intermediate imports and local sourcing), potentially reflecting transshipment of Chinese products ahead of further escalation. The decisive shift across all three flows came in mid-2019: imports from China, exports to the US, and local sourcing all surged simultaneously from July 2019, following the May 10 List 3 rate increase from 10% to 25%. The timing suggests that the initial 10% rate on the largest tranche was insufficient to trigger large-scale supply chain reconfiguration, while the escalation to 25% signaled a durable tariff regime that justified the fixed costs of adjusting sourcing and production networks. That imports from China including final goods track US exports so closely raises the question of whether Vietnam's trade expansion reflects genuine value-added processing or transshipment. We decompose this in Section 3.

3. Data and measures

3.1. Data sources and sample

We collect transaction-level trade records from S&P Global Panjiva Supply Chain Intelligence, covering all export, import, and intra-nation trade activities of firms in Vietnam from 2018 to 2019. The trade data cover four layers of shipment records: 16 million records of Vietnam's imports from China, 6 million records of Vietnam's exports to the US, 12 million domestic procurement records capturing each firm's purchases from local suppliers, and 18 million local sales records capturing each supplier's domestic sales activity. Each record identifies shipper’s tax IDs and both transacting parties through firm names and S&P Capital IQ identifier (SPCIQID), and classifies traded products using HS codes at the 8-digit level.

We combine transaction-level trade records with product-level tariff schedules from Fajgelbaum et al. (2020), updated in Fajgelbaum et al. (2024). The tariff data record US import tariffs on Chinese goods across five waves of escalation between 2018 and 2019, China's retaliatory tariffs on US exports, US import tariffs on Vietnamese goods, and Vietnamese tariffs on US goods, all at the HS 10-digit level. To make sure cross-country comparability, we aggregate their 10-digit product-country pairs to the HS 6-digit level. We conduct the analysis at the firm-quarter level after aggregating the transaction level data. We do not use monthly panel to avoid any seasonal fluctuation. For example, the shipment count surges before and after Chinese New Year in February, but is closed to zero during the period.

Our estimation sample is drawn from US import customs records for year 2017, which identify approximately 1,360 unique Vietnamese shippers after matching to the 2018-2019 records using Tax IDs, SPCIQIDs, and firm names. By starting from the pre-treatment 2017 US export records, we construct a sample whose composition is determined entirely before the tariff shock, ensuring that sample membership is orthogonal to treatment. Based on Tax IDs, SPCIQIDs, and names, we link local sales and import records, identifying the degree of Chinese GVC-embeddedness for local suppliers. Our study is the first to build up a comprehensive trade network from foreign suppliers to local buyers and suppliers to foreign buyers, and to characterize their features in GVCs.

Table 2: Summary statistics by treatment baseline

	Panel A: 2017 Baseline (1,360)		Panel B: 2018H1 Baseline (4,380)		Observation	
Variable	Mean	SD	Mean	SD	Panel A	Panel B
Log Value of Intermediate Import (CN)	5.439	6.238	4.898	6.048	10,880	35,040
Log Value of Final Goods Import (CN)	4.508	5.414	4.444	5.434	10,880	35,040
Log Value of Final Goods Export (US)	5.488	6.183	5.535	6.024	10,880	35,040
Log Value of Consumer Goods Export (US)	5.214	6.121	5.154	5.969	10,880	35,040
Log Value of Capital Goods Export (US)	0.536	2.413	0.657	2.617	10,880	35,040
Log Value of Local Intermediate Sourcing	3.130	5.221	2.587	4.863	10,880	35,040
Log Number of CN Suppliers (Interm.)	0.723	1.047	0.635	0.960	10,880	35,040
Log Number of US Buyers (Final)	0.566	0.759	0.541	0.704	10,880	35,040
Log Number of Local Suppliers (Interm.)	0.353	0.697	0.294	0.648	10,880	35,040
Log Per-CN-Supplier Value of Import	4.885	5.579	4.416	5.433	10,880	35,040
Log Per-US-Buyer Value of Export	5.135	5.754	5.184	5.668	10,880	35,040
Log Per-Local-Supplier Sourcing Value	2.904	4.838	2.397	4.500	10,880	35,040

Table 2 reports summary statistics. Panel A describes the 1,360 estimation-sample firms, reporting all dependent variables including intermediate imports from China, final goods exports to the US, local sourcing, and buyer-supplier network measures. The 1,360 estimation-sample firms account for 26.9% of Vietnam's total exports to the US during 2018-2019. The modest coverage reflects that the design sacrifices sample breadth for clean pre-treatment identification. As a robustness check, we construct a broader sample of 4,380 Vietnamese exporters to the US in the 2018H1 export shipment records, the period preceding US-China tariff formal implementation. These firms account for 99% and 71.7% of Vietnam's exports to the US in 2018 and during 2018-2019, respectively. The decline in coverage over time reflects the large-scale entry of new exporters in 2019. Firms that began exporting to the US after July 2018 are excluded from our estimation sample, as their product selection is itself a response to the tariff structure, introducing endogenous entry bias. Panel B of Table 2 reports summary statistics for the sample, showing a similar pattern as the 1360 sample.

Based on UNCTAD Stages of Processing (SoP) concordance for product classification, we classify traded products by stage of processing using the UNCTAD Stages of Processing concordance at the HS 6-digit level, which groups products into four categories: raw materials (SoP 1), intermediate goods (SoP 2), consumer goods (SoP 3), and capital goods (SoP 4). We aggregate these into two groups for the analysis: intermediates (SoP 1-2) and final goods (SoP 3-4). We extend the concordance to cover the HS 2012 and 2017 classification vintages, achieving 100 percent product coverage across all shipment records.

3.2. Tariff exposure identification

3.2.1. Exposure to US import tariffs on Chinese products

Our tariff exposure panel comprises 1,360 firms observed quarterly from January 2018 through December 2019. The key independent variable is a firm-level tariff exposure index, aggregated by product export categories. Following Benguria et al. (2022) and Utar et al. (2025), the specific formula is:

$$TE_i^{US-CN} = \frac{\sum_{j \in USIT^{CN}} EX_{ij}^{base} * \Delta\tau_j^{USIT^{CN}}}{\sum_j EX_{ij}^{base}} \quad (1)$$

TE_i^{US-CN} measures the export-weighted exposure of firm i's goods in Vietnam that will be subject to US import tariffs from China, relative to the firm's total exports to US in the baseline period 2017 Q1-Q4. In this expression, $USIT^{CN}$ denotes the set of HS 6-digit products subject to the 2018/19 US import tariffs imposed on China, while $\Delta\tau_j^{USIT^{CN}}$ represents the tariff change on product j imported from China. EX_{ij}^{base} refers to the export value of firm i in product j in the baseline period. The product of EX_{ij}^{base} and $\Delta\tau_j^{USIT^{CN}}$ assigns varying weights to the export goods to US of firm i in Vietnam based on the tariff escalation that they are set to encounter if originating from China.

We use each firm's pre-treatment exports to the US as the denominator because US tariffs on Chinese goods create arbitrage opportunities exclusively in the US market, where Vietnamese exports substitute for tariff-affected Chinese competitors. The relevant exposure is therefore the tariff-affected share of each firm's US-bound export portfolio. Using total world exports as the denominator would dilute measured exposure for firms that export extensively to third markets, even though their competitive position in the US market is unaffected by sales elsewhere.

Additionally, we use the first half of 2018 (2018H1) as the baseline period for robustness. There are two reasons. First, the Vietnam customs data are available from 2018 onward and provide comprehensive coverage of Vietnamese exporters through tax ID records, as we mentioned in section 3.1. Second, although the US imposed Section 201 tariffs on washing machines and solar panels in February 2018 and Section 232 tariffs on steel and aluminum between March and June 2018, these were global safeguard and national security measures applied to all origin countries, not specific to China.

Figure 2: Tariff exposure of Vietnam exporters

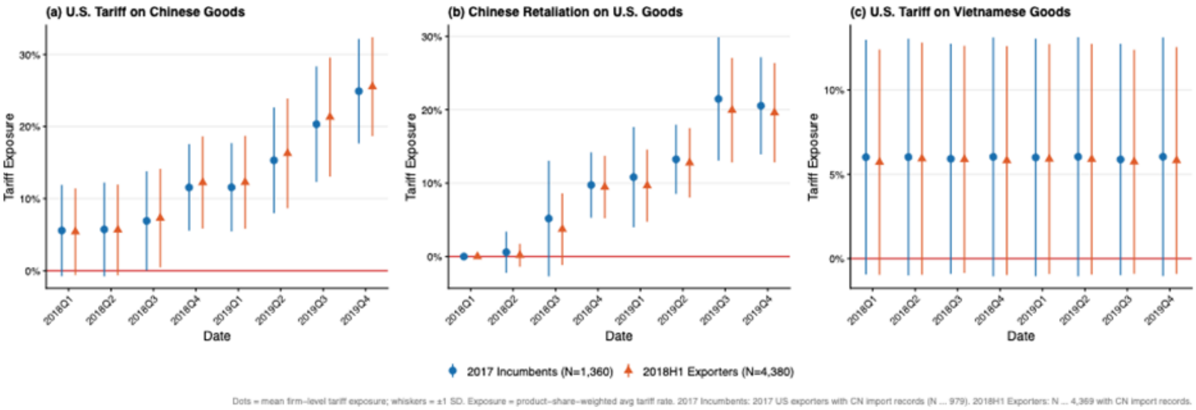


Figure 2 plots the cumulative product-share-weighted average tariff rate faced by firms in each sample at each quarter. As Panel (a) of Figure 1 shows, the average firm exposure rate to US tariff on Chinese goods was almost constant in 2018Q1 and 2018Q2. The China-specific Section 301 tariffs were announced in April 2018 and took effect in July 2018, when the average firm tariff exposure jumped to around 7%. The 2018H1 period is therefore pre-treatment with respect to the Section 301 shock.

3.2.2. Exposure to Chinese retaliatory tariffs on US exports

Likewise, to examine if China's retaliatory tariffs on US exports spill over to third-country exporters and determine the direction of this effect, we identify third-country firms that were exporting goods that would later be targeted by these tariffs. $USRT^{CN}$ denotes the set of HS 6-digit products targeted by China's retaliatory tariffs. $\Delta\tau_j^{URIT^{CN}}$ is the tariff increase for good j as of 2019 Q3-Q4. As before, TE_i^{CN-US} measures the weighted export value in goods targeted by Chinese retaliatory tariffs to the total pre-war US exports of firm i.

$$TE_i^{US-CN} = \frac{\sum_{j \in USRT^{CN}} EX_{ij}^{base} * \Delta\tau_j^{USRT^{CN}}}{\sum_j EX_{ij}^{base}} \qquad (2)$$

Panel (b) of Figure 2 confirms that Chinese retaliatory tariff exposure rises substantially over the sample period for both the 2017 incumbent and 2018H1 exporter samples, with mean firm-level exposure increasing from near zero to approximately 15-20% by 2019Q3-Q4, underscoring the importance of controlling for this channel in the main specification.

The 2018H1 exporters show marginally higher exposure to US tariffs on Chinese products (Panel a) and marginally lower exposure to Chinese retaliatory tariffs on US products (Panel b), consistent with post-2017 entrants self-selecting into product categories targeted by Section 301 but largely outside the scope of China's retaliation targets, creating larger arbitrage opportunities.

3.2.3. Exposure to tariffs between Vietnam and the US

To account for other trade policy changes during the sample period, we control for US tariffs on Vietnamese goods and Vietnam's retaliatory tariffs on US goods. Since the Section 201 and Section 232 tariffs targeted multiple countries including Vietnam, $TE_i^{US-\mathrm{VIE}}$ does not cleanly identify China-specific effects but instead serves as a control for potential confounding effects of these global tariff measures.

$$TE_i^{US-\mathrm{VIE}} = \frac{\sum_{j \in USIT^{VIE}} EX_{ij}^{base} * \Delta\tau_j^{USIT^{VIE}}}{\sum_j EX_{ij}^{base}} \tag{3}$$

Panel (c) of Figure 2 corroborates that mean US tariff exposure on Vietnamese goods remains low and stable at approximately 5% throughout 2018-2019 for both samples, with minimal cross-sectional dispersion, confirming that these global safeguard measures generate negligible variation in our setting. Vietnam imposed no retaliatory tariffs on the US during the 2018-2019 period; the corresponding control variable $TE_i^{US-\mathrm{VIE}}$ is identically zero and excluded from the specification.

3.3. Buyer-supplier relationship

From these transaction-level data, we construct firm-quarter panel variables capturing the structure and dynamics of each firm's buyer-supplier network. Similar to the method of Alfaro-ureña, Manelici, and Vasquez (2022), we decompose the relationship into extensive margin (new relationship formation measured by the number of supplier) and intensive margin (deepening of existing relationships measured by transaction value per supplier). On the upstream side, we measure the number of distinct Chinese suppliers of intermediate goods and per-supplier intermediate import value. On the downstream side, we measure the number of distinct US buyers of final goods and per-buyer export value, enabling the same extensive-intensive decomposition for the export channel. On the local sourcing side, we measure the number of distinct local suppliers of intermediate goods and per-local-supplier value, capturing the evolution of local sourcing relationships.

3.4. Product-family classification

To distinguish genuine value-added processing from transshipment within the triangular trade sample, we exploit the joint product composition of each firm's import and export portfolios. For each firm i in quarter t, we observe the HS 6-digit code and UNCTAD SoP classification of every shipment across all three trade flows: imports from China, exports to the US, and local sourcing. We follow Utar et al. (2025) in adopting the SoP classification, which is analogous to the BEC classification widely used in value-added trade accounting (e.g., Koopman, Wang, and Wei, 2014), but sorts products by processing stage rather than end-use. This distinction is better suited to our purpose of identifying whether imported goods undergo further transformation before export in the triangular trade context.

We use HS-2 chapters as the product-family unit within the SoP framework to match upstream intermediate imports with downstream final goods exports, paralleling the approach of Freund et al. (2024) and Feenstra and Hanson (1999), who identify components at the fine-grained product level and then classifies them within the same 2-digit industry. Finer groupings (HS-4 or HS-6) would restrict matching to near-identical products, thereby conflating genuine processing with transshipment. Broader industry groupings, conversely, risk false matches between unrelated products.

3.4.1. Processing and Transhipment

A firm-quarter-chapter observation is classified as processing if the firm imports intermediate goods from China in that HS2 chapter and simultaneously exports final goods to the US in the same chapter. For instance, importing HS 60 knitted fabrics (intermediate) from China and exporting HS 61 knitted garments (consumer) to the US, both within the textiles family. A firm-quarter-chapter observation is classified as transshipment if the firm imports final goods from China and exports final goods to the US in the same chapter, with no intermediate imports: importing and re-exporting HS 85 finished electronic equipment without corresponding component imports.

Because classification requires within-chapter co-occurrence of specifically-staged HS-6 goods, every flagged firm-quarter-chapter has cleared a stringent three-layer. The HS-2 boundary limits the search window; the HS-6 and SoP intersection performs the actual identification. The classification is therefore a conservative lower bound on both channels. Cross-chapter input-output linkages are missed (Kimura and Obashi, 2010), but no channel is spuriously flagged. This contrasts with the net-export approach of Utar et al. (2025), who subtract same-HS-6 Chinese imports from US exports. Their method captures same-product pass-through but cannot identify processing trade.

3.4.2. Import and local alternatives

Table 3: Product-family activity of firms (2017 and 2018H1 sample) by quarter

Quarter	Active firms number		Processing firms %		Transshipment firms %		With local alternative %		China-dependent %	
Sample	A	B	A	B	A	B	A	B	A	B
2018Q1	895	3397	13.3	12.7	11.3	13.8	32.8	22.8	64.5	53.1
2018Q2	913	3288	14.2	13.8	13.5	15	34.2	25.8	66.5	56.8
2018Q3	879	3025	15.8	14	14.1	14.2	34.5	27.2	68.5	62.9
2018Q4	899	2993	13	14.2	14.5	14.7	33.5	28	67.7	63.2
2019Q1	868	2823	13.6	13.7	13.2	13.4	34.3	28.2	66.8	63.7
2019Q2	880	2882	16.2	15	14.1	15.5	35	29	67.7	64.1
2019Q3	616	1498	16.4	17.1	20.8	18.6	33.3	30.1	66.7	66.9
2019Q4	834	2200	14.5	12.9	15.8	12.8	37.1	34.6	73.9	76.8

Notes: Each column reports the number and percentage of firms in both samples with at least one firm-quarter-HS2 observation in that category during the given quarter. A firm may simultaneously exhibit processing activity in one HS2 product family and transshipment in another, or source intermediates from both Chinese and local suppliers in some product families while remaining China-dependent in others.

We further classify each firm-quarter-chapter observation by domestic supply availability: *with local alternatives* if the firm sources intermediates from both China and local suppliers in the same HS2 chapter in that quarter, and *without local alternatives* if the firm imports Chinese intermediates with no corresponding local procurement in that chapter. This classification is determined contemporaneously at each quarter rather than fixed at baseline (see Table 3), ensuring that the measure reflects actual sourcing conditions at each point in time. The share of observations with local alternatives remains stable at approximately 34% throughout the sample period.

3.5. China-embeddedness identification

Following the approach of weighting firm-level sourcing by supplier characteristics (Cajal-Grossi et al., 2023), we construct a measure of Chinese intermediate content embedded in each firm's local sourcing. For each local supplier s in quarter t, we compute the ratio of s's intermediate imports from China ($CN\_IntermediateImport_{s,t}$) to its total sales in Vietnam ($TotalSales_{s,t}$). A potential concern is that trade firms' own sourcing decisions may drive their suppliers' China-embeddedness. To ensure that the measure captures the supplier's pre-existing integration into Chinese production networks rather than the trade firm's demand-side influence, we exclude firm i's own sourcing from the denominator:

$$ChinaRatio_{s,t}^{(-i)} = \frac{CN\_IntermediateImport_{s,t}}{TotalSales_{s,t} - LocalSourcing_{i,s,t}} \tag{4}$$

The ratio thus reflects supplier s's China- embeddedness as revealed by its transactions with all clients other than firm i. The ratio is capped at 1. A ChinaRatio of zero identifies an independent local supplier with no Chinese intermediate imports. Computing this ratio requires observing each supplier's import and domestic sales activities, which we obtain by linking the import records to an additional 18 million sales records from the supplier side in Vietnam.

We then aggregate to the trade firm level:

$$Y_{i,t}^{weighted} = \log\left(1 + \textstyle\sum_s LocalSourcing_{i,s,t} \text{ x } ChinaRatio_{s,t}^{(-1)}\right) \tag{5}$$

where $LocalSourcing_{i,s,t}$ is trade firm i's sourcing from local supplier s in quarter t. This measures the total Chinese intermediate content flowing through firm i's local supply chain, weighting each dollar of sourcing by the supplier's China-embeddedness intensity. We additionally construct a binary version, local sourcing from suppliers that have any Chinese intermediate imports, as a robustness check.

Table 4: Local supplier China-embeddedness by quarter

Quarter	Active suppliers		Independent suppliers		Independent %		Mean China Ratio		Mean Weighted Y	
Sample	A	B	A	B	A	B	A	B	A	B
2018Q1	2542	6,310	504	1081	19.8	17.1	0.514	0.407	1.59	1.385
2018Q2	2650	6,342	461	1060	17.4	16.7	0.529	0.425	1.631	1.453
2018Q3	2646	6,489	485	1081	18.3	16.7	0.561	0.445	1.611	1.441
2018Q4	2538	6,242	416	980	16.4	15.7	0.561	0.437	1.72	1.471
2019Q1	2295	5,787	381	925	16.6	16.0	0.579	0.421	1.617	1.383
2019Q2	2372	6,137	404	956	17	15.6	0.612	0.467	1.632	1.458
2019Q3	2617	4,436	656	971	25.1	21.9	0.493	0.540	0.989	0.744
2019Q4	3203	6,751	573	1185	17.9	17.6	0.702	0.703	1.774	1.47

Notes: Sample A involves 1360 exporters based on 2017 export records and sample B involves 4380 exporters based on 2018H1 export records. Active suppliers are local suppliers with at least one local B2B transaction in the given quarter. Independent suppliers do not have Chinese intermediate imports.

Table 4 reports the characteristics of local suppliers serving each exporter sample. Both samples exhibit stable local supplier counts and Chinese content in local sourcing throughout the 2018Q1-2019Q2 pre-expansion period. Levels are lower in the 4,380-firm sample, which includes a larger share of exporters without Chinese import activity.

4. Empirical model

4.1. Generalized difference in differences

We form the Difference in Differences (DD) framework with continuous treatment intensity, exploiting the exogenous variation in US tariffs on Chinese goods across HS 6-digit product categories. Since these tariffs were imposed on China rather than Vietnam, Vietnamese firms' exposure is determined by their pre-existing product composition, which is orthogonal to the tariff decision. We estimate the following event-study specification:

$$Y_{i,t} = \beta_0 \sum_{\substack{h=2018Q1 \\ \neq 2018Q2}}^{2019Q4} \partial_h \theta_{h=t} * TE_i^{US-CN} + X_{it} + Z_{it} + \gamma_i + \sigma_{it} \quad (6)$$

where Y_{it} denotes the outcome of triangular trade firm i in quarter t; the dependent variables, defined in Section 3, capture trade values, partner counts, and per-partner values along all three dimensions of the triangular trade chain, as well as the product-family and Chin-embeddedness decompositions. TE_i^{US-CN} is the firm-level tariff exposure index defined in Equation (1). The coefficients ∂_h trace the differential response of more-exposed relative to less-exposed firms at each quarter, with 2018Q2, the quarter before Section 301 tariff implementation, as the reference period. X_{it} includes controls for China's retaliatory tariff exposure and US tariffs on Vietnamese goods, and firm baseline export size.

All controls are interacted with time indicators. γ_i and σ_{it} are firm and quarter fixed effects. Standard errors are clustered at the firm level. In our 2017Q1-2019Q4 sample, we set 2017Q4 as the base.

4.2. Triple difference in differences

We construct a triple-difference (DDD) specification to examine whether treatment effects differ systematically between firms with pre-existing US export relationships and those that entered US markets closer to the tariff shock. Define $INCi$ as an indicator equal to one if firm i appears in 2017 US customs records as an exporter to the US, and zero if the firm first appears in 2018H1 export records. The DDD equation is:

$$Y_{i,t} = \beta_0 \sum_{\substack{h=2018Q1 \\ \neq 2018Q2}}^{2019Q4} \delta_h \theta_{h=t} * TE_i^{US-CN} + \sum_{\substack{h=2018Q1 \\ \neq 2018Q2}}^{2019Q4} \delta_h^{INC} \theta_{h=t} \cdot TE_i^{US-CN} \cdot INC_i + X_{it} + Z_{it} + \gamma_i + \sigma_{it} \qquad (17)$$

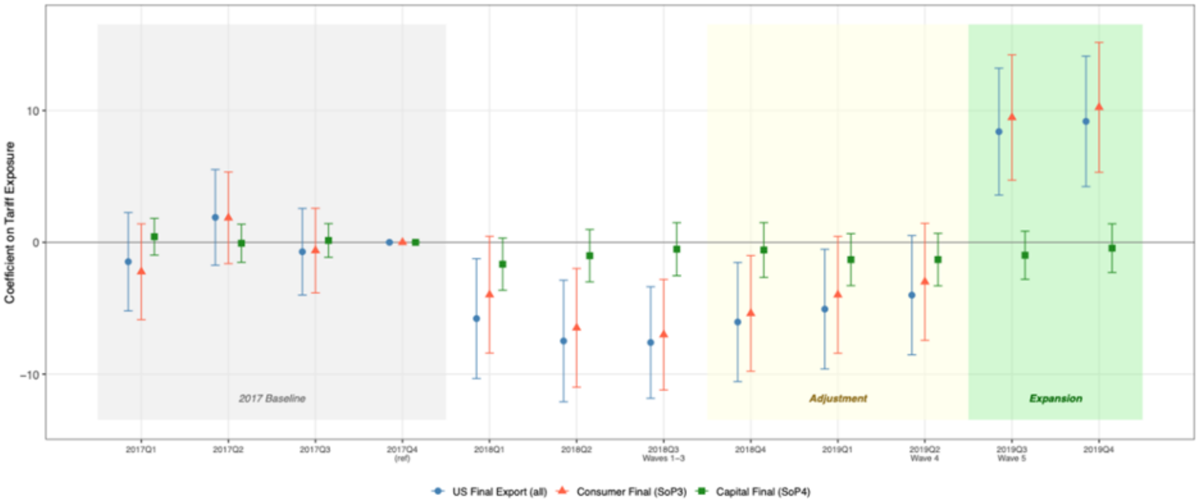
The first set of interactions captures the effect of firm-level tariff exposure at each quarter, identified across all 4,380 exporters. The δ_h^{INC} coefficients, the DDD parameters of interest, capture any additional effect specific to 2017 incumbent exporters relative to 2018 entrants at the same level of tariff exposure. Because both groups are assigned firm-level TE_i^{US-CN} constructed from their own 2018H1 export product weights, the specification preserves cross-firm variation in tariff exposure while testing whether prior export experience generates differential treatment responses.

5. Main results

5.1. Triangular trade dynamics and pre-treatment validation

We begin by examining whether US tariff escalation on Chinese goods activates genuine triangular trade processing through Vietnam. Figure 3 presents estimates from the 12-quarter event-study specification (2017Q1-2019Q4) for the continuous firm-level treatment variable, TE_i^{US-CN}, constructed from each firm's 2017 US export product composition. The dependent variable is the log of firms' final goods exports to the US. Pre-treatment coefficients for 2017Q1 through 2017Q3 are statistically indistinguishable from zero, confirming the absence of differential export trends between more- and less-tariff-exposed firms before any tariff-related announcement.

Figure 3: The impact of US-China tariff on US exports of firms in Vietnam



The figure further demonstrates pronounced temporal heterogeneity. It first reveals an initial deterrent effect. The 2018Q2 coefficient is sharply negative, consistent with a wait-and-see response in which more-exposed firms defer export commitments following the April 2018 announcement of the Section 301 tariff list. Coefficients then remain close to zero after 2018, rising after the Wave 5 escalation in May 2019 extends 25% tariffs to virtually all remaining Chinese goods. In the expansion period, the coefficient surges to approximately 8 in 2019Q3-Q4, indicating a 232% differential export growth between firms at the 75th and 25th percentiles of tariff exposure ($e^{8.0\times0.150} - 1$, IQR[*] = 0.150).

The consumer and capital decomposition shows that this expansion is driven entirely by consumer final goods, whose coefficients closely track the aggregate, while capital final goods show no significant response throughout the sample period, consistent with Vietnam's limited capacity for capital-intensive assembly and manufacturing.

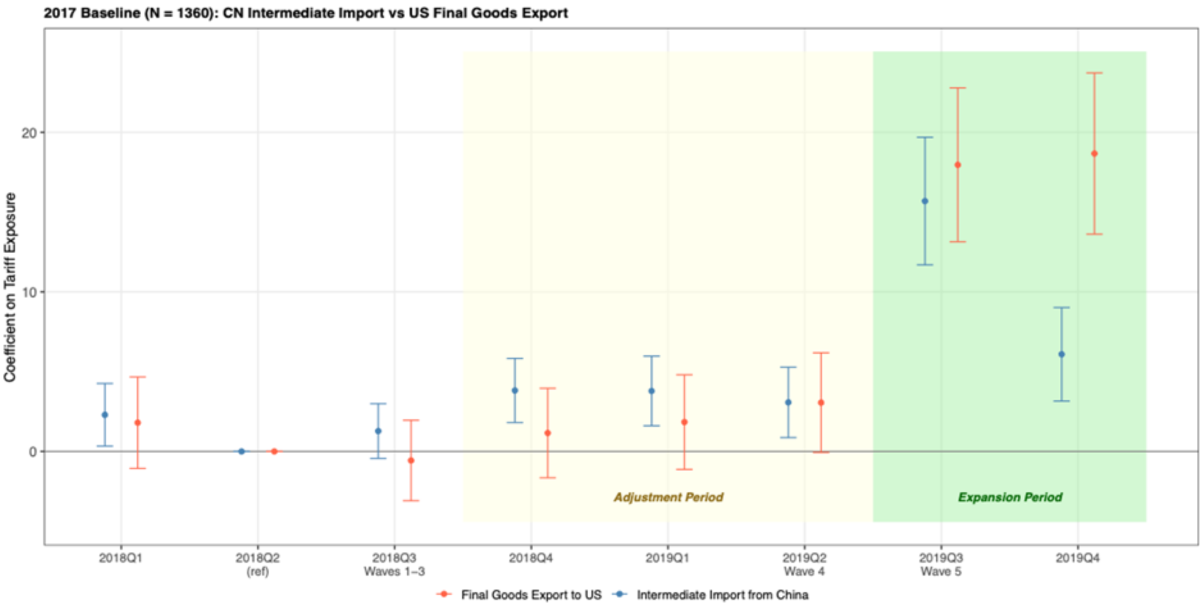
The pronounced 2018Q2 dip also has implications for the following empirical design. Due to data limitation, results related to Chinese import and local sourcing are reported in the eight-quarter specification. While using the announcement-quarter trough as the baseline may amplify the visual magnitude of post-treatment coefficients in event-study figures, the identification of differential responses between more- and less-exposed firms is unaffected, as the reference period shifts all coefficients by a constant.

Figure 4 presents the eight-quarter estimates for intermediate imports from China alongside final goods exports to the US. The two series move in broadly similar magnitude and direction. Both remain near zero through the adjustment period before surging after the Wave 5 escalation, consistent with the activation of triangular trade through Vietnam. Comparing Vietnamese exporters at the 75th and 25th percentiles of tariff exposure, more-exposed firms import on average 85% more intermediate

[*] We report economic magnitudes as interquartile range (IQR) differentials: the predicted percentage difference in the outcome between a firm at the 75th percentile and a firm at the 25th percentile of tariff exposure, computed as $e^{\widehat{\delta}_h\times(P_{75}-P_{25})} - 1$, where $P_{75} - P_{25}$ = 0.150 for the main sample.

inputs from China and export 126% more final goods to the US than less-exposed firms over the post-treatment period.

Figure 4: The impact of US-China tariff on firms' imports from China and exports to the US



Several features of the temporal pattern merit discussion. First, the pre-treatment coefficient for intermediate imports from China in 2018Q1 is significantly positive at the 5% level. Using 2018Q2, the quarter of the Section 301 tariff list announcement, as the reference period means that 2018Q1 is measured relative to the sample-period minimum, paralleling the deterrence dip documented in the 12-quarter export panel in Figure 3. Figures A2 and A3 show no analogous pre-trend in either aggregate Chinese imports or final goods imports from China; the 2018Q1 differential appears only in intermediate inputs, consistent with anticipatory component sourcing by more-exposed firms ahead of tariff implementation.

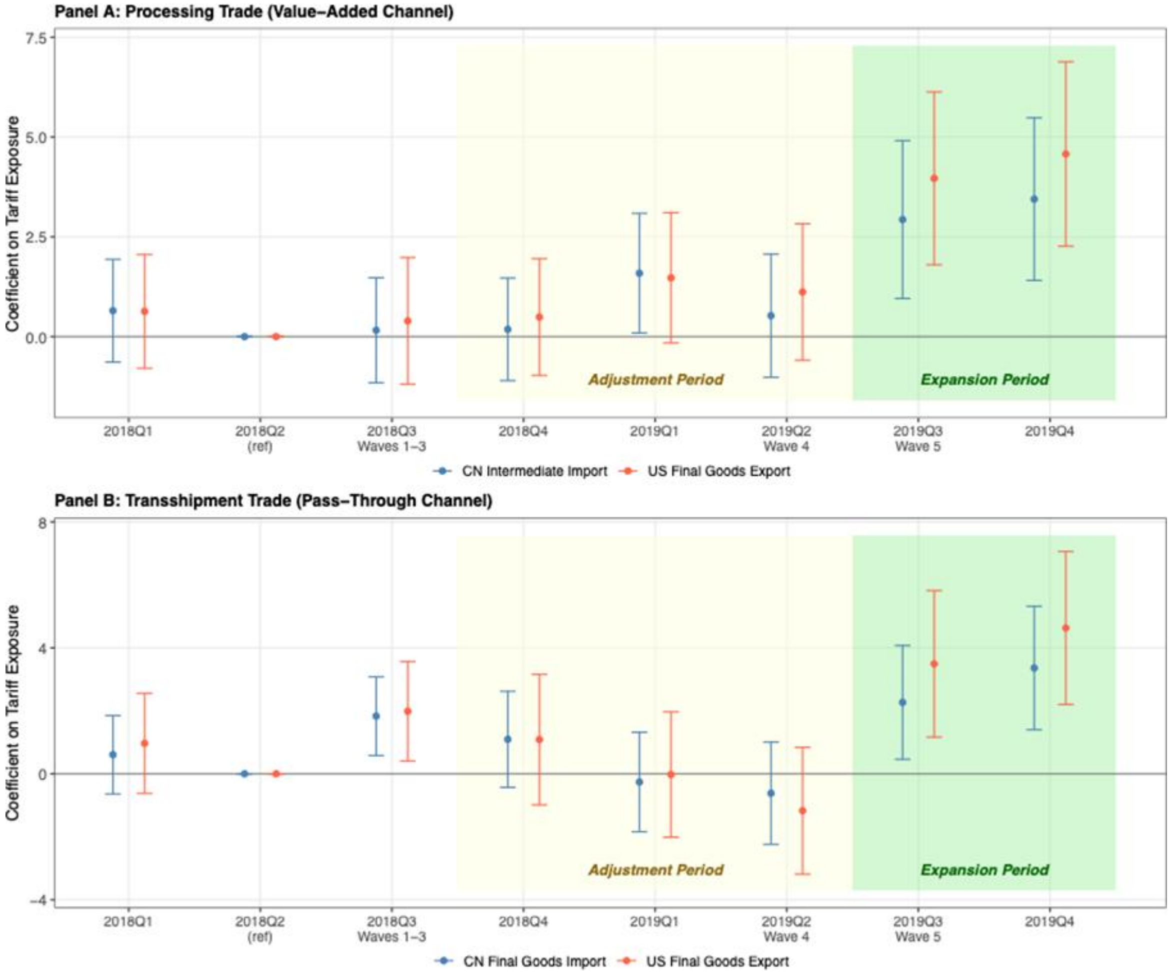
Second, both series rise sharply following the Wave 5 escalation in 2019Q3, reaching approximately 14.4 for intermediate imports and 16.2 for final goods exports. In 2019Q4, however, the two series diverge. US exports remain elevated at 16.73, while intermediate imports fall back to 5.53. This asymmetry suggests that the 2019Q3 import surge may partly reflect anticipatory stockpiling ahead of further enforcement.

5.2. GVC reconfigurations: processing vs transshipment

A central concern in the trade war literature is whether third-country export expansion reflects genuine value-added processing or simple transshipment of finished goods to circumvent tariffs (Freund et al., 2024; Iyoha et al., 2025). We address this directly by decomposing each firm's Chinese imports within matched HS-2 product families into two channels. The processing channel tracks intermediate imports from China in product families where the firm simultaneously exports final goods to the US. The transshipment channel tracks final goods imports from China in product families where the firm re-exports final goods to the US without corresponding intermediate inputs. Both dependent variables are estimated in the same regression sample, exploiting within-firm variation across product families.

Panel A in Figure 5 reports the processing channel. Pre-treatment coefficients are close to zero for both Chinese intermediate imports and US final goods exports, and remain statistically insignificant before 2019. After Wave 4, both series rise sharply: the processing import coefficient reaches 3.37 in 2019Q3, while the corresponding US export coefficient reaches 4.551, both statistically significant at the 5% level. More-exposed firms import 66% more intermediate inputs from China within processing product families ($e^{3.37\times0.150} - 1$) and export 98% more final goods to the US in the same product families ($e^{4.551\times0.150} - 1$), relative to less-exposed firms.

Figure 5: The impact of US-China tariff escalation on processing and transshipment trade



Panel B reports the transshipment channel. Unlike processing, transshipment responds almost instantaneously to tariff implementation: the channel first emerges in 2018Q3 with both Chinese final goods imports and US final goods re-exports turning positive in lockstep, spikes again after the Wave 5 escalation, but does not build across intervening quarters. At the 2019Q3 peak, more-exposed firms increase final goods imports by 43% and re-exports by 75% within transshipment product families, roughly two-thirds the magnitude of the processing channel. This episodic pattern contrasts sharply with the gradual buildup of processing trade and is consistent with transshipment requiring minimal fixed costs but remaining vulnerable to enforcement scrutiny that prevents sustained accumulation.

The consumer and capital goods decomposition of each channel (Figures A5-A6) confirms that processing trade is concentrated entirely in consumer goods, reinforcing the interpretation that Vietnam's processing capacity in consumer goods instead of capital goods.

5.3. Buyer-supplier adjustment: Extensive and intensive-margin responses

The muted adjustment-period response in aggregate trade values does not preclude active network formation during this interval. To examine whether firms were building new buyer-supplier relationships before scaling procurement volumes, we decompose network dynamics into extensive margins (number of distinct partners) and intensive margins (trade value per partner) for both upstream Chinese suppliers and downstream US buyers.

Figure 6: The impact of US-China tariffs on Buyer-supplier network of firms in Vietnam

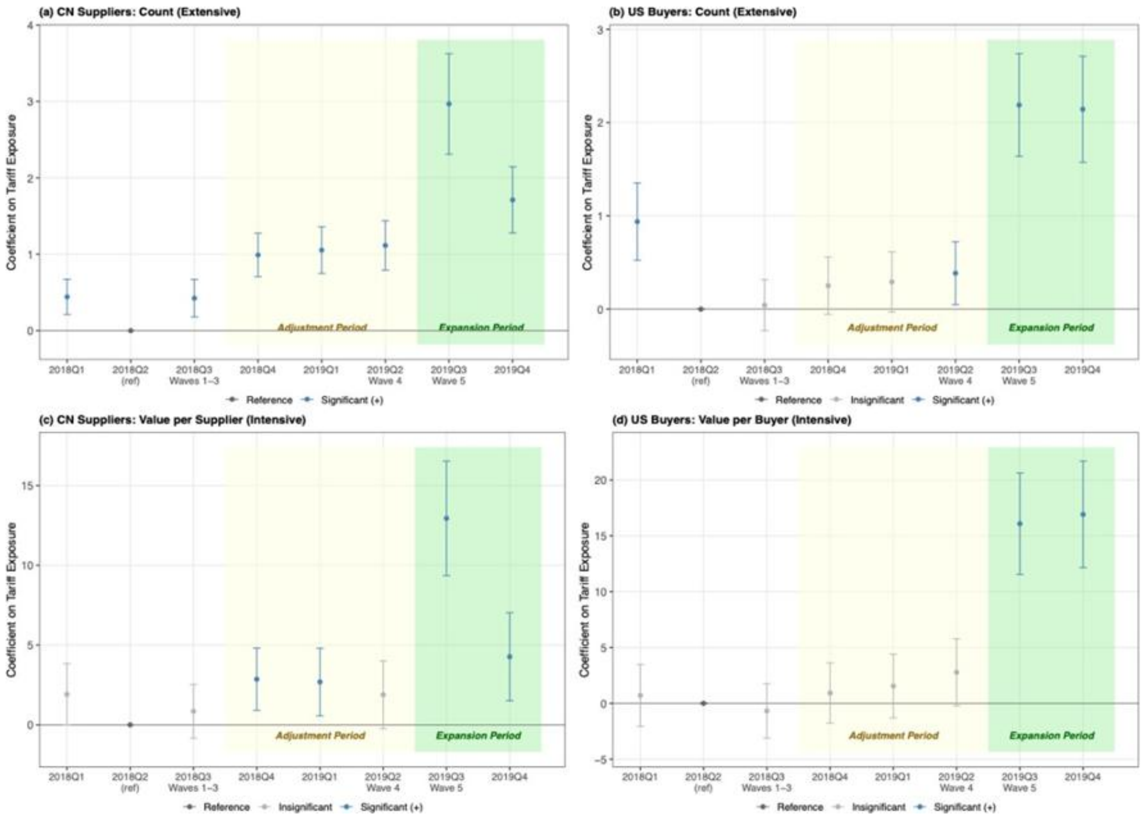


Figure 6 presents the results. Panels (a) and (c) report the upstream margins. Chinese supplier counts (Panel a) rise significantly from the first post-treatment quarter and remain elevated throughout the adjustment period. Per-supplier procurement value (Panel c), by contrast, remains statistically insignificant and economically modest during the same interval. Both margins surge decisively after the Wave 5 escalation, with per-supplier value rising sharply in 2019Q3 as procurement volumes concentrate through the newly established supplier base. The subsequent decline in per-supplier value in 2019Q4, while supplier counts remain elevated, reprises that firms front-loaded procurement through established suppliers in 2019Q3, then scaled back per-supplier orders once inventories were secured.

Panels (b) and (d) present a strikingly different pattern for downstream US buyer relationships. Both buyer counts and per-buyer export value remain close to zero and statistically insignificant throughout the entire adjustment period. Neither new buyer formation nor the deepening of existing buyer relationships responds to the initial tariff waves. Both margins activate in the expansion period, surging almost simultaneously after Wave 4.

The upstream-downstream asymmetry is consistent with differential adjustment costs across value chain positions. Geographic proximity to China and relatively standardised intermediates allow firms in Vietnam to reconfigure upstream sourcing networks at relatively low cost and achieve rapid supplier exploration to resolve uncertainty. This pattern is consistent with Ersahin et al.'s (2024) findings. Downstream adjustment operates under a different constraint. Monarch (2022) documents that US buyers face substantial costs when switching foreign suppliers, including product certification, compliance verification, and relationship-specific investment. These buyer-side sunk costs may explain why Vietnamese firms' US buyer networks remain inactive during the adjustment period: until the tariff regime consolidates, US buyers retain their existing sourcing arrangements rather than qualifying new Vietnamese suppliers.

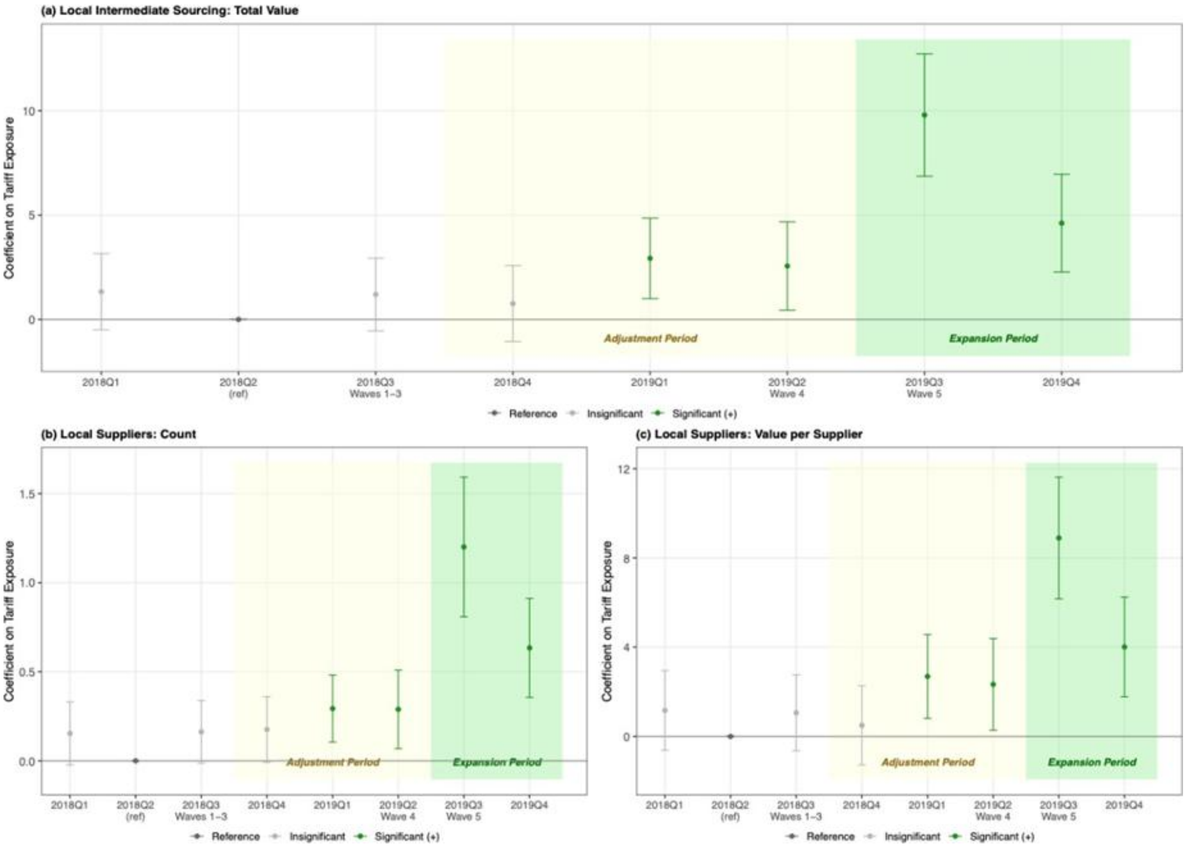
5.4. Local sourcing and Chinese supply chain embeddedness

A complete picture of GVC reconfiguration requires tracking whether tariff-induced processing activity extends into the domestic supply chain, both because existing empirical work on trade diversion has focused almost exclusively on cross-border flows (e.g., Handley et al., 2025; Utar et al., 2025; Garred and Yuan, 2025) and because the host country's real benefit from GVC relocation ultimately depends on the depth of local supply chain participation rather than the volume of pass-through trade. Local sourcing expansion is driven by intermediates and consumer final goods (Figure A7); we focus on intermediate sourcing as the margin most directly relevant to local value-added participation.

5.4.1. Local sourcing dynamics

Figure 7 presents estimates for three dimensions of local intermediate sourcing: local intermediate sourcing value (Panel a), number of distinct local suppliers (Panel b), and per-supplier sourcing value (Panel c). Pre-treatment coefficients are statistically insignificant across all three panels, confirming parallel trends. Local sourcing activates later than the import channel documented above, but its onset precedes the Wave 5 escalation. Total local sourcing value (Panel a) first reaches significance in 2019Q1 (coefficient 2.695, $p < 0.05$), corresponding to a 50% differential between firms at the 75th and 25th percentiles of tariff exposure ($e^{2.695\times0.150} - 1$, IQR = 0.150). This timing, the quarter immediately preceding the Wave 4 announcement in May 2019, suggests that more-exposed firms began scaling local sourcing as the cumulative weight of the first three tariff waves took hold, before the policy signal was fully confirmed. Per-supplier value (Panel c) and local supplier count (Panel b) both show a similar pattern in 2019Q1.

Figure 7: The impact of US-China tariffs on local sourcing network of trader in Vietnam



The pattern intensifies dramatically following the Wave 5 escalation. In 2019Q3, total local sourcing value surges to 9.371 at 5% level, implying more than a fourfold increase in more-exposed firms' local sourcing relative to less-exposed firms. Per-supplier value tracks at 8.494 (258% IQR differential), while local supplier count reaches 1.159 (19% IQR differential).

The intensive margin thus accounts for the vast majority of the expansion-period growth. More-exposed firms roughly quadruple per-supplier sourcing while expanding their supplier base by only 19%. By 2019Q4, all three measures decline from their 2019Q3 peaks, total value to 4.418 (94% IQR differential), per-supplier value to 3.823 (77%), and supplier count to 0.616 (10%).

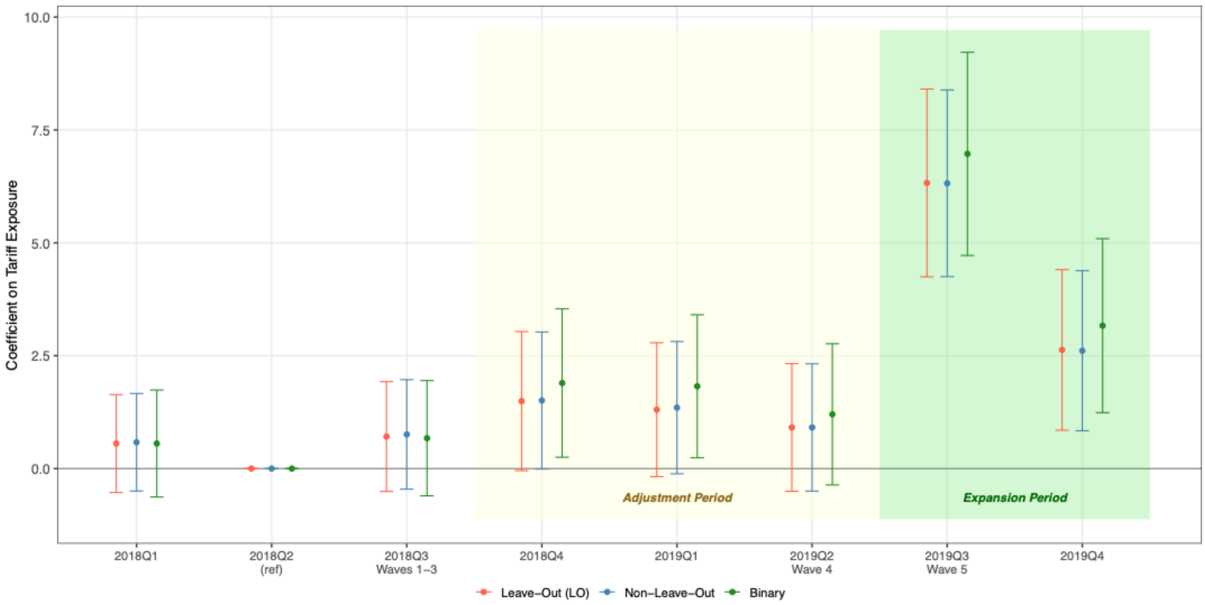
The trend parallels the upstream Chinese import decline documented earlier, and is consistent with an inventory correction following front-loaded sourcing. The difference is intuitive: building local supplier relationships has lower search and contracting costs than cross-border buyer-supplier relationships, and Ersahin et al. (2024) document that supply chain risk shifts firms toward proximate and domestic sourcing precisely because these channels economise on the matching frictions that make distant relationships costly to form. Vietnamese firms accordingly require no exploration phase to identify local partners.

5.4.2. Chinese intermediate content in local sourcing

The total local sourcing expansion documented above does not reveal how much of the increase reflects Chinese intermediate content flowing through local supplier networks. To measure this directly, we apply the leave-out weighted China-embeddedness measure constructed in Section 3.5, which weights each dollar of local sourcing by the supplier's Chinese import intensity, excluding the focal firm's own purchases from the denominator to avoid mechanical correlation.

Figure 8 presents the results. Comparing firms at the 75th and 25th percentiles of tariff exposure, the Chinese-input-weighted local sourcing increases by 158% ($e^{6.326\times0.150} - 1$, IQR= 0.150) in 2019Q3, roughly half the 308% increase in total local sourcing, indicating that a substantial share of the tariff-induced local sourcing expansion channels Chinese intermediate content through the third-country supply chain, though independent local sourcing also contributes.

Figure 8: The impact of US-China tariffs on Chinese intermediate content in local sourcing



We assess the sensitivity of this result to the weighting method. Figure 8 compares the leave-out weighted measure with the unadjusted (non-leave-out) weighted measure and a binary version that sums total sourcing from local suppliers with any Chinese imports. All three track closely throughout the sample period. At the 2019Q3 peak, the leave-out, non-leave-out, and binary coefficients are 6.326, 6.318, and 6.969, respectively. The binary coefficient is the largest of the three because it assigns full weight to every dollar sourced from a supplier with any Chinese imports, regardless of intensity. For instance, a supplier importing 5% of its inputs from China receives the same weight as one importing 90%. This upward bias is precisely what the continuous leave-out measure corrects for. That all three nonetheless converge closely confirms that the result is robust to the choice of weighting scheme.

5.4.3. China-embedded suppliers: Through whom does local sourcing expand?

Section 5.4.2 establishes that a substantial share of tariff-induced local sourcing channels Chinese intermediate content. We now ask through which types of local suppliers this expansion operates. We classify each local supplier by whether it imports any intermediate goods from China in the same quarter: China-embedded if it does, independent if it does not. We then estimate separate regressions for local sourcing value from each supplier type.

Figure 9: The impact of US-China tariffs on local sourcing by supplier type

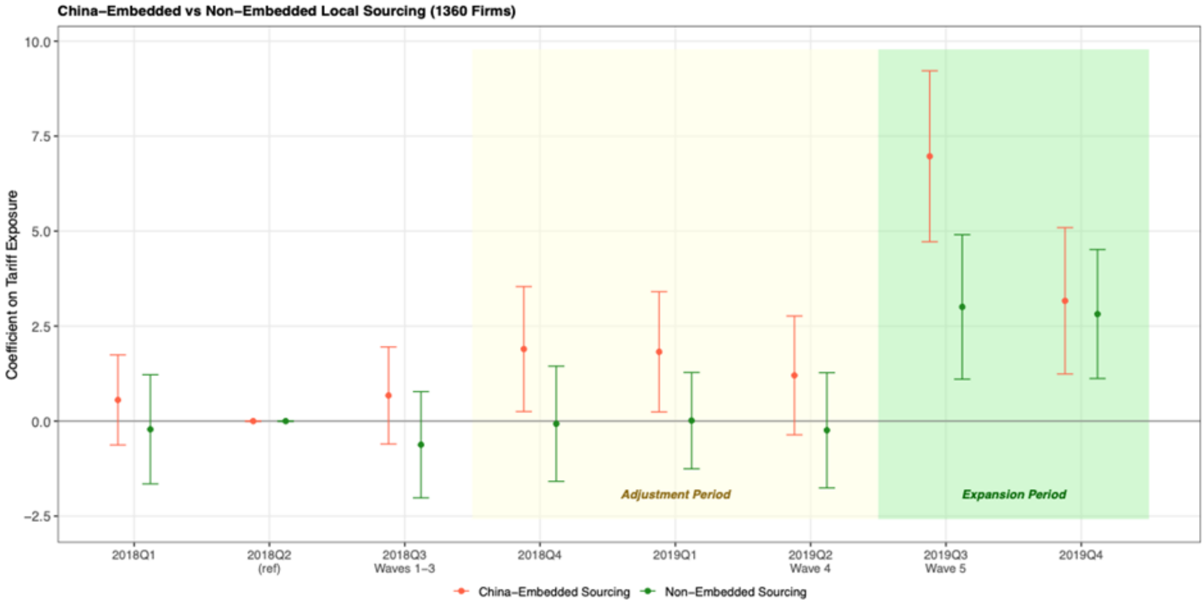


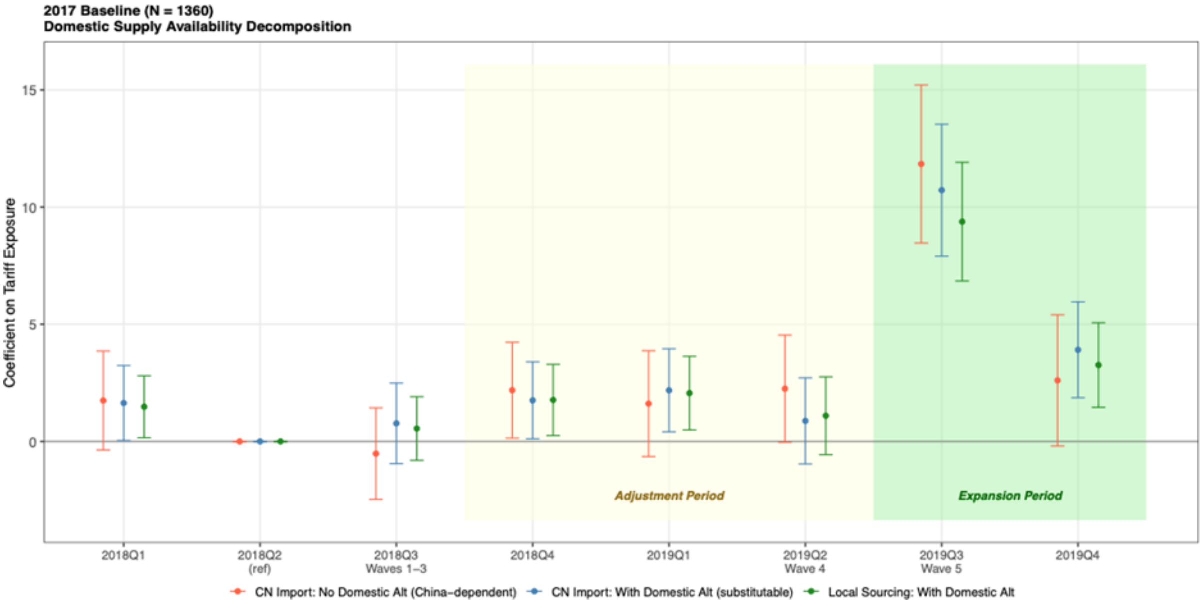
Figure 9 presents the results. The two series diverge sharply. Following the Wave 5 escalation, more-exposed firms increase local sourcing from China-embedded suppliers by 184% relative to less-exposed firms in 2019Q3, compared with 57% increase from independent local suppliers. The expansion-period magnitude of the China-embedded channel is over triple that of the independent channel in 2019Q3. The evidence indicates that the local sourcing expansion operates primarily through suppliers already integrated into Chinese production networks.

5.4.4. Local supply availablility

We now ask whether local sourcing substitutes for or complements Chinese imports, and how domestic supply capacity shapes the intensity of the tariff response. To distinguish between these mechanisms, we decompose firm-level intermediate sourcing by the availability of domestic alternatives within matched HS-2 product families (see section 3).

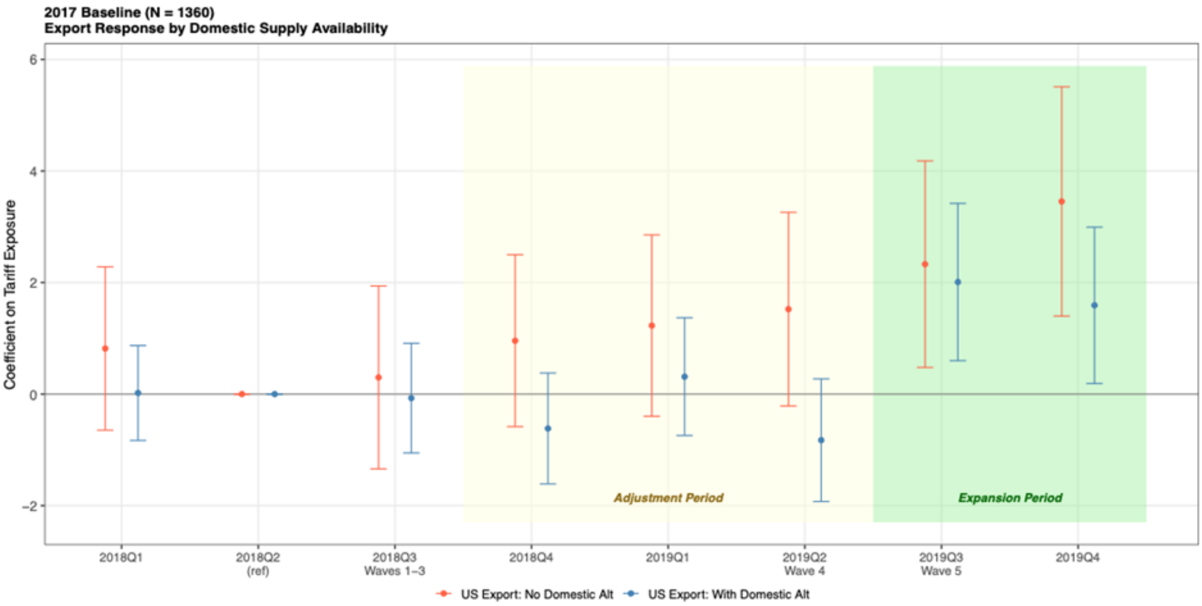
Figure 10 presents the estimates for the three import-side channels. Chinese imports in product families without domestic alternatives respond most intensely, reaching approximately 13 in 2019Q3. These are product families where firms are fully dependent on Chinese supply and face no local adjustment margin. Every unit of tariff-induced demand expansion must be absorbed through intensified Chinese sourcing.

Figure 10: The impact of US-China tariffs on trade input by local supply availability



Chinese imports in product families with domestic alternatives show a more moderate peak of approximately 11 in 2019Q3, while local sourcing in the same product families reaches approximately 9. The attenuation from 13 to 11 indicates that the availability of domestic capacity dampens the CN import response. Where local alternatives exist, firms absorb part of the expansion through domestic channels. The local sourcing coefficient rises in parallel with rather than at the expense of the CN import coefficient within the same product families. The pattern may show that local sourcing supplements Chinese intermediates within product families where both sources are available, while product families without domestic capacity remain exclusively China-dependent.

Figure 11: The impact of US-China tariffs on export to US by local supply availability



The export side mirrors this hierarchy. Figure 11 shows that exports in product families without domestic alternatives respond more strongly than those with alternatives. The stronger export response in China-dependent product families is the downstream counterpart of the import-side pattern. Where firms must rely exclusively on Chinese intermediates, the tariff arbitrage opportunity is both more direct (no alternative sourcing channel dilutes the cost advantage) and more concentrated (the full value chain runs through the China-Vietnam-US corridor).

The import-side and export-side hierarchies jointly reveal a product-level boundary condition on GVC reconfiguration. The intensity of the tariff response on both the sourcing and export margins is governed by the depth of domestic manufacturing capacity in each product family. In product families such as leather and hides or footwear components, where Vietnamese producers have developed substantial capacity, local sourcing meaningfully complements Chinese inputs and the export arbitrage is shared across sourcing channels. In product families such as synthetic fibres, iron and steel, or organic chemicals, where domestic capacity remains thin, firms absorb the full tariff shock through intensified Chinese imports, and the resulting export expansion flows entirely through the China-dependent corridor.

6. Robustness checks

We begin with a permutation placebo test. Figure A8 reports the distribution of treatment coefficients from 1,000 random reassignments of the firm-level tariff exposure variable TE_i^{US-CN} across firms, holding the panel structure and all controls fixed. The placebo distribution is tightly centred at zero, and the actual estimated coefficients lie far outside the support of the placebo distribution. This confirms that our main results are driven by the specific structure of tariff exposure rather than by aggregate trends common to all Vietnamese exporters or by spurious correlation arising from the panel design.

6.1. Broader sample with 2018H1 tariff baseline

To assess sensitivity to the baseline period and sample construction, we re-estimate the main specification using 2018H1 export product weights and the full sample of 4,380 exporters. Table A1 reports the results. The temporal dynamics replicate across all primary dependent variables: relatively muted adjustment-period responses through 2018Q3-2019Q2 followed by a pronounced expansion-period activation in 2019Q3, confirming that the pattern is not an artifact of the narrower 2017-baseline sample.

The 4380 specification, however, produces noisier pre-treatment coefficients, with several variables showing significant deviations from the 2018Q2 reference quarter. This is consistent with the 2018H1 product weights incorporating firms' anticipatory responses to the tariff signal rather than reflecting pre-determined competitive positions. In particular, firms that recognised the arbitrage opportunity may have shifted their export portfolios toward tariff-affected products, inflating 2018H1 export weights for precisely those products that would later define tariff exposure (also see Figure 2). Because the treatment variable is no longer strictly exogenous to the tariff announcement, the 2018H1 specification does not satisfy the same identification conditions as the 2017 baseline. The qualitative consistency of temporal dynamics across both specifications, combined with the cleaner pre-treatment behavior of the 2017-baseline estimates, reinforces our preference for the latter as the primary specification.

6.2. Is there any differences between 2017 incumbents and 2018 entrants?

A potential concern is that the main results are specific to the 2017 incumbent firms identified through cross-database matching, rather than reflecting a general response to tariff exposure. We address this with the DDD specification described in Section 4, which decomposes the full 2018H1 exporter sample (4,380 firms) into 977 incumbents matched to 2017 US customs records and 3,403 firms that entered US export markets in 2018. Of the 1,360 firms in the 2017 baseline, 977 (71.8%) are present in the 2018H1 sample; the remaining 383 firms lacked 2018H1 export activity and all appear in 2018-2019 export records.

Table A2 reports the δ_h^{INC} interaction coefficients for all 13 dependent variables. Pre-treatment coefficients are likewise insignificant across all 13 variables. None of the expansion-period coefficients reaches statistical significance at the 5% level across all trade value, network dynamics, and local sourcing outcomes, with the sole exception of local supplier count in 2019Q3 (−0.187, $p = 0.043$), suggesting that 2018 entrants briefly add local suppliers at a faster rate, consistent with newer firms needing to establish local sourcing relationships that incumbents already maintain.

The first post-treatment quarter (2018Q3) reveals a brief timing difference in the processing channel. Incumbents show a marginally stronger processing response in both Chinese intermediate imports and US final goods exports. The interaction coefficients return to zero in 2018Q4 and remain insignificant throughout the adjustment and expansion periods. The pattern is consistent with incumbents' pre-existing Chinese supplier networks enabling slightly faster activation of the processing channel upon tariff implementation, with entrants catching up rapidly as they establish their own sourcing ties.

These null results show that conditional on the same firm-level tariff exposure, 2017 incumbents and 2018 entrants exhibit indistinguishable treatment responses across all channels documented in the main analysis. The main findings thus generalize beyond the matched incumbent sample to the broader population of Vietnamese exporters.

7. Conclusion

We examine how firms in Vietnam reconfigure their cross-border and domestic supply chain linkages in response to the 2018-2019 US tariff escalation on Chinese goods, using transaction-level data covering imports from China, exports to the US, and domestic business-to-business transactions for 1,360 firms identified from pre-treatment US customs records. Three sets of findings emerge. First, both value-added processing and transshipment contribute to Vietnam's triangular trade expansion, but they operate on distinct timelines: transshipment responds immediately to tariff implementation, while processing activates only after the May 2019 escalation signals tariff permanence. Value-added activity is concentrated in consumer goods, with no significant processing response in capital goods. Second, supply chain network reconfiguration precedes trade value expansion and follows a sequenced pattern across value chain positions: upstream Chinese supplier diversification begins first, local intermediate sourcing activates two to three quarters later, and downstream US buyer commitment follows last. Third, tariff-induced local sourcing operates predominantly through suppliers already embedded in Chinese production networks rather than through independent domestic producers, and the intensity of the tariff response on both sourcing and export margins is governed by the depth of domestic manufacturing capacity in each product family.

By tracking firm-level trade flows across imports, exports, and local sourcing, our study opens the host-country interior of GVC reconfiguration to direct empirical examination, a dimension previously unobserved in the trade war literature. A next step is to move from inter-firm trade patterns to intra-firm production processes, using plant-level output data to characterize how firms internally organize manufacturing within GVCs. Our sequenced buyer-supplier adjustment pattern also invites temporal comparison between Trump 1.0 and 2.0. Whether firms exhibit fundamentally different adjustment speeds under abrupt versus sequential policy regimes is an open question with direct policy relevance. Finally, extending the triadic analytical framework to a broader cross-country setting would help establish place-based trade policy. Downstream economies such as Japan, South Korea, and the EU, and upstream economies across Southeast Asia and South America, occupy different positions in GVCs and may exhibit distinct reconfiguration dynamics in response to the same tariff shock.

References

Alfaro-Urena, A., Manelici, I., and Vasquez, J. P. (2022). The effects of joining multinational supply chains: New evidence from firm-to-firm linkages. *The Quarterly Journal of Economics*, 137(3): 1495–1552. <https://doi.org/10.1093/qje/qjac006>

Alfaro, L., and Chor, D. (2023). Global supply chains: The looming "great reallocation" (No. w31661). National Bureau of Economic Research. <https://doi.org/10.3386/w31661 >

Amiti, M., Redding, S.J. and Weinstein, D.E. (2019). The impact of the 2018 tariffs on prices and welfare. *Journal of Economic Perspectives*, 33(4): 187–210.

Antrás, P., and Chor, D. (2022). Global value chains. *Handbook of international economics*, 5: 297–376. <https://doi.org/10.1016/bs.hesint.2022.02.005>

Benguria, F., Choi, J., Swenson, D. L., and Xu, M. J. (2022). Anxiety or pain? The impact of tariffs and uncertainty on Chinese firms in the trade war. *Journal of International Economics*, 137, 103608. <https://doi.org/10.1016/j.jinteco.2022.103608 >

Bown, C. P., and Kolb, M. (2023). Trump's Trade War Timeline. An Up-to-Date Guide Peterson Institute for International Economics, PIIE, 2023. 12. 31.

Cajal-Grossi, J., Macchiavello, R., and Noguera, G. (2023). Buyers' sourcing strategies and suppliers' markups in Bangladeshi garments. *The Quarterly Journal of Economics*, 138(4): 2391–2450. <https://doi.org/10.1093/qje/qjad026 >

Cavalcanti, T., Ogeda, P. M., & Ornelas, E. (2026). The US-China trade war creates jobs (elsewhere). *Journal of International Economics*, 161, 104249. <https://doi.org/10.1016/j.jinteco.2026.104249 >

Chor, D., & Li, B. (2024). Illuminating the effects of the US-China tariff war on China's economy. *Journal of International Economics*, 150, 103926. <https://doi.org/10.1016/j.jinteco.2024.103926 >

Ersahin, N., Giannetti, M., and Huang, R. (2024). Supply chain risk: Changes in supplier composition and vertical integration. *Journal of International Economics*, 147, 103854. <https://doi.org/10.1016/j.jinteco.2023.103854 >

Fajgelbaum, P. D., Goldberg, P. K., Kennedy, P. J., and Khandelwal, A. K. (2020). The return to protectionism. *The Quarterly Journal of Economics*, 135(1): 1–55. <https://doi.org/10.1093/qje/qjz036>

Fajgelbaum, P., Goldberg, P., Kennedy, P., Khandelwal, A., and Taglioni, D. (2024). The US-China trade war and global reallocations. *American Economic Review: Insights*, 6(2): 295–312. <https://doi.org/10.1257/aeri.20230094 >

Feenstra, R. C., and Hanson, G. H. (1999). The impact of outsourcing and high-technology capital on wages: estimates for the United States, 1979–1990. *The Quarterly Journal of Economics*, 114(3): 907–940. <https://doi.org/10.1162/003355399556179 >

Freund, C., Mattoo, A., Mulabdic, A., and Ruta, M. (2024). Is US trade policy reshaping global supply chains?. *Journal of International Economics*, 152, 104011. <https://doi.org/10.1016/j.jinteco.2024.104011 >

Garred, J., and Yuan, S. (2025). Relocation from China (with Chinese characteristics). *Journal of Development Economics*, 176, 103510. <https://doi.org/10.1016/j.jdeveco.2025.103510 >

Handley, K., Kamal, F., and Monarch, R. (2025). Rising Import Tariffs, Falling Exports: When Modern Supply Chains Meet Old-Style Protectionism. *American Economic Journal: Applied Economics*, 17(1): 208–238. <https://doi.org/10.1257/app.20210051 >

Huang, Y., Lin, C., Liu, S., and Tang, H. (2023). Trade networks and firm value: Evidence from the US-China trade war. *Journal of International Economics*, 145, 103811. <https://doi.org/10.1016/j.jinteco.2023.103811 >

Iyoha, E., Malesky, E., Wen, J., Wu, S. J., and Feng, B. (2025). Exports in Disguise?: Trade Rerouting during the US-China Trade War. Centre for Inclusive Trade Policy.

Jiang, L., Lu, Y., Song, H., and Zhang, G. (2023). Responses of exporters to trade protectionism: Inferences from the US-China trade war. *Journal of International Economics*, 140, 103687. <https://doi.org/10.1016/j.jinteco.2022.103687 >

Kimura, F., and Obashi, A. (2010). International production networks in machinery industries: Structure and its evolution. ERIA discussion paper series, 9. <https://www.eria.org/ERIA-DP-2010-09.pdf >

Koopman, R., Wang, Z., and Wei, S. J. (2014). Tracing value-added and double counting in gross exports. *American Economic Review*, 104(2): 459–494. <https://doi.org/10.1257/aer.104.2.459 >

Lee, J., and Rhee, K. K. (2025). The impact of the US-China trade war on Vietnam's US Exports. Available at SSRN 5252880.

Mayr-Dorn, K., Narciso, G., Dang, D. A., and Phan, H. (2023). Trade diversion and labor market adjustment: Vietnam and the US-China trade war. Available at SSRN 4444393.

Monarch, R. (2022). "It's Not You, It's Me": Price, Quality, and Switching in US-China Trade Relationships. *Review of Economics and Statistics*, 104(5): 909–928. <https://doi.org/10.1162/rest_a_01015 >

Rotunno, L., Roy, S., Sakakibara, A., and Vezina, P. L. (2024). Trade policy and jobs in vietnam: the unintended consequences of US-China trade tensions. International Monetary Fund.

Utar, H., Zurita, A. C., and Torres, L. (2025). The US-China trade war and the relocation of global value chains to Mexico. *Review of Economics and Statistics*, 1–47. <https://doi.org/10.1162/REST.a.1682 >

Appendix

Figure A1: Trend of Vietnam trade flows and US tariffs on Chinese products

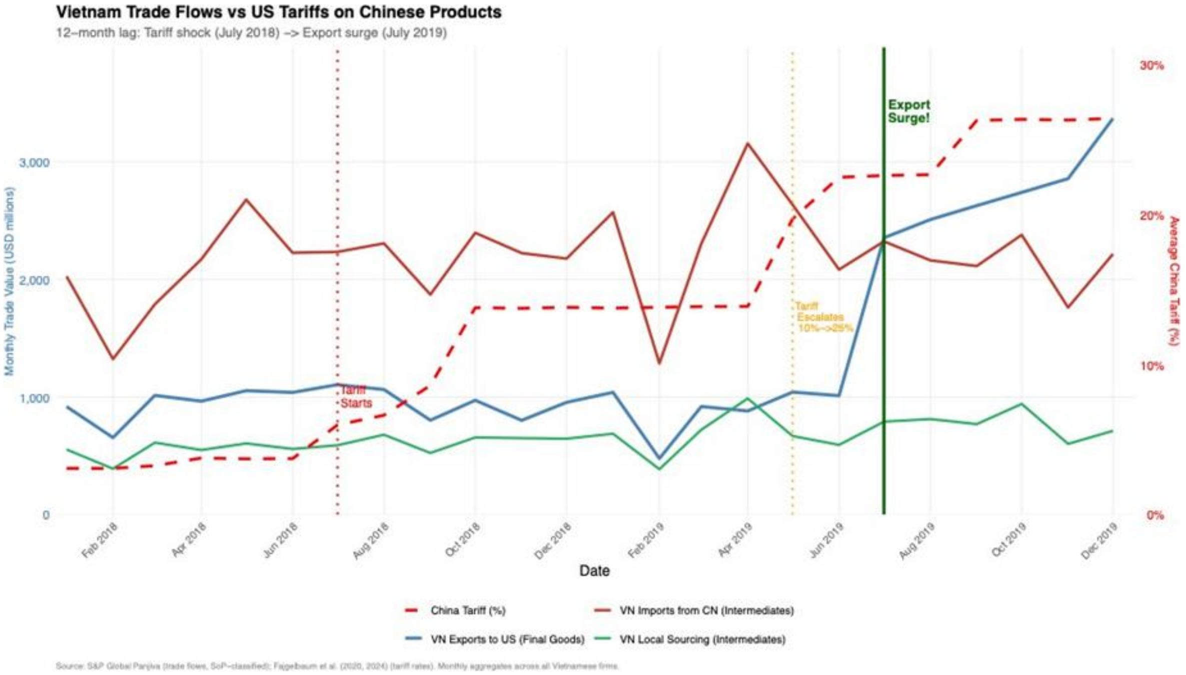


Figure A2: The impact of US-China tariffs on total imports from China and exports to the US

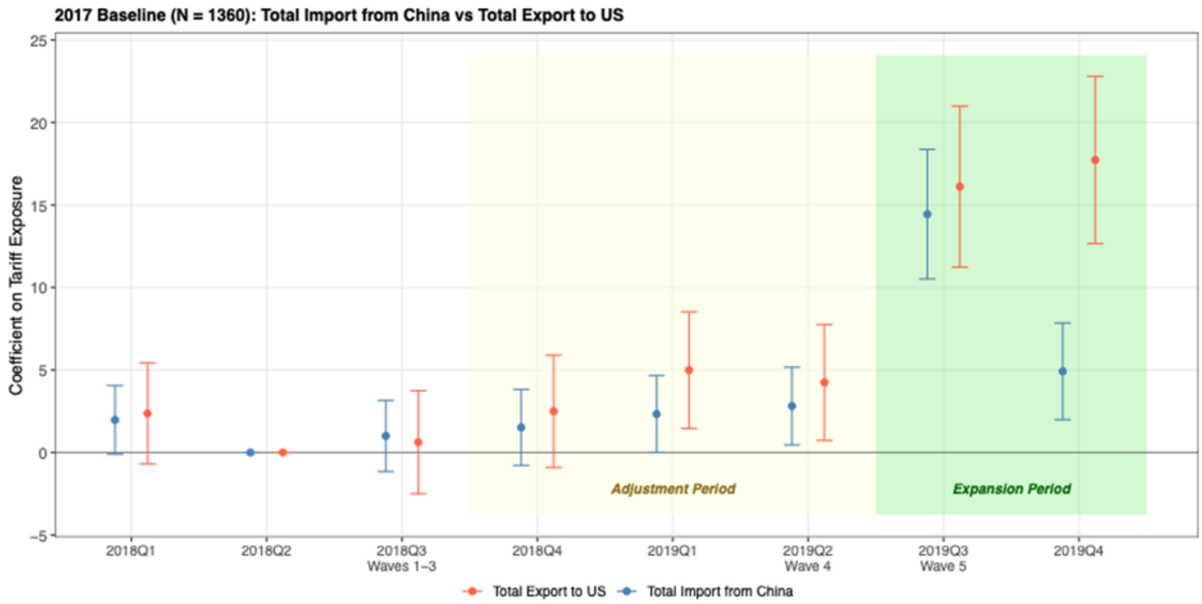


Figure A3: The impact of US-China tariffs on firms' exports to the US by SoP category

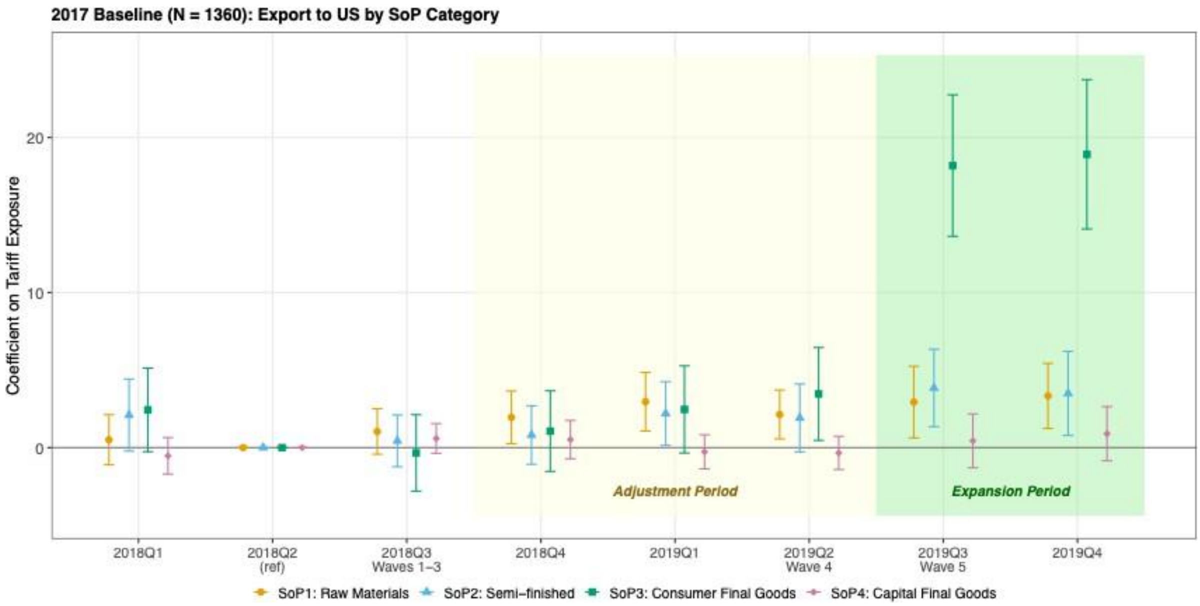


Figure A4: The impact of US-China tariffs on firms' imports from China by SoP category

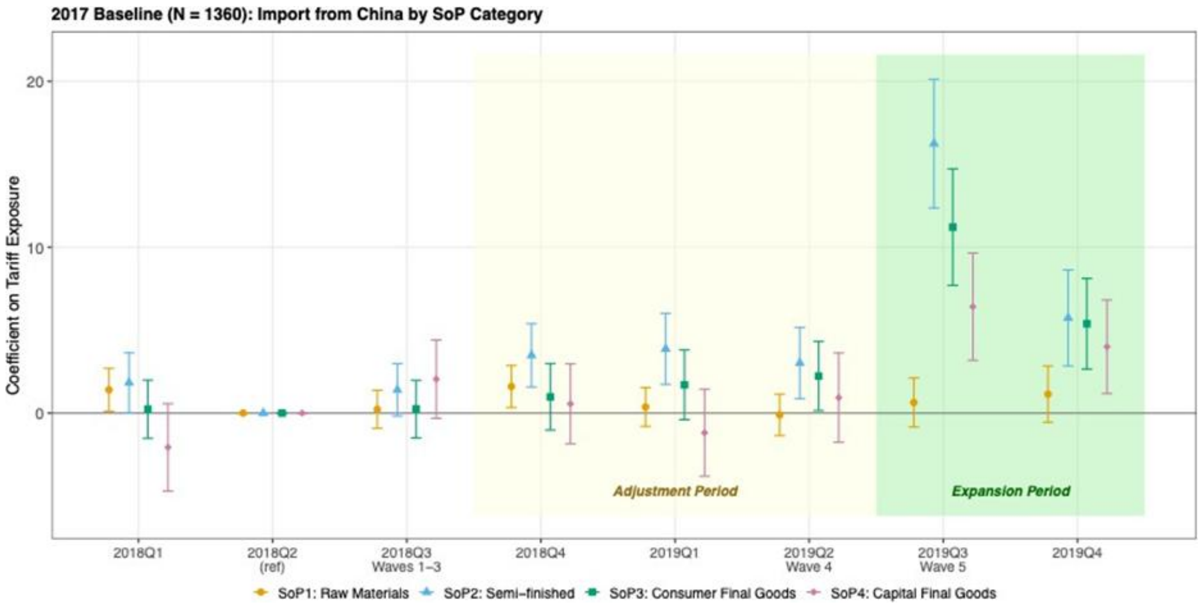


Figure A5: The impact of tariff escalation on processing and transshipment in consumer goods

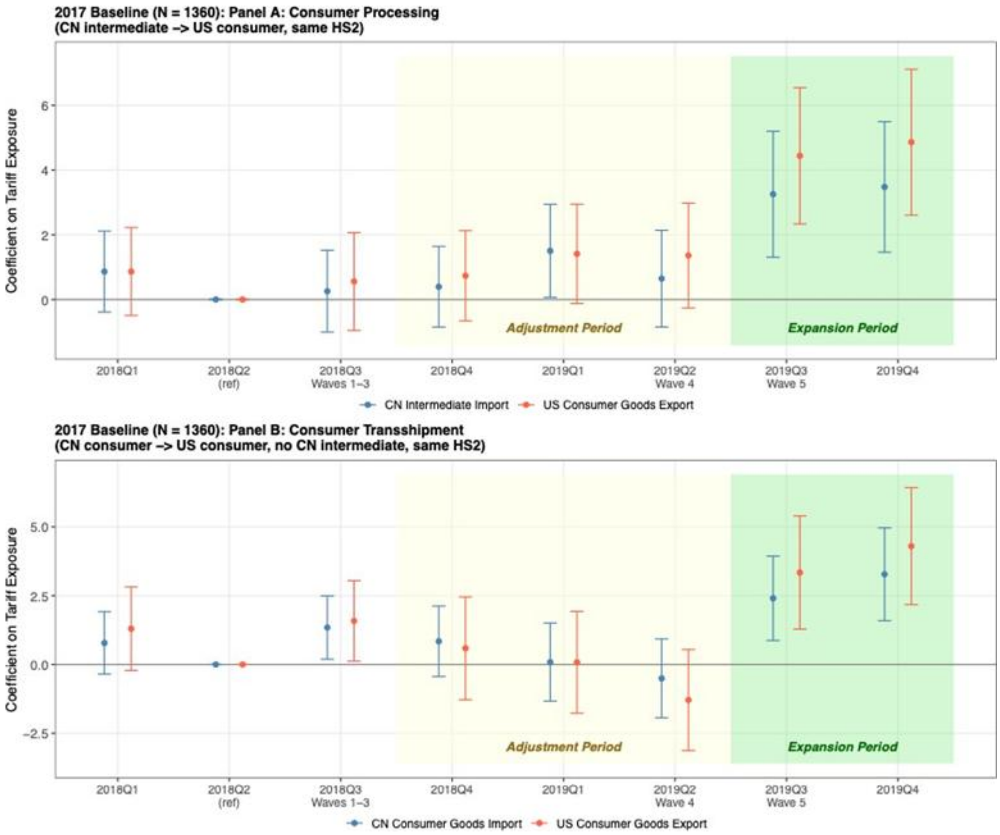


Figure A6: The impact of tariff escalation on processing and transshipment in capital goods

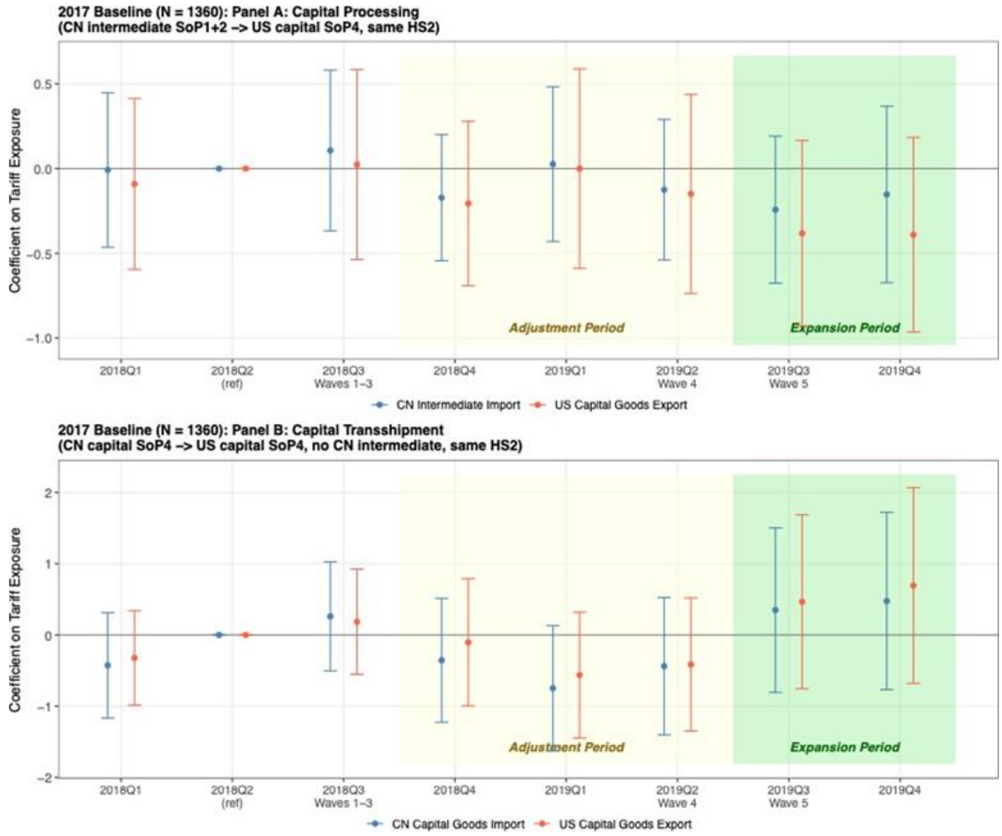


Figure A7: The impact of tariff escalation on firms' local sourcing by SoP category

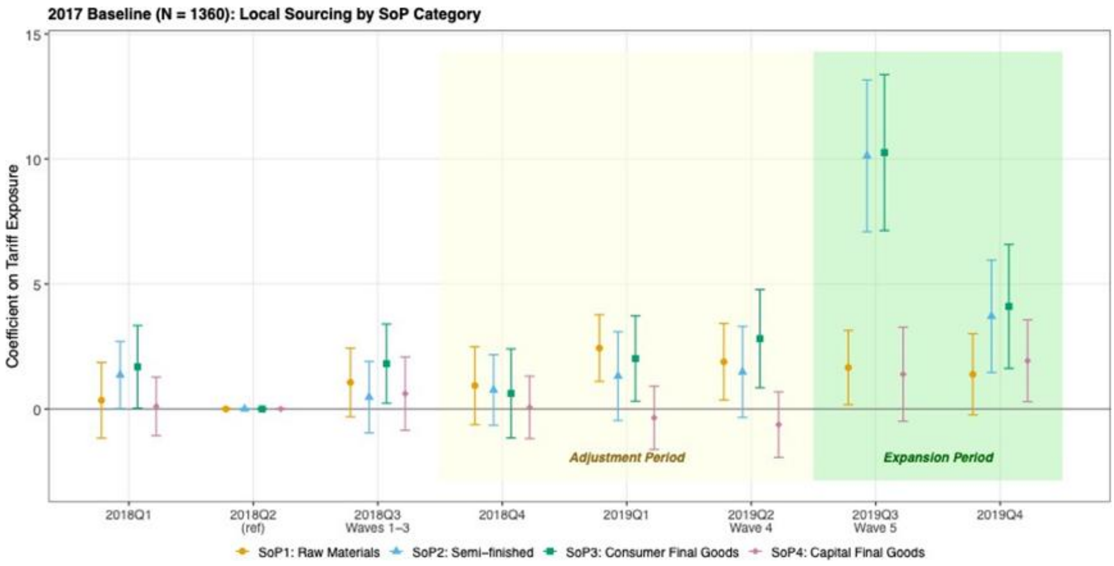


Figure A8: Treatment randomization inference

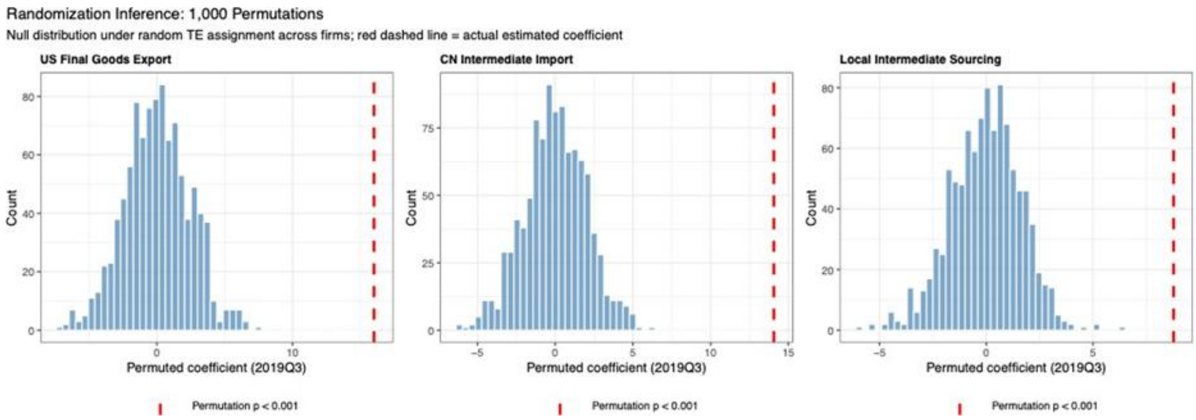


Table A1: The effect of US-China tariffs on Vietnamese firm (2018H1 Baseline)

			Processing		Transshipment		CN Suppliers		US Buyers		Local Sourcing		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Dep Var: Log of	US Final Export	CN Interm. Import	CN Input	US Export	CN Input	US Export	Count	Value/ Supplier	Count	Value/ Buyer	Value	Count	Value/ Supplier
2018Q1	8.086***	-0.200	1.080**	0.917	0.866	1.085	0.138	-0.405	1.423***	6.765***	1.140**	0.151***	1.018**
	(1.008)	(0.571)	(0.484)	(0.493)	(0.485)	(0.597)	(0.072)	(0.554)	(0.117)	(0.963)	(0.531)	(0.053)	(0.519)
2018Q3	2.083***	0.350	0.369	0.396	0.621	0.749	0.550***	-0.349	0.166**	1.533**	0.662	0.141***	0.479
	(0.750)	(0.560)	(0.431)	(0.487)	(0.435)	(0.552)	(0.079)	(0.547)	(0.076)	(0.721)	(0.530)	(0.052)	(0.521)
2018Q4	3.258***	1.280**	0.993**	1.297**	0.505	0.841	0.857***	0.329	0.264***	2.732***	0.546	0.142**	0.380
	(0.817)	(0.590)	(0.474)	(0.508)	(0.472)	(0.601)	(0.092)	(0.571)	(0.083)	(0.778)	(0.546)	(0.056)	(0.537)
2019Q1	5.402***	1.688***	1.323***	1.692***	0.954	1.349**	1.036***	0.510	0.509***	4.453***	1.660***	0.262***	1.441***
	(0.873)	(0.589)	(0.492)	(0.530)	(0.496)	(0.642)	(0.098)	(0.570)	(0.090)	(0.834)	(0.562)	(0.057)	(0.552)
2019Q2	5.923***	0.936	0.495	0.986	0.310	0.327	0.951***	-0.131	0.510***	5.046***	0.732	0.184***	0.582
	(0.881)	(0.605)	(0.505)	(0.555)	(0.503)	(0.643)	(0.101)	(0.585)	(0.092)	(0.842)	(0.589)	(0.059)	(0.578)
2019Q3	17.390***	11.850***	3.604***	4.723***	1.330**	2.446***	2.266***	9.780***	1.694***	14.756***	8.786***	0.960***	8.209***
	(1.212)	(1.051)	(0.580)	(0.649)	(0.546)	(0.690)	(0.173)	(0.948)	(0.130)	(1.131)	(0.815)	(0.102)	(0.767)
2019Q4	17.436***	2.993***	3.284***	4.719***	0.847	1.847***	1.255***	1.646**	1.605***	14.881***	2.615***	0.363***	2.294***
	(1.218)	(0.695)	(0.583)	(0.651)	(0.573)	(0.707)	(0.113)	(0.665)	(0.131)	(1.137)	(0.597)	(0.065)	(0.582)
CN Retaliation Tariff × Quarter FEs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
US Tariff on Vietnam × Quarter FEs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Baseline Firm Trade Size × Quarter FEs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	35,040	35,040	35,040	35,040	35,040	35,040	35,040	35,040	35,040	35,040	35,040	35,040	35,040
Firms	4,380	4,380	4,380	4,380	4,380	4,380	4,380	4,380	4,380	4,380	4,380	4,380	4,380

Notes: Standard errors clustered at the firm level in parentheses. *** $p < 0.01$, ** $p < 0.05$

Table A2: Additional effect for 2017 incumbents relative to 2018 entrants

	2018Q1	2018Q3	2018Q4	2019Q1	2019Q2	2019Q3	2019Q4
Panel A: Trade values							
US Final Export	−1.041	0.421	0.945	0.657	0.189	0.064	0.646
	(1.007)	(0.809)	(0.858)	(0.904)	(0.932)	(1.220)	(1.248)
CN Intermediate Import	0.234	0.223	0.166	0.115	0.356	0.081	0.062
	(0.611)	(0.550)	(0.584)	(0.639)	(0.634)	(0.949)	(0.753)
Panel B: Processing and transshipment							
Processing: CN Input	0.132	1.205^{***}	0.024	0.502	0.905	0.613	0.896
	(0.466)	(0.456)	(0.431)	(0.499)	(0.501)	(0.592)	(0.622)
Processing: US Export	0.092	1.301^{**}	0.014	0.575	1.352^{**}	0.244	0.803
	(0.491)	(0.515)	(0.499)	(0.546)	(0.568)	(0.621)	(0.688)
Transshipment: CN Input	−0.580	0.459	0.627	0.332	−0.123	0.625	1.092
	(0.505)	(0.455)	(0.549)	(0.568)	(0.577)	(0.545)	(0.581)
Transshipment: US Export	−1.066	0.764	0.859	0.798	−0.488	0.948	0.988
	(0.606)	(0.572)	(0.705)	(0.675)	(0.699)	(0.720)	(0.724)
Panel C: Buyer-supplier network dynamics							
N CN Suppliers	−0.039	0.085	0.058	−0.084	−0.016	−0.125	−0.054
	(0.070)	(0.071)	(0.079)	(0.086)	(0.089)	(0.138)	(0.100)
CN Value/Supplier	0.227	0.059	0.073	0.244	0.389	0.215	0.119
	(0.603)	(0.537)	(0.571)	(0.625)	(0.615)	(0.881)	(0.724)
N US Buyers	0.135	0.114	0.150	0.172	0.059	0.085	0.073
	(0.127)	(0.081)	(0.088)	(0.094)	(0.098)	(0.138)	(0.139)
US Value/Buyer	−1.394	0.101	0.712	0.272	0.082	−0.134	0.505
	(0.975)	(0.791)	(0.835)	(0.881)	(0.912)	(1.157)	(1.188)
Panel D: Local sourcing							
Local Intermediate	0.717	−0.021	0.082	0.313	0.358	−1.225	−0.318
	(0.480)	(0.471)	(0.473)	(0.529)	(0.542)	(0.739)	(0.555)
No. Local Suppliers	0.023	0.009	−0.011	−0.031	0.008	-0.187^{**}	−0.034
	(0.045)	(0.045)	(0.047)	(0.049)	(0.055)	(0.092)	(0.057)
Local Value/Supplier	0.787	−0.013	0.088	0.393	0.373	−1.072	−0.266
	(0.473)	(0.465)	(0.465)	(0.520)	(0.532)	(0.695)	(0.544)
N (Total Firms)	4,380						
N (INC = 1)	977						
N (INC = 0)	3,403						
Observations	35,040						

Notes: Each cell reports δ^{HINc} from the triple-difference specification, measuring the additional effect for 2017 incumbent exporters (INC = 1) relative to 2018 entrants (INC = 0) at the same level of firm-level tariff exposure. All tariff and firm size controls are included. Standard errors clustered by firm in parentheses. ** $p < 0.05$, *** $p < 0.01$. Reference period: 2018Q2.