From Diversification to Consolidation: Supply Chain Reconfiguration across Repeated Tariff Episodes

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Problem definition: Most prior academic research examines how firms respond to a single tariff episode. Yet firms increasingly operate in an environment characterized by recurring tariff shocks. Whether successive tariff episodes lead firms to continue diversifying their supply chains or instead prompt a different mode of adaptation remains largely unknown.

Methodology/results: We study how U.S. importing firms reconfigure their global supply chains across two major tariff episodes: Trade War 1.0 in 2018 and Trade War 2.0 in 2025. Using firm-product-level import transactions from Panjiva matched with Compustat, we track changes in sourcing locations, supplier networks, and shipment flows. We first show that both tariff episodes divert sourcing away from China toward a similar set of alternative countries. However, the magnitude of reallocation is substantially weaker during the second episode, and the nearshoring shift toward North America that emerged in the first episode is largely absent. We then document a fundamental shift in firms' adjustment behavior across episodes. The initial tariff episode induces broad-based diversification: firms expand the number of sourcing countries and suppliers while reducing average shipment volumes per supplier, consistent with an explore-and-test response under uncertainty. In contrast, the repeated tariff episode does not further broaden supplier networks. Instead, firms reduce the number of active suppliers and concentrate sourcing within networks established during the first episode. Moreover, supply chain reconfiguration following the second episode occurs more rapidly and is driven primarily by supplier exits rather than new supplier entry. This pattern suggests that firms draw on knowledge accumulated during the first trade war to make more targeted and decisive adjustments. The consolidation effect is particularly pronounced for differentiated products, where coordination-intensive inputs are less amenable to fragmented supplier networks.

Managerial implications: Repeated tariff episodes do not lead to further diversification. Rather, an initial episode prompts firms to build supply chain optionality by expanding their sourcing networks, whereas subsequent episodes trigger selective pruning and consolidation within those expanded networks. These findings offer guidance for managers seeking to design resilient global supply chains in an era of recurring trade-policy uncertainty.

Key words: supply chain reconfiguration, tariffs, supplier diversification, supplier consolidation.

1. Introduction

U.S. trade policy has entered a phase in which tariffs have re-emerged as recurring instruments of economic statecraft rather than isolated interventions (Alfaro and Chor 2025, Barbiero et al. 2025, Clayton et al. 2025). The 2018 U.S.–China trade war marked a first large-scale disruption to global supply chains, followed by a renewed and broader escalation in 2025 that targeted a wider set of products and trading partners. These episodes imposed substantial and heterogeneous shocks on firms' sourcing environments by altering landed costs, changing the relative attractiveness of supplier countries, and increasing uncertainty about the durability of existing trade relationships. Estimates that the 2025 escalation reduced U.S.–China trade by roughly 30 percent and redirected more than $160 billion in global trade flows underscore the scale at which tariffs can reshape global supply chains.

A growing empirical literature documents how firms responded to the initial tariff episode in 2018. U.S. importers shifted sourcing away from China toward locations such as Vietnam and Mexico, and much of this adjustment occurred within existing trade networks rather than through entirely new supplier relationships. Tariffs raised input costs that propagated along supply chains and affected both sourcing decisions and downstream production. However, this literature largely treats tariff shocks as one-off events. As trade policy becomes more recurrent and uncertain, that perspective is increasingly inadequate: firms now operate in an environment of sequential shocks, where each episode interacts with the supply networks and learning created by prior disruptions.

This shift raises a central question for operations and supply chain management: How do firms restructure global supply chains when tariff episodes occur repeatedly rather than once? Firms' global sourcing structures reflect a fundamental trade-off between efficiency and resilience. Under stable trade-policy conditions, firms often benefit from relatively concentrated sourcing portfolios, which allow them to exploit scale economies, reduce search and monitoring costs, simplify logistics coordination, and deepen relationships with established partners. Tariff shocks change this balance by increasing the landed costs and the uncertainty associated with incumbent sourcing relationships. Shocks can signal a broader regime of trade policy risk—including the prospect of additional tariffs, retaliatory measures, or changes in rules of origin—shifting sourcing priorities from pure cost minimization toward flexibility under uncertainty.

An initial, relatively targeted tariff episode may encourage broad diversification across countries and suppliers: firms expand their networks and allocate small volumes to new suppliers as they experiment and hedge. The presence of repeated shocks adds a second layer of complexity. One possibility is continued diversification: as trade-policy risk persists or broadens, firms may keep expanding across countries and suppliers to hedge against future shocks and preserve flexibility. Another is consolidation: a subsequent, broader episode—covering more countries, products, and with higher and more persistent tariffs—may reduce the marginal value of further expansion. Once many alternative suppliers and locations are themselves tariff-exposed or capacity-constrained, and once firms have learned which relationships are viable, the incentive shifts toward rationalizing the supplier base and pruning marginal relationships.

We study how U.S. importing firms restructure their global supply chains across two major tariff episodes: Trade War 1.0 (TW1) in 2018 and Trade War 2.0 (TW2) in 2025. Using firm–product–month data aggregated from Panjiva bills of lading and matched to Compustat, we analyze 9,404 listed U.S. importing firms and 5,964 HS6 products across both episodes. We focus on four dimensions of adjustment: (1) geographic reallocation (shifts in geographic import shares), (2) sourcing breadth (number of sourcing countries and suppliers), (3) volume allocation (average shipment size and concentration), and (4) adjustment dynamics (turnover, entry, and exit of suppliers), with special attention to differences between standardized and differentiated products. We are particularly interested in the following research questions (RQ):

RQ1 – Geographic reallocation across tariff episodes. *How does the geographic distribution of sourcing shift across two tariff episodes?* The first tariff episode targeted China while leaving most alternative locations tariff-free, creating incentives for geographic substitution. The second episode imposed tariffs more broadly, including on previously favored alternatives such as Canada and Mexico, potentially reducing the scope for further geographic reallocation. RQ1 asks whether both episodes generate similar trade diversion away from China, and whether the broader tariff coverage of TW2 shifts the set of alternative sourcing locations.

RQ2 – Diversification response to the initial tariff episode. *How do firms adjust the breadth and intensity of their sourcing relationships following the first tariff episode?* We posit that the initial tariff episode shifts firms from concentrated, scale-driven sourcing toward more diversified, option-rich structures. Concretely, we ask whether firms increase the number of sourcing countries and suppliers while reducing average shipment volume per supplier after TW1, consistent with an explore-and-test response under heightened uncertainty.

RQ3 – Consolidation under repeated tariff episode. *Do firms continue to diversify under a second, broader tariff episode, or do they consolidate within the networks created by the first episode?* We hypothesize that once firms have built an alternative sourcing network and tariffs broaden in scope and magnitude, the marginal value of additional geographic diversification declines. Higher tariffs and wider coverage increase the fixed and coordination costs of maintaining a fragmented supplier base. RQ3 therefore asks whether, during TW2, firms are less likely to further diversify geographically and more likely to consolidate within their pre-existing alternative supplier networks, reducing the number of active suppliers and contracting shipment flows.

RQ4 – Speed and margin of supplier-network adjustment under repeated shocks. *Does supplier-network reconfiguration accelerate under the second tariff episode, and through which mechanism—entry or exit—does this adjustment primarily occur?* After the first shock, firms have already incurred search and qualification costs and have accumulated information about supplier reliability, cost, and compliance. This learning should allow faster reconfiguration when a subsequent shock arrives. At the same time, onboarding new suppliers remains costly and risky, especially under broad policy coverage and uncertainty. RQ4 therefore asks whether TW2 generates faster turnover in supplier networks than TW1, and whether this acceleration is driven mainly by supplier exits (pruning marginal relationships) rather than new supplier entry.

RQ5 – Product differentiation and selective reconcentration. *Is the consolidating* *effect of the second tariff shock stronger for differentiated products than for standardized products?* Differentiated and coordination-intensive products typically require buyer-specific specifications, engineering collaboration, and extensive qualification and quality assurance. These features make supplier relationships less interchangeable and raise the cost of fragmented sourcing. We therefore expect that, under repeated shocks, firms will reconcentrate more strongly around core suppliers for differentiated products, while standardized products—where suppliers are more easily substitutable—will show weaker reconcentration pressures. RQ5 tests whether the consolidate-and-contract pattern documented under TW2 is disproportionately driven by differentiated goods.

Together, these five research questions translate the paper's central motivation into a concrete empirical agenda. By addressing these questions, the paper contributes in three ways. First, it provides new empirical evidence on how repeated rather than single tariff episodes reshape global supply chains, showing a transition from diversification to consolidation across episodes. Second, it highlights the role of learning and coordination costs in driving this transition, with repeated shocks accelerating exit-driven pruning rather than continuous expansion. Third, it demonstrates that these dynamics are product-specific, with differentiated goods exhibiting stronger reconcentration. Together, these contributions offer a dynamic view of supply chain redesign under recurring trade-policy disruption and generate implications for managers and policymakers navigating an era of escalating and repeated tariffs.

2. Literature Review

Global supply chains are increasingly shaped by geopolitical forces, as geopolitical risk disrupts cross-border flows, increases uncertainty, affects firm performance, and destabilizes inter-firm relationships (Cohen et al. 2026, Zhu et al. 2025). Recent work frames these dynamics as geoeconomic pressure, with governments using tariffs, sanctions, and export controls as strategic tools (Clayton et al. 2025), thereby embedding supply chains in state-driven interactions.

Building on this, Bednarski et al. (2026) conceptualize geopolitical supply chain disruptions as being systemic and persistent and develop a framework integrating Transaction Cost Economics, Resource Dependence Theory, and International Relations. Transaction Cost Economics, in particular, offers a useful lens for analyzing supply chain responses to recurring tariff shocks. It emphasizes that relationship-specific investments, bounded rationality, and contract incompleteness make supplier switching costly, which helps explain why firms tend to reallocate volumes within established networks rather than build entirely new supplier relationships when faced with policy disruptions (Alfaro and Chor 2025, Fan et al. 2024). This perspective is particularly relevant for coordination-intensive, differentiated inputs, where asset specificity and tacit know-how accumulated through repeated interactions raise the cost of severing ties and favor consolidation around proven partners once viable alternatives have been identified. These perspectives collectively suggest that supply chain adjustments are shaped by switching costs, dependency on key partners, and the difficulty of reconfiguring established relationships under uncertainty.

Recent theoretical work provides a foundation for these dynamics by modelling supply chains as networks of firm-to-firm relationships with costly search, matching frictions, and renegotiation. Grossman et al. (2024) show that tariffs disrupt these relationships by altering bargaining outcomes and inducing either renegotiation or costly supplier switching, while sunk search costs generate persistence in supplier networks. Complementary operations management research emphasizes that such adjustments are further shaped by network-level trade-offs and policy uncertainty, which delay restructuring and favor gradual reconfiguration (Dong and Kouvelis 2020, Kouvelis et al. 2025).

Importantly, policy uncertainty itself plays a central role in shaping firms' decisions even before tariffs materialize. Handley and Limão (2017) show that uncertainty about future trade policy reduces firms' incentives to enter export markets or invest in capacity, as firms delay irreversible decisions when facing the risk of adverse policy changes. This highlights that supply chain adjustments are driven not only by observed tariffs but also by expectations about future policy, reinforcing the role of uncertainty in shaping gradual and path-dependent responses.

Taken together, these perspectives imply that supply chain responses to tariff shocks are incremental and path-dependent, driven by switching costs, relationship stickiness, and uncertainty-induced delays rather than immediate large-scale restructuring. In the following sections, we review and compare literature on how supply chains respond to tariff shocks, focusing on the U.S.–China trade conflict initiated in 2018 and the renewed escalation beginning in 2025.

2.1. Supply Chain Responses to the U.S.–China Trade War 2018

Research on the 2018 U.S.–China trade conflict identifies several mechanisms through which tariffs affect global supply chains. At the core, tariffs act as price shocks. Gopinath and Neiman (2026) show that pass-through to import prices is high, implying that importing firms absorb most of the financial burden. Firm-level evidence further indicates that these costs propagate through supply chains via multiple channels, including direct import costs, exposure to input suppliers, and spillovers to export performance (Barbiero et al. 2025, Handley et al. 2025).

In addition, tariffs affect firms differently depending on their supply network exposure. Firms more strongly connected to trade relationships affected by the U.S.–China trade tariffs experience larger declines in transaction activity and face higher transaction costs, reflecting disruptions in established buyer–supplier relationships (Fan et al. 2024).

Beyond cost effects, tariffs lead to a reallocation of sourcing. Alfaro and Chor (2025) show that U.S. firms shift away from suppliers in China toward alternative sourcing locations such as

Vietnam and Mexico. This reallocation is consistent with industry-level evidence showing that firms adjust to tariffs by relocating production across countries to avoid tariff exposure. Flaaen et al. (2020), studying the U.S. washing machine industry, document "country-hopping" behavior, whereby firms sequentially shift production across locations such as China, Vietnam, and the United States depending on tariff scope and coverage, with relocation occurring more readily under targeted tariffs that leave alternative sourcing options available, whereas broader tariffs limit such substitution. However, this shift does not reflect broad diversification. Rather, sourcing remains concentrated among a stable set of trade partners, with firms primarily adjusting volumes across existing suppliers rather than establishing new relationships (Alfaro and Chor 2025).

Moreover, Alfaro and Chor (2025) show that adjustments to sourcing patterns unfold unevenly over time. While some sourcing decisions occur immediately, others reflect gradual adjustment. A substantial share of reallocation takes place in later periods (2021–2024), consistent with firms initially adopting a "wait-and-see" approach, particularly for contract-intensive goods. This gradual adjustment is consistent with models in which supply chains are characterized by search frictions, sunk costs, and policy uncertainty, which together delay restructuring and lead firms to adjust incrementally (Grossman et al. 2024, Kouvelis et al. 2025, Handley and Limão 2017).

Related to this, Hsu et al. (2026) analyze sourcing adjustments following the U.S.-Mexico-Canada Agreement (USMCA) in 2020. They find that tighter regional value content requirements under this agreement lead U.S. firms to increase sourcing from Mexico and Canada, consistent with a shift toward nearshoring. Similarly, they show that adjustments are faster for less complex components, revealing that restructuring is constrained by implementation costs and production complexity.

Taken together, this literature shows that initial responses to tariff shocks are characterized by reallocation within existing networks rather than broad restructuring, reflecting the significant adjustment costs and coordination complexity firms face when reconfiguring supplier relationships.

2.2. Supply Chain Responses to Renewed Trade Tensions in 2025

More recent literature examines the renewed and broadened tariff escalation beginning in 2025, which differs from the initial trade conflict in both scale and scope. Tariff increases in this period are larger, more widespread across countries and products, and embedded in a broader context of geoeconomic pressure and strategic competition (Clayton et al. 2025, Gopinath and Neiman 2026).

Empirical evidence suggests that the 2025 tariff escalation reinforces earlier reallocation patterns. Alfaro and Chor (2025) document a continued reduction in U.S. reliance on China and provide early evidence that these trends persist. The shift is primarily toward alternative suppliers such as Vietnam, Mexico, and other major U.S. trade partners, while sourcing remains concentrated within existing networks, indicating adjustment through reallocation rather than expansion to new countries. Clayton et al. (2025) show that firms respond to the broader scope of the 2025 shock along multiple margins, including price, supply chain configuration, and investment decisions.

2.3. Diversification, Complexity, and Strategic Trade-offs

Across both tariff episodes in 2018 and 2025, the literature highlights a fundamental trade-off between diversification and coordination costs. Diversification is widely viewed as a risk mitigation strategy that enhances flexibility and reduces dependence on individual suppliers (Niu et al. 2025). Examining the impact of the U.S.–China trade war, Fan et al. (2022) show that firms with more diversified supply bases experience worse operating performance, as a higher number of suppliers increases supply chain complexity and makes adjustment more difficult under tariff shocks. Conversely, more concentrated supply chains can improve coordination and efficiency but increase dependence on a limited set of partners, raising exposure to supply-side risks (Zhu et al. 2025).

The optimal supply chain structure therefore reflects a trade-off between flexibility and coordination. Importantly, policy uncertainty plays a central role in shaping this trade-off. Firms adjust sourcing strategies not only in response to realized tariff changes but also in anticipation of future disruptions. Handley and Limão (2017) show that such uncertainty reduces entry and investment, while Charoenwong et al. (2023) find that firms diversify under country-specific uncertainty but adopt alternative strategies when uncertainty is broader or more persistent.

In summary, while the literature provides substantial evidence on supply chain responses to the 2018 and 2025 tariff episodes, it primarily treats these events as isolated shocks. This overlooks the increasingly recurrent nature of geopolitical disruptions, which expose firms to repeated policy shocks rather than one-off adjustments.

From a theoretical perspective, existing research highlights switching costs, relationship stickiness, and uncertainty-driven delays but does not account for how firms adapt their supply chain strategies across successive disruptions. Firms may initially engage in limited reallocation due to high adjustment costs and uncertainty but revise their strategies over time as they accumulate experience and update expectations about policy persistence.

Consequently, supply chain restructuring is inherently dynamic, shaped not only by coordination costs and dependency structures but also by learning and forward-looking behavior under uncertainty. However, existing studies do not examine how these mechanisms jointly determine supply chain adjustments across repeated tariff shocks. This study addresses this gap by analyzing how firms adapt their sourcing strategies under successive tariff shocks, focusing on the interaction between learning, coordination costs, and supply network structure.

3. Data and Variable Construction

3.1. Tariff Data

We obtain country-product-month-level U.S. tariff data from the United States International Trade Commission (USITC), which provides monthly ad valorem tariff rates at the Harmonized System

10-digit (HS10) level. To supplement this with trade policy information, particularly for the more recent episode, we collect tariff announcement data from the Peterson Institute for International Economics (CP 2025). We focus on two distinct tariff episodes: TW1, covering the period 2016–2019 and capturing the initial U.S.-China trade conflict that began in 2018; and TW2, covering the period 2023–2025 and capturing the renewed and broadened tariff escalation of 2025. For TW2, our data extends through November 2025.

3.2. Bill of Lading Data

Our primary source of supply chain data is S&P Panjiva, a commercial database that compiles U.S. import transactions from customs records and bills of lading. Each shipment record provides detailed transaction-level information, including the identity of the importing firm and its overseas supplier, the product (classified at the HS6 level), the country of origin, the shipment date, and the shipment quantity. A notable advantage of the Panjiva data is that it enables linkage of buyer and supplier entities to identifiers shared with S&P Capital IQ and Compustat. Specifically, Panjiva assigns a unique identifier to each importing and exporting firm and provides a matching table that maps each Panjiva firm ID to a Capital IQ company ID (CIQ ID), which can in turn be matched to a publicly listed firm via its GVKEY. This matching procedure allows us to identify the ultimate parent company of each U.S. importing firm and to merge supply chain transaction data with firm-level financial fundamentals from Compustat. We aggregate the matched transactions to the ultimate-parent-company–product–year-month level. The final sample comprises approximately 9,404 listed U.S. importing firms and 5,964 products at the HS6 level.

3.3. Variable Construction

Tariff Exposure. We construct the tariff exposure at the firm-product-year month level. Specifically, for firm f, product p (at HS6 level), and year month t, we define the tariff exposure measure as:[1]

$$TE_{f,p,t} = \sum_{c \in C^{t_0}_{f,p}} \omega^{t_0}_{f,p,c} \cdot \tau_{p,c,t} \tag{1}$$

where $\tau_{p,c,t}$ is the additional tariff rate for product p imposed by the US and on country c in year month t on top of tariff rate in 2016, and $\omega^{t_0}_{f,p,c}$ represents the pre-shock import share weight defined as:

$$\omega^{t_0}_{f,p,c} = \frac{\text{Imports}^{t_0}_{f,p,c}}{\sum_{c'} \text{Imports}^{t_0}_{f,p,c'}} \tag{2}$$

Since the value is estimated in Panjiva, we use weight to measure $\text{Imports}^{t_0}_{f,p,c}$. The pre-shock period t_0 is defined as the 24-month period prior to each tariff episode: calendar year 2016-2017 for TW1

[1] While the broader trade conflicts also involved non-tariff barriers and regulatory restrictions, our empirical strategy specifically leverages changes in tariff rates as a measurable, systematic proxy for companies' policy exposure.

and calendar year 2023-2024 for TW2. This approach ensures that our exposure measure is not endogenous to contemporaneous sourcing decisions.

Sourcing Structure Variables. We construct three measures to characterize the structure of each firm's sourcing network at the firm-product-month level.

Number of sourcing countries: The count of distinct countries from which a firm sources a given HS6 product in a given year-month.

Number of suppliers: The count of distinct suppliers from which a firm sources a given HS6 product in a given year-month.

Average shipment size per supplier: The log of average shipment weight per supplier at the firm-product-year month level.

Together, these three measures allow us to distinguish geographic diversification (country count), supplier-base breadth (supplier count), and per-relationship volume allocation (shipment size).

Supplier Turnover Variables. To capture the dynamics of supplier reconfiguration, we define supplier turnover using a rolling window of $K = 6$ months. For each firm-product-month observation, we compare the set of active suppliers in the current window (months t) with the set in the previous window (months $t-K$ to $t-1$).

Supplier entry: The share of suppliers in the current month that were not present in the previous K-month window:

$$\text{Entry}_{f,p,t} = \frac{|S_{f,p,t} \setminus S_{f,p,t-K:t-1}|}{|S_{f,p,t}|} \tag{3}$$

Supplier exit: The share of suppliers in the previous K-month window that are not present in the current month:

$$\text{Exit}_{f,p,t} = \frac{|S_{f,p,t-K:t-1} \setminus S_{f,p,t}|}{|S_{f,p,t-K:t-1}|} \tag{4}$$

Supplier turnover: The share of suppliers that are either newly added or dropped, normalised by the total number of distinct suppliers active in either period:

$$\text{Turnover}_{f,p,t} = \frac{|S_{f,p,t} \setminus S_{f,p,t-K:t-1}| + |S_{f,p,t-K:t-1} \setminus S_{f,p,t}|}{|S_{f,p,t-K:t}|} \tag{5}$$

Decomposing total turnover into entry and exit margins is central to testing RQ4, as it allows us to distinguish whether faster reconfiguration in the second episode is driven by the onboarding of new suppliers or by the pruning of existing ones.

Concentration Variables. To measure supplier concentration, we compute:

Supplier HHI: The Herfindahl-Hirschman Index calculated over supplier-level import shares at the firm-product-month level:

$$\text{HHI}_{f,p,t} = \sum_{s \in S_{f,p,t}} \left(\frac{\text{Imports}_{f,p,s,t}}{\sum_{s'} \text{Imports}_{f,p,s',t}} \right)^2 \tag{6}$$

where s indexes suppliers and $S_{f,p,t}$ is the set of active suppliers for firm f, product p, in month t.
Top supplier share: The import share of the largest supplier at the firm-product-month level:

$$\text{TopShare}_{f,p,t} = \max_{s \in S_{f,p,t}} \left\{ \frac{\text{Imports}_{f,p,s,t}}{\sum_{s'} \text{Imports}_{f,p,s',t}} \right\} \tag{7}$$

These two measures capture different aspects of concentration: HHI reflects the overall distribution of import volumes across all active suppliers, whereas top supplier share focuses on the dominance of the single most important relationship.

Product Classification. We classify products as differentiated versus standardized using the Rauch (1999) classification at the HS6 level. Products are categorized as *differentiated* if they are classified as neither traded on organized exchanges nor having reference prices, and as *standardized* otherwise. We use an indicator variable Diff_p to indicate the classification of product p, equal to 1 if the product is a differentiated good. This classification captures the degree to which products require relationship-specific investment, supplier qualification, and ongoing coordination, characteristics that, as we suggest in RQ5, make fragmented sourcing especially costly and therefore predict stronger reconcentration under repeated disruption.

3.4. Summary Statistics

Our final sample comprises 9,404 firms, of which 7,617 appear during TW1 (2016-2019) and 7,308 during TW2 (2023-2025.11). Table 1 reports key summary statistics for both periods. In Panel A, the average tariff exposure during TW1 is 0.013 with a standard deviation of 0.047, indicating that most firm-product pairs face zero or modest tariff increases, while a subset of observations is substantially exposed. By contrast, Panel B shows that tariff exposure during TW2 is nearly ten times larger on average (0.123) and considerably more dispersed (standard deviation of 0.217), reflecting the broader scope and higher magnitude of the second round of tariffs. A similar pattern holds for the lagged tariff measures.

Turning to the dependent variables, the average firm sources from approximately 1.3 countries and 1.7 suppliers in both periods, suggesting that a large portion of the sample relies on a narrow supplier base. Consistent with this, supplier concentration is high: the weight-based HHI averages around 0.89, and the top supplier's share exceeds 0.91 in both panels. Firms have fewer sourcing countries and suppliers, and a lower average weight per supplier, during TW2 than during TW1. In terms of supplier turnover, the exit rate averages 0.396 during TW1 and rises to 0.427 during TW2, while the entry rate increases from 0.189 to 0.213, and the overall turnover rate rises from 0.419 to 0.449. These patterns suggest a somewhat more turbulent supplier adjustment environment during the second trade war.

Table 1 Summary Statistics

Variable	N	Mean	Std	25 Percentile	Median	75 Percentile
Panel A: TW1 (2016–2019)						
Tariff exposure	1,595,134	0.013	0.047	0.000	0.000	0.000
One-month-lagged tariff exposure	1,560,778	0.012	0.045	0.000	0.000	0.000
Two-month-lagged tariff exposure	1,525,737	0.011	0.043	0.000	0.000	0.000
Number of sourcing countries	1,594,791	1.341	0.980	1.000	1.000	1.000
Number of sourcing suppliers	1,342,025	1.731	2.896	1.000	1.000	2.000
Average weight per supplier (ln)	1,342,025	9.014	2.112	7.675	9.154	10.252
Supplier HHI index (weight-based)	1,342,025	0.890	0.216	0.971	1.000	1.000
Top supplier share (weight-based)	1,342,025	0.915	0.176	0.986	1.000	1.000
Differentiated product	1,595,134	0.733	0.442	0.000	1.000	1.000
Supplier turnover rate	1,059,658	0.419	0.372	0.000	0.500	0.722
Supplier entry rate	1,059,658	0.189	0.346	0.000	0.000	0.250
Supplier exit rate	1,059,658	0.396	0.372	0.000	0.500	0.667
Total asset (ln)	1,328,851	9.806	2.568	8.020	9.607	11.058
Inventory/total asset	1,328,851	0.142	0.114	0.066	0.121	0.201
PPENT/total asset	1,328,851	0.248	0.176	0.115	0.205	0.340
ROA	1,228,398	0.012	0.836	0.005	0.013	0.023
Panel B: TW2 (2023–2025)						
Tariff exposure	1,136,390	0.123	0.217	0.000	0.019	0.185
One-month-lagged tariff exposure	1,136,390	0.113	0.205	0.000	0.014	0.168
Two-month-lagged tariff exposure	1,136,390	0.105	0.195	0.000	0.010	0.155
Number of sourcing countries	1,136,151	1.325	0.935	1.000	1.000	1.000
Number of sourcing suppliers	957,370	1.716	2.836	1.000	1.000	1.000
Average weight per supplier (ln)	957,370	8.943	2.125	7.619	9.133	10.181
Supplier HHI index (weight-based)	957,370	0.894	0.214	1.000	1.000	1.000
Top supplier share (weight-based)	957,370	0.918	0.175	1.000	1.000	1.000
Differentiated product	1,136,390	0.722	0.448	0.000	1.000	1.000
Supplier turnover rate	738,647	0.449	0.378	0.000	0.500	0.750
Supplier entry rate	738,647	0.213	0.365	0.000	0.000	0.333
Supplier exit rate	738,647	0.427	0.379	0.000	0.500	0.750
Total asset (ln)	954,964	10.214	2.618	8.474	9.971	11.411
Inventory/total asset	954,964	0.140	0.104	0.065	0.126	0.203
PPENT/total asset	954,964	0.259	0.176	0.122	0.215	0.369
ROA	894,694	0.011	0.260	0.004	0.013	0.023

4. Empirical Strategy

4.1. Continuous Difference-in-Differences

To identify the causal effect of tariff shocks on supply chain reconfiguration, we employ a continuous difference-in-differences (DiD) design. Rather than classifying firms into discrete treated and control groups, our treatment variable is the firm-product-month-level tariff exposure $TE_{f,p,t}$ constructed in Section 3, which varies continuously across firms and products based on their pre-shock import shares from tariff-targeted countries. This approach exploits variation in tariff exposure intensity rather than a binary treatment indicator, enabling us to estimate dose-response relationships between tariff exposure and supply chain outcomes. A key advantage of this design is that firm-by-product fixed effects absorb all time-invariant heterogeneity in sourcing relationships, while product-by-time fixed effects control for product-level demand shifts, cost trends, and seasonality. Identification therefore comes from within-firm-product variation in tariff exposure over time. Furthermore, because the exposure weights $\omega^{t_0}_{f,p,c}$ are anchored to the pre-shock period, the treatment variable is predetermined and not subject to reverse causality from contemporaneous sourcing decisions.

4.2. Empirical Specification

We estimate three specifications to characterize the pattern of supply chain adjustment, including contemporaneous exposure (Equation (8a)), one-month lagged exposure (Equation (8b)), and two-month lagged exposure (Equation (8c)):

$$Y_{f,p,t} = \beta_0 + \beta_1 TE_{f,p,t} + \beta_2 X_{f,t-1} + \alpha_{f,p} + \lambda_{p,t} + \epsilon_{f,p,t} \tag{8a}$$

$$Y_{f,p,t} = \beta_0 + \beta_1 TE_{f,p,t-1} + \beta_2 X_{f,t-1} + \alpha_{f,p} + \lambda_{p,t} + \epsilon_{f,p,t} \tag{8b}$$

$$Y_{f,p,t} = \beta_0 + \beta_1 TE_{f,p,t-2} + \beta_2 X_{f,t-1} + \alpha_{f,p} + \lambda_{p,t} + \epsilon_{f,p,t} \tag{8c}$$

where $Y_{f,p,t}$ denotes the supply chain outcomes for firm f, product p, and month t. $TE_{f,p,t}$, $TE_{f,p,t-1}$, and $TE_{f,p,t-2}$ denote contemporaneous, one-month lagged, and two-month lagged tariff exposure, respectively, as described in Section 3. $X_{f,t-1}$ is a vector of lagged firm-quarter-level controls, including the log of total assets ($\ln at$), the inventory-to-assets ratio (inv_at), the property, plant, and equipment-to-assets ratio (ppe_at), and return on assets (roa). $\alpha_{f,p}$ denotes firm-by-product fixed effects, which absorb all time-invariant heterogeneity in firms' sourcing relationships of each product. $\lambda_{p,t}$ denotes product-by-time fixed effects, which control for product-specific demand shifts, cost trends, and seasonality that could drive changes in sourcing structure. Standard errors are clustered at the firm-by-product level.

For the heterogeneous effects analysis in Sections 5.2 and 5.4, we augment specifications (8) with the interaction between tariff exposure and the moderators, as described in Equations (9) and (10).

5. Empirical Results

5.1. Geographic Reallocation across Tariff Episodes

To answer RQ1, we first document how the geographic distribution of sourcing shifts across the two tariff episodes. Table 2 reports the average effect of tariff exposure on U.S. firms' import shares from nine country and regional groupings, estimated separately for TW1 and TW2. Two broad patterns emerge from this analysis.

First, both episodes generate significant diversion away from China and toward a broadly similar set of alternative locations, including Vietnam, India, Taiwan, Japan and Korea, and Western Europe. This geographic substitution pattern is consistent with the "Great Reallocation" documented in Alfaro and Chor (2025), which shows that U.S. importers have decoupled from China but not from the global economy, and that reallocation has occurred primarily among trade partners rather than through entry into entirely new sourcing countries. Notably, the magnitude of

Table 2 Trade Diversion Across Tariff Episodes

TW1	(1) China	(2) Vietnam	(3) India	(4) Taiwan	(5) JpnKor	(6) NC Am	(7) S Am	(8) W Eur	(9) E Eur
TE_t	-0.922***	0.047***	0.046***	0.129***	0.101***	0.036***	0.033***	0.222***	0.011*
	(−48.53)	(7.83)	(6.57)	(14.33)	(10.10)	(6.00)	(6.60)	(18.50)	(1.83)
Observations	1,134,884	1,134,884	1,134,884	1,134,884	1,134,884	1,134,884	1,134,884	1,134,884	1,134,884
R-squared	0.692	0.520	0.656	0.668	0.746	0.702	0.690	0.779	0.617
TW2	(1) China	(2) Vietnam	(3) India	(4) Taiwan	(5) JpnKor	(6) NC Am	(7) S Am	(8) W Eur	(9) E Eur
TE_t	-0.187***	0.017***	0.014***	0.018***	0.021***	0.002	0.004***	0.035***	0.008***
	(−37.40)	(8.50)	(7.00)	(9.00)	(10.50)	(1.00)	(4.00)	(11.67)	(8.00)
Observations	795,230	795,230	795,230	795,230	795,230	795,230	795,230	795,230	795,230
R-squared	0.670	0.557	0.662	0.677	0.752	0.692	0.662	0.752	0.628
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm*Product FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Product*Time FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes. For TW1 and TW2, the sample periods are 2016-2019 and 2023-2025.11, respectively. The dataset for this table is organized at the firm-product(HS6)-year month-level. The dependent variable represents the US import share from different countries/regions, measured in weight. Lagged firm control variables, firm and product(HS6)-year month fixed effects are included. The t-values are reported in parentheses. Standard errors are clustered at the firm-HS6-product level. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

China diversion is substantially larger in TW1 (coefficient of -0.922) than in TW2 (coefficient -0.187), suggesting that the geographic reallocation triggered by the initial tariff episode was more extensive than that induced by the repeated episode.

Second, the two episodes appear to diverge with respect to North America. In TW1, imports from North America (Canada and Mexico) increase significantly in response to tariff exposure, consistent with a nearshoring response. In TW2, however, the corresponding coefficient is small and statistically indistinguishable from zero. It indicates that the repeated tariff episode does not simply intensify or replicate the geographic adjustment observed in the first episode. Rather, the second episode involves more selective utilization of the alternative supply base already established during TW1, rather than a further broadening of the sourcing footprint. The fundamental structural difference between the two episodes may explain this finding. TW1 was predominantly bilateral, targeting China while leaving imports from Canada and Mexico largely untouched; nearshoring was therefore a tariff-free alternative. TW2, by contrast, imposed substantial tariffs on imports from Canada and Mexico as well, undermining nearshoring as a tariff-advantaged strategy.

5.2. Initial Tariff Episode Induces Diversification, While Repeated Episode Induces Consolidation

To answer RQ2 and RQ3, we examine how tariff episodes affect the structure of firms' sourcing relationships. Table 3, Table 4, and Table 5 report the effects of tariff exposure on the number of sourcing countries, the number of suppliers, and the log average shipment weight per supplier, respectively, estimated separately for each tariff episode.

Table 3 Effect of Tariff Shocks on Number of Sourcing Countries

	Num of Sourcing Countries (TW1)			Num of Sourcing Countries (TW2)		
	(1)	(2)	(3)	(4)	(5)	(6)
TE_t	0.155***			-0.010		
	(3.84)			(-1.04)		
TE_{t-1}		0.164***			0.006	
		(3.99)			(0.65)	
TE_{t-2}			0.173***			0.020*
			(4.10)			(1.94)
ln_at	0.031***	0.031***	0.032***	0.066***	0.066***	0.066***
	(2.82)	(2.75)	(2.76)	(5.04)	(5.04)	(5.04)
inv_at	0.293***	0.283***	0.283***	-0.153**	-0.153**	-0.153**
	(3.90)	(3.71)	(3.64)	(-2.04)	(-2.04)	(-2.04)
ppe_at	-0.240***	-0.243***	-0.244***	0.048	0.047	0.047
	(-5.87)	(-5.91)	(-5.87)	(0.72)	(0.72)	(0.71)
roa	-0.001*	-0.001*	-0.003***	-0.041*	-0.041*	-0.041*
	(-1.67)	(-1.68)	(-2.88)	(-1.65)	(-1.65)	(-1.65)
Observations	1,134,884	1,110,481	1,085,758	795,230	795,230	795,230
R-squared	0.724	0.726	0.727	0.725	0.725	0.725
Firm*Product FE	YES	YES	YES	YES	YES	YES
Product*Time FE	YES	YES	YES	YES	YES	YES

Notes. For TW1 and TW2, the sample periods are 2016-2019 and 2023-2025.11, respectively. The dataset for this table is organized at the firm-product(HS6)-year month-level. The dependent variable represents the number of sourcing countries. Lagged firm control variables, firm and product(HS6)-year month fixed effects are included. The t-values are reported in parentheses. Standard errors are clustered at the firm-HS6-product level. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

TW1: diversification. The initial tariff episode tends to induce broad-based diversification of sourcing structure among exposed firms, which answers RQ2. Columns (1)–(3) of Table 3 show that tariff exposure significantly increases the number of sourcing countries during TW1, with coefficients ranging from 0.155 to 0.173 and significant at the 1% level across all lag specifications.[2] The number of active suppliers also increases significantly (Table 4, columns (1)–(3)), with coefficients ranging from 0.260 to 0.290.[3] Simultaneously, average shipment weight per supplier tends to decline significantly (Table 5, with coefficients of -0.164 to -0.193 (columns (1)–(3)).[4] Taken together, these results indicate that firms tend to respond to the initial tariff episode by broadening their sourcing footprint, i.e. adding both countries and suppliers, while distributing orders more thinly across the expanded network. This pattern is consistent with an explore-and-test response: firms expand the option set without committing large volumes to new relationships.

TW2: consolidation. By contrast, the second tariff episode appears to generate a different average response, as indicated by RQ3. The coefficients on the number of sourcing countries during TW2 are small and statistically indistinguishable from zero across all lag specifications (Table 3, columns (4)–(6)), indicating no meaningful geographic expansion. The number of active suppliers

[2] A firm-product pair subject to the typical 25-percentage-point tariff increase sources, on average, approximately 0.04 additional countries, relative to a baseline mean of 1.3.

[3] Evaluated at the same 25-percentage-point benchmark, this implies approximately 0.07 additional suppliers relative to a baseline mean of 1.73.

[4] This corresponds to roughly a 4-5% reduction in shipment weight for a 25-percentage-point tariff change.

Table 4 Effect of Tariff Shocks on Number of Suppliers

	Num of Suppliers (TW1)			Num of Suppliers (TW2)		
	(1)	(2)	(3)	(4)	(5)	(6)
TE_t	0.290**			-0.040		
	(2.55)			(-1.46)		
TE_{t-1}		0.277**			-0.080**	
		(2.45)			(-2.53)	
TE_{t-2}			0.260**			-0.057*
			(2.29)			(-1.71)
ln_at	0.089***	0.090***	0.093***	0.044	0.044	0.043
	(3.14)	(3.16)	(3.19)	(0.98)	(0.98)	(0.98)
inv_at	0.368	0.330	0.293	-0.333	-0.333	-0.333
	(1.40)	(1.24)	(1.09)	(-1.39)	(-1.38)	(-1.39)
ppe_at	-0.908***	-0.929***	-0.948***	-0.023	-0.022	-0.022
	(-3.92)	(-3.98)	(-3.99)	(-0.10)	(-0.09)	(-0.09)
roa	-0.001	-0.001	-0.001	-0.163*	-0.163*	-0.163*
	(-0.75)	(-0.66)	(-0.69)	(-1.66)	(-1.66)	(-1.66)
Observations	943,812	922,511	900,863	656,451	656,451	656,451
R-squared	0.723	0.725	0.725	0.770	0.770	0.770
Firm*Product FE	YES	YES	YES	YES	YES	YES
Product*Time FE	YES	YES	YES	YES	YES	YES

Notes. For TW1 and TW2, the sample periods are 2016-2019 and 2023-2025.11, respectively. The dataset for this table is organized at the firm-product(HS6)-year month-level. The dependent variable represents the number of suppliers. Lagged firm control variables, firm and product(HS6)-year month fixed effects are included. The t-values are reported in parentheses. Standard errors are clustered at the firm-HS6-product level. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

declines significantly, particularly at the one-month lag (coefficient of -0.080, significant at the 5% level; Table 4, columns (4)–(6)). Average shipment size also falls significantly at the one-month lag (coefficient of -0.070, significant at the 1% level; Table 5, columns (4)–(6)). Firms exposed to the repeated shock are not extending their diversification frontier; rather, many seem to reduce the number of active supplier relationships and contract the order flows within the network already in place.

The contrast of these shipment-size results across the two episodes is suggestive. In TW1, smaller average shipment size per supplier reflects experimentation: firms test new relationships without committing large volumes, preserving flexibility as they assess supplier capabilities. In TW2, however, smaller shipment sizes coexist with a declining supplier count. This combination appears inconsistent with exploratory diversification and instead may reflect contraction within a narrower, more selected set of relationships. The first shock builds the option set; the second shock selectively narrows it. This evidence supports our characterization of the two episodes as exhibiting an average tendency toward "diversify-and-explore" versus "consolidate-and-contract."

Moderating the Response during TW2 using prior tariff experience. We then examine whether firms with prior tariff experience consolidate more aggressively during TW2. We estimate specifications (9), which augment the baseline model with the interaction between tariff exposure and the indicator variables $\text{Moderator}_{f,p}$:

$$Y_{f,p,t} = \beta_0 + \beta_1 TE_{f,p,t} \times Moderator_{f,p} + \beta_2 TE_{f,p,t} + \beta_3 X_{f,t-1} + \alpha_{f,p} + \lambda_{p,t} + \epsilon_{f,p,t} \tag{9a}$$

Table 5 Effect of Tariff Shocks on Average Shipment Size Per Supplier

	Log Average Weight Per Supplier (TW1)			Log Average Weight Per Supplier (TW2)		
	(1)	(2)	(3)	(4)	(5)	(6)
TE_t	-0.164**			-0.038*		
	(-1.99)			(-1.72)		
TE_{t-1}		-0.178**			-0.070***	
		(-2.11)			(-2.96)	
TE_{t-2}			-0.193**			-0.027
			(-2.22)			(-1.13)
ln_at	0.036***	0.038***	0.040***	0.057***	0.057***	0.057***
	(2.98)	(3.13)	(3.27)	(2.72)	(2.72)	(2.71)
inv_at	0.155*	0.152*	0.147*	-0.070	-0.069	-0.070
	(1.90)	(1.85)	(1.76)	(-0.59)	(-0.59)	(-0.59)
ppe_at	-0.058	-0.073	-0.073	-0.536***	-0.535***	-0.536***
	(-1.03)	(-1.29)	(-1.29)	(-4.87)	(-4.87)	(-4.87)
roa	-0.003***	-0.003***	-0.004*	0.058*	0.058*	0.058*
	(-2.60)	(-2.63)	(-1.74)	(1.73)	(1.74)	(1.73)
Observations	943,812	922,511	900,863	656,451	656,451	656,451
R-squared	0.788	0.789	0.790	0.777	0.777	0.777
Firm*Product FE	YES	YES	YES	YES	YES	YES
Product*Time FE	YES	YES	YES	YES	YES	YES

Notes. For TW1 and TW2, the sample periods are 2016-2019 and 2023-2025.11, respectively. The dataset for this table is organized at the firm-product(HS6)-year month-level. The dependent variable represents the average shipment size per supplier. Lagged firm control variables, firm and product(HS6)-year month fixed effects are included. The t-values are reported in parentheses. Standard errors are clustered at the firm-HS6-product level. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

$$Y_{f,p,t} = \beta_0 + \beta_1 TE_{f,p,t-1} \times Moderator_{f,p} + \beta_2 TE_{f,p,t-1} + \beta_3 X_{f,t-1} + \alpha_{f,p} + \lambda_{p,t} + \epsilon_{f,p,t} \tag{9b}$$

$$Y_{f,p,t} = \beta_0 + \beta_1 TE_{f,p,t-2} \times Moderator_{f,p} + \beta_2 TE_{f,p,t-2} + \beta_3 X_{f,t-1} + \alpha_{f,p} + \lambda_{p,t} + \epsilon_{f,p,t} \tag{9c}$$

where $Y_{f,p,t}$ represents number of suppliers. $Moderator_{f,p}$ denotes firm-product-level prior tariff experience, measured by two variables: TW1 Supplier Number and TW1 Tariff Exposure. The first moderator, TW1 Supplier Number, is an indicator equal to one if the firm–product pair had an above-median number of active suppliers during TW1, capturing the extent of the diversified supplier network built in the first episode. The second moderator, TW1 Tariff Exposure, is an indicator equal to one if the firm–product pair was directly exposed to tariff increases during TW1, capturing direct experiential learning from the initial shock.

Table 6 reports the interaction between TW2 tariff exposure and two proxy variables for TW1 experience. Both moderators yield a consistent pattern. The interaction terms are negative and significant at the one-month lag. In both cases, the uninteracted baseline effect is small and statistically insignificant, indicating that supplier consolidation during TW2 appears to be concentrated among firms that either built broader supplier networks during the first episode or were directly exposed to TW1 tariffs.

5.3. Repeated Tariff Episodes Accelerate Supplier Reconfiguration through Exits Rather Than Entry

To answer RQ4, we next examine the speed and mechanisms of supplier reconfiguration, including supplier turnover, entry and exit.

Table 6 **Moderating Effects of TW1 Experience on Supplier Consolidation (TW2)**

	TW1 Supplier Number			TW1 Tariff Exposure		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
TE_t × Moderator	-0.059			-0.092		
	(-1.14)			(-1.44)		
TE_t	-0.015			-0.002		
	(-0.45)			(-0.05)		
TE_{t-1} × Moderator		-0.122**			-0.153**	
		(-2.18)			(-2.22)	
TE_{t-1}		-0.027			-0.013	
		(-0.67)			(-0.30)	
TE_{t-2} × Moderator			-0.107*			-0.156**
			(-1.85)			(-2.24)
TE_{t-2}			-0.010			0.012
			(-0.26)			(0.27)
Controls	YES	YES	YES	YES	YES	YES
Observations	656,451	656,451	656,451	656,451	656,451	656,451
R-squared	0.770	0.770	0.770	0.770	0.770	0.770
Firm*Product FE	YES	YES	YES	YES	YES	YES
Product*Time FE	YES	YES	YES	YES	YES	YES

Notes. This table is for TW2, and the sample period is 2023-2025.11. The dataset for this table is organized at the firm-product(HS6)-year month-level. The dependent variable represents the number of suppliers. Lagged firm control variables, firm and product(HS6)-year month fixed effects are included. The t-values are reported in parentheses. Standard errors are clustered at the firm-HS6-product level. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Turnover dynamics. Table 7 reports the effect of tariff exposure on overall supplier turnover. During TW1, none of the turnover coefficients (contemporaneous or lagged) are statistically significant (columns (1)–(3)), suggesting that firms' supplier reconfiguration in response to the initial shock may unfold gradually and is not fully captured within a two-month window. By contrast, during TW2, the one-month lagged tariff exposure coefficient is positive and significant at the 5% level (coefficient of 0.014; columns (4)–(6)), indicating that supplier reconfiguration accelerates meaningfully in the repeated episode. This compression of the adjustment window is consistent with a learning interpretation: having navigated a prior tariff disruption, firms may enter the second episode with an established set of alternatives and can act more decisively without the exploratory delay that characterized the first shock. Prior evidence suggests that this capability accumulates not only through realized disruptions but also through the anticipatory restructuring that firms undertake under policy uncertainty (Charoenwong et al. 2023), implying that firms build the organizational capacity to reconfigure supply chains incrementally across multiple episodes of disruption and uncertainty.

Entry-exit decomposition. To identify the mechanism underlying this faster adjustment, Table 8 and Table 9 decompose total turnover into supplier entry and supplier exit, respectively. In TW1, neither supplier entry nor supplier exit is significantly responsive to tariff exposure across any lag specification (Table 8 and Table 9, columns (1)–(3)). In TW2, however, a clear asymmetry emerges between entry and exit. New supplier entry remains largely unresponsive to tariff exposure (Table 8, columns (4)–(6)), with coefficients small and mostly insignificant. By contrast, supplier

Table 7 Effect of Tariff Shocks on Suppliers Turnover

	Supplier Turnover (TW1)			Supplier Turnover (TW2)		
	(1)	(2)	(3)	(4)	(5)	(6)
TE_t	0.015			0.009		
	(0.70)			(1.58)		
TE_{t-1}		0.023			0.014**	
		(1.01)			(2.33)	
TE_{t-2}			0.025			0.007
			(1.07)			(1.16)
ln_at	0.005	0.005	0.006*	0.011*	0.011*	0.011*
	(1.63)	(1.62)	(1.87)	(1.90)	(1.90)	(1.91)
inv_at	0.006	0.006	0.006	0.080**	0.080**	0.081**
	(0.24)	(0.24)	(0.28)	(2.40)	(2.40)	(2.40)
ppe_at	0.000	0.000	-0.001	0.036	0.036	0.036
	(0.00)	(-0.00)	(-0.04)	(1.21)	(1.21)	(1.21)
roa	0.000	0.000	-0.001	-0.001	-0.001	-0.001
	(-0.57)	(-0.57)	(-0.68)	(-0.09)	(-0.09)	(-0.09)
Observations	761,976	761,976	750,278	530,741	530,741	530,741
R-squared	0.619	0.619	0.620	0.640	0.640	0.640
Firm*Product FE	YES	YES	YES	YES	YES	YES
Product*Time FE	YES	YES	YES	YES	YES	YES

Notes. For TW1 and TW2, the sample periods are 2016-2019 and 2023-2025.11, respectively. The dataset for this table is organized at the firm-product(HS6)-year month-level. The dependent variable represents the supplier turnover. Lagged firm control variables, firm and product(HS6)-year month fixed effects are included. The t-values are reported in parentheses. Standard errors are clustered at the firm-HS6-product level. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

exit responds more significantly and promptly: the one-month lagged coefficient is positive and significant at the 1% level (coefficient of 0.017; Table 9, columns (4)–(6)), indicating that firms tend to begin shedding existing supplier relationships within one month of increased tariff exposure.

The fact that faster reconfiguration in TW2 occurs through exits rather than entry is consistent with the high and largely unchanged costs of onboarding new suppliers, combined with firms' improved ability to identify which existing relationships are dispensable. In other words, the learning accumulated during TW1 does not reduce the cost of forming new supplier relationships; rather, it may equip firms to evaluate and prune their existing network more rapidly and selectively. This interpretation aligns with the diversification-then-consolidation narrative: the first shock tends to build the option set; the second shock appears to activate disciplined pruning within it.

5.4. Repeated Tariff Shocks Selectively Reconcentrate Differentiated Products

We next examine whether repeated tariff shocks lead firms to reconcentrate their sourcing toward a smaller set of core suppliers, and whether this effect is heterogeneous across product types. To test RQ5, we estimate specifications (10), which augment the baseline model with the interaction between tariff exposure and the differentiated-product indicator $Diff_p$:

$$Y_{f,p,t} = \beta_0 + \beta_1 TE_{f,p,t} \times Diff_p + \beta_2 TE_{f,p,t} + \beta_3 X_{f,t-1} + \alpha_{f,p} + \lambda_{p,t} + \epsilon_{f,p,t} \tag{10a}$$

$$Y_{f,p,t} = \beta_0 + \beta_1 TE_{f,p,t-1} \times Diff_p + \beta_2 TE_{f,p,t-1} + \beta_3 X_{f,t-1} + \alpha_{f,p} + \lambda_{p,t} + \epsilon_{f,p,t} \tag{10b}$$

$$Y_{f,p,t} = \beta_0 + \beta_1 TE_{f,p,t-2} \times Diff_p + \beta_2 TE_{f,p,t-2} + \beta_3 X_{f,t-1} + \alpha_{f,p} + \lambda_{p,t} + \epsilon_{f,p,t} \tag{10c}$$

Table 8 Effect of Tariff Shocks on Supplier Entry

	Supplier Entry (TW1)			Supplier Entry (TW2)		
	(1)	(2)	(3)	(4)	(5)	(6)
TE_t	-0.001			-0.009		
	(-0.08)			(-1.36)		
TE_{t-1}		-0.002			0.004	
		(-0.09)			(0.57)	
TE_{t-2}			-0.005			0.009
			(-0.25)			(1.31)
ln_at	-0.010***	-0.010***	-0.009***	0.003	0.003	0.003
	(-3.40)	(-3.40)	(-3.29)	(0.57)	(0.56)	(0.55)
inv_at	-0.051**	-0.051**	-0.051**	0.021	0.021	0.021
	(-2.41)	(-2.41)	(-2.37)	(0.67)	(0.66)	(0.66)
ppe_at	0.024	0.024	0.024	-0.034	-0.034	-0.034
	(1.56)	(1.56)	(1.57)	(-1.18)	(-1.19)	(-1.19)
roa	0.000	0.000	0.000	-0.009	-0.009	-0.009
	(0.59)	(0.59)	(0.33)	(-0.72)	(-0.72)	(-0.72)
Observations	761,976	761,976	750,278	530,741	530,741	530,741
R-squared	0.393	0.393	0.393	0.405	0.405	0.405
Firm*Product FE	YES	YES	YES	YES	YES	YES
Product*Time FE	YES	YES	YES	YES	YES	YES

Notes. For TW1 and TW2, the sample periods are 2016-2019 and 2023-2025.11, respectively. The dataset for this table is organized at the firm-product(HS6)-year month-level. The dependent variable represents the supplier entry. Lagged firm control variables, firm and product(HS6)-year month fixed effects are included. The t-values are reported in parentheses. Standard errors are clustered at the firm-HS6-product level. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 9 Effect of Tariff Shocks on Supplier Exit

	Supplier Exit (TW1)			Supplier Exit (TW2)		
	(1)	(2)	(3)	(4)	(5)	(6)
TE_t	0.017			0.011*		
	(0.77)			(1.88)		
TE_{t-1}		0.026			0.017***	
		(1.15)			(2.75)	
TE_{t-2}			0.027			0.006
			(1.16)			(0.91)
ln_at	0.006*	0.006*	0.006**	0.009	0.009	0.009
	(1.84)	(1.83)	(2.05)	(1.55)	(1.55)	(1.56)
inv_at	0.027	0.027	0.028	0.098***	0.098***	0.098***
	(1.12)	(1.13)	(1.16)	(2.81)	(2.81)	(2.82)
ppe_at	0.005	0.005	0.004	0.052*	0.052*	0.053*
	(0.29)	(0.29)	(0.27)	(1.72)	(1.71)	(1.72)
roa	-0.001	-0.001	-0.001	-0.006	-0.006	-0.006
	(-0.83)	(-0.83)	(-0.96)	(-0.84)	(-0.84)	(-0.84)
Observations	761,976	761,976	750,278	530,741	530,741	530,741
R-squared	0.592	0.592	0.594	0.613	0.613	0.613
Firm*Product FE	YES	YES	YES	YES	YES	YES
Product*Time FE	YES	YES	YES	YES	YES	YES

Notes. For TW1 and TW2, the sample periods are 2016-2019 and 2023-2025.11, respectively. The dataset for this table is organized at the firm-product(HS6)-year month-level. The dependent variable represents the supplier exit. Lagged firm control variables, firm and product(HS6)-year month fixed effects are included. The t-values are reported in parentheses. Standard errors are clustered at the firm-HS6-product level. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

where $Y_{f,p,t}$ represents supplier HHI index and top supplier share to proxy supply chain concentration. $Diff_p$ represents the classification of product p as differentiated or standardized, defined in Section 3.

Table 10 Heterogeneous Effects by Product Type on HHI (Differentiated vs. Standardized Products)

	Supplier HHI (TW1)			Supplier HHI (TW2)		
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{TE}_t \times$Diff	0.007			-0.002		
	(0.28)			(-0.33)		
TE_t	-0.015			0.006		
	(-0.74)			(1.05)		
$\text{TE}_{t-1} \times$Diff		0.008			0.017**	
		(0.36)			(2.16)	
TE_{t-1}		-0.017			-0.008	
		(-0.87)			(-1.11)	
$\text{TE}_{t-2} \times$Diff			-0.001			0.012
			(-0.06)			(1.49)
TE_{t-2}			-0.011			-0.010
			(-0.53)			(-1.43)
Controls	YES	YES	YES	YES	YES	YES
Observations	883,315	863,463	843,290	601,707	601,707	601,707
R-squared	0.602	0.604	0.605	0.636	0.636	0.636
Firm*Product FE	YES	YES	YES	YES	YES	YES
Product*Time FE	YES	YES	YES	YES	YES	YES

Notes. For TW1 and TW2, the sample periods are 2016-2019 and 2023-2025.11, respectively. The dataset for this table is organized at the firm-product(HS6)-year month-level. The dependent variable represents the supplier HHI index. Lagged firm control variables, firm and product(HS6)-year month fixed effects are included. The t-values are reported in parentheses. Standard errors are clustered at the firm-HS6-product level. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Average concentration effects. Appendix Table A.1 and Table A.2 report the baseline effects of tariff exposure on supplier HHI and top supplier share, respectively. In TW1, both concentration measures move in the direction of lower concentration, which is consistent with the diversification documented in Section 5.2, though the estimates are generally weak. In TW2, the average concentration measures do not exhibit a strong or pervasive reconcentration pattern for the full sample, with coefficients small and largely insignificant. This suggests that the consolidation documented in Section 5.2 does not manifest uniformly as increased supplier concentration when averaging across all product types.

Heterogeneous effects by product type. Table 10 and Table 11 report the interaction specifications. As suggested in RQ5, differentiated products exhibit significantly stronger reconcentration in TW2. Specifically, the interaction term $TE_{f,p,t-1} \times \text{Diff}_p$ is positive and significant at the 5% level for both supplier HHI (coefficient of 0.017; Table 10, columns (4)–(6)) and top supplier share (coefficient of 0.015; Table 11, columns (4)–(6)) during the second episode. By contrast, no analogous interaction effect emerges during TW1 (columns (1)–(3) in Table 10 and Table 11), where the interaction coefficients are small and statistically indistinguishable from zero across all lag specifications.

This selective reconcentration of differentiated products in the second episode but not the first is consistent with a learning and selection mechanism. Prior evidence in Alfaro and Chor (2025) shows that products with higher contract intensity and stickier buyer-supplier relationships adjusted more slowly to the initial shock. Our evidence extends this finding: once a repeated disruption

Table 11 Heterogeneous Effects by Product Type on Top Supplier Share (Differentiated vs. Standardized Products)

	Top Supplier Share (TW1)			Top Supplier Share (TW2)		
	(1)	(2)	(3)	(4)	(5)	(6)
$TE_t \times$Diff	0.007			-0.002		
	(0.28)			(-0.33)		
TE_t	-0.011			0.006		
	(-0.68)			(1.17)		
$TE_{t-1} \times$Diff		0.005			0.015**	
		(0.28)			(2.24)	
TE_{t-1}		-0.012			-0.007	
		(-0.73)			(-1.22)	
$TE_{t-2} \times$Diff			-0.002			0.012*
			(-0.13)			(1.71)
TE_{t-2}			-0.006			-0.009
			(-0.38)			(-1.56)
Controls	YES	YES	YES	YES	YES	YES
Observations	883,315	863,463	843,290	601,707	601,707	601,707
R-squared	0.602	0.604	0.605	0.634	0.634	0.634
Firm*Product FE	YES	YES	YES	YES	YES	YES
Product*Time FE	YES	YES	YES	YES	YES	YES

Notes. For TW1 and TW2, the sample periods are 2016-2019 and 2023-2025.11, respectively. The dataset for this table is organized at the firm-product(HS6)-year month-level. The dependent variable represents the top supplier share. Lagged firm control variables, firm and product(HS6)-year month fixed effects are included. The t-values are reported in parentheses. Standard errors are clustered at the firm-HS6-product level. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

arrives, firms no longer continue fragmenting their sourcing of coordination-intensive products but instead reconcentrate toward a smaller set of proven suppliers. This is operationally intuitive, since differentiated products require ongoing coordination, relationship-specific investment, and quality assurance that are difficult to sustain across a fragmented supplier base. The first shock may have forced initial experimentation with alternative suppliers; the second shock may reveal which of those alternatives are worth retaining, triggering consolidation around them. In this sense, repeated tariff shocks may act as a selection mechanism, accelerating the rationalization of supplier networks in those product categories where fragmentation is most costly to maintain.

5.5. Robustness Analysis

A potential concern with our episode-specific estimates is that the COVID-19 pandemic during 2020 to 2022 may have confounded the effects attributed to tariff shocks. If firms restructured their sourcing networks in response to pandemic-related disruptions, then the supply chain adjustments we observe after the pandemic period may partly reflect responses to COVID-19 rather than tariffs alone. To address this concern, we estimate a full-period specification (2016-2025) that explicitly controls for firm-product-time-level COVID-19 supply chain exposure, assessing whether our tariff estimates remain robust after netting out pandemic-induced adjustments.

Tables A.3 and A.4 in Appendix A.2. report the full results. After controlling for COVID-19 supply chain exposure, TW1 tariff exposure continues to drive sourcing country diversification, and TW2 exposure remains significantly associated with supplier turnover and exit. The TW2 coefficients are quantitatively larger than the COVID-19 coefficients for these turnover outcomes, suggesting that the restructuring patterns we document are not primarily driven by pandemic-induced adjustments.

5.6. Evaluation of Alternative Mechanisms

In our empirical analysis, we observe realized structural configurations rather than direct corporate intent. We interpret the transition from sourcing experimentation to disciplined rationalization as reflecting an internal process of operational learning, but several alternative mechanisms could also contribute to the patterns we document. Here we outline three such mechanisms and assess how they compare with our evidence.

5.6.1. Supplier financial distress and capacity constraints The consolidation observed in TW2 could in principle be driven by the supply side: smaller, peripheral suppliers onboarded during the first shock may have suffered financial distress, faced tighter credit, or lacked the capacity to absorb the escalated volumes of the second shock, forcing U.S. importers back to core partners.

However, if this mechanism were the dominant driver, supplier attrition and network contraction should be most pronounced among commoditized or standardized goods, where peripheral suppliers operate on thin margins and are especially vulnerable to macro disruptions. Instead, our empirical results show that consolidation during TW2 is concentrated in differentiated products, for which tariff exposure significantly increases supplier concentration and top-supplier share. This highly selective pruning of contract-intensive, relationship-specific product categories is more consistent with an active coordination decision by importing firms than with a purely exogenous wave of supplier failures.

5.6.2. Shifting expectations: temporary versus permanent policy shocks Firms may also have adjusted their networks differently across the two episodes because their expectations about the duration of trade barriers changed. TW1 may initially have been perceived as a temporary bargaining tactic, prompting firms to explore and test alternative options without fully severing old ties. By contrast, TW2 likely signaled a more persistent, structural shift in trade policy, pushing firms to accept the new regime as the "new normal."

We cannot observe these expectations directly, but this mechanism complements rather than contradicts our learning-based story. Consolidation becomes attractive once the coordination costs of a fragmented architecture outweigh its flexibility benefits. A shift from temporary to permanent expectations increases the present value of those coordination costs, accelerating firms' move toward a rationalized, consolidated architecture. In our data this is reflected in faster, exit-driven reconfiguration in TW2, but still operating through pruning within the alternative networks created after TW1 rather than through a new wave of supplier entry.

5.6.3. Macro-level capacity bottlenecks in alternative sourcing nations A third possibility is that macro-level capacity constraints in alternative sourcing hubs shaped firms' adjustment margins. During TW1, locations such as Vietnam and Mexico may have had ample spare capacity. By the time the second shock hit, these markets could have been facing port congestion, tight industrial space, or rising labor costs that limited further expansion. Under this mechanism, U.S. firms might be forced to concentrate volumes on the few suppliers that retained reliable access to scarce capacity, independent of their own learning.

If country-level bottlenecks were the primary driver, we would expect a relatively uniform halt to diversification and convergence of sourcing structures within affected country–product pairs, regardless of firm experience or product characteristics. Instead, our results show that consolidation and faster supplier turnover in TW2 are concentrated among firm-product pairs with prior tariff exposure or broader supplier networks in TW1, and among differentiated rather than standardized products. This firm- and product-level heterogeneity suggests that internal capabilities and coordination frictions play a central role in determining who consolidates and where, rather than firms being uniformly constrained by aggregate capacity ceilings.

Taken together, these alternative mechanisms likely form part of the broader environment in which firms operate, but they do not by themselves reproduce the full pattern of exploratory diversification followed by selective, exit-driven reconcentration that we observe. The evidence is most consistent with a transition from exploration to rationalization within the option sets created after the first episode, particularly for differentiated products and for firms that accumulated tariff experience in TW1.

6. Concluding Remarks

This paper examines how firms reconfigure global supply chains across repeated tariff episodes. Using firm-product-level import transactions from Panjiva matched with Compustat, we study U.S. firms' sourcing responses to TW1 in 2018 and TW2 in 2025. While prior research largely focuses on a single tariff episode, our analysis shows that supply chain adaptation evolves as firms accumulate experience across successive disruptions.

We document the following main findings. First, both tariff episodes divert sourcing away from China toward many of the same alternative countries, although the magnitude of reallocation is substantially smaller during the second episode and the nearshoring shift toward North America largely disappears. Second, firms respond differently across episodes. The initial tariff episode induces broad-based diversification: firms expand the number of sourcing countries and suppliers while reducing average shipment volumes per supplier, consistent with an explore-and-test response under uncertainty. By contrast, the repeated tariff episode does not further broaden supplier networks. Instead, firms reduce the number of active suppliers and contract sourcing within networks established during the first episode, producing a pattern of consolidation rather than continued diversification. Third, supplier reconfiguration occurs more rapidly during the second episode and is driven primarily by supplier exits rather than new supplier entry. The consolidation effect is especially pronounced for differentiated products, where coordination-intensive inputs are less compatible with fragmented supplier networks.

These findings contribute to the literature on supply chain restructuring under geopolitical disruption. Existing work primarily studies how firms respond to individual tariff shocks and generally views diversification as the dominant resilience strategy. Our results suggest a more dynamic process. An initial disruption encourages firms to build supply chain optionality by expanding their sourcing networks, but repeated disruptions can reduce the value of further expansion and instead favor selective pruning. The transition from diversification to consolidation highlights the joint importance of learning and coordination costs in shaping supply chain reconfiguration over time.

The findings also carry managerial implications. Managers should not assume that resilience requires continuous expansion of supplier networks. While diversification may be valuable when firms first encounter a new source of trade-policy risk, maintaining a highly fragmented supplier base can become increasingly costly as firms gain experience and learn which relationships are most reliable. Repeated disruptions may therefore call for a different response: consolidating around proven suppliers while retaining sufficient flexibility to respond to future shocks. In this sense, resilient supply chains may evolve from exploration toward disciplined selection rather than toward ever-greater diversification.

Several limitations suggest directions for future research. First, our analysis relies on transaction-level customs data that capture realized shipping volumes and supplier switches but not internal procurement metrics, contractual structures, or coordination costs. Quantifying the specific operational trade-offs that govern the shift from experimentation to rationalization is an important next step, that could in turn support prescriptive models. Second, the framework focuses on the immediate and intermediate reconfigurations across two sequential episodes. Formally modeling the steady-state equilibrium of the newly consolidated networks would clarify whether the post-consolidation architecture achieves a durable balance between cost efficiency and geopolitical risk mitigation or leaves firms exposed to localized shocks.

Third, while the results suggest that firm-level learning accelerates supplier reconfiguration under repeated shocks, the organizational mechanisms behind this learning remain opaque. Future work could examine how internal capabilities and governance structures moderate the ability to adapt quickly to sequential policy changes. Finally, the evidence is drawn from two U.S.-China-centered tariff episodes. Investigating whether a similar explore-then-select dynamic arises in other trade conflicts or in response to different types of disruptions (e.g., natural disasters, pandemics, or sanctions) would help establish the broader generality of the mechanisms documented here.

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Appendix: "From Diversification to Consolidation: Supply Chain Reconfiguration across Repeated Tariff Episodes"

A.1. Impact of Tariff Shocks on Supplier HHI Index and Top Supplier Share

Table A.1 and A.2 show the average effects of tariff exposure on supplier HHI index and top supplier share, and the average effects are generally weak.

Table A.1 Effect of Tariff Shocks on Supplier HHI Index

	Supplier HHI (TW1)			Supplier HHI (TW2)		
	(1)	(2)	(3)	(4)	(5)	(6)
TE_t	-0.017			0.004		
	(-1.63)			(1.31)		
TE_{t-1}		-0.018*			0.005	
		(-1.70)			(1.53)	
TE_{t-2}			-0.020*			0.000
			(-1.79)			(-0.13)
ln_at	-0.011***	-0.010***	-0.011***	-0.009***	-0.009***	-0.009***
	(-5.65)	(-5.49)	(-5.50)	(-2.77)	(-2.76)	(-2.76)
inv_at	-0.046***	-0.041**	-0.036**	0.057***	0.057***	0.057***
	(-2.74)	(-2.40)	(-2.06)	(2.85)	(2.85)	(2.86)
ppe_at	0.049***	0.049***	0.049***	-0.007	-0.007	-0.007
	(5.06)	(5.05)	(4.99)	(-0.38)	(-0.39)	(-0.38)
roa	0.000	0.000	0.000	0.006	0.006	0.006
	(0.31)	(0.14)	(-0.05)	(0.74)	(0.74)	(0.74)
Observations	943,812	922,511	900,863	656,451	656,451	656,451
R-squared	0.602	0.603	0.604	0.608	0.608	0.608
Firm*Product FE	YES	YES	YES	YES	YES	YES
Product*Time FE	YES	YES	YES	YES	YES	YES

Notes. For TW1 and TW2, the sample periods are 2016-2019 and 2023-2025.11, respectively. The dataset for this table is organized at the firm-product(HS6)-year month-level. The dependent variable represents the supplier HHI index. Lagged firm control variables, firm and product(HS6)-year month fixed effects are included. The t-values are reported in parentheses. Standard errors are clustered at the firm-HS6-product level. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

A.2. Robustness Checks

COVID-19 Exposure Variable. We construct a firm-product-time-level COVID exposure measure using the Oxford COVID-19 Government Response Tracker (Hale et al. 2021), which provides a daily Stringency Index ($SI_{c,t}$) capturing the intensity of containment policies, such as lockdowns, border closures, and movement restrictions, that directly disrupt cross-border supply chains through factory shutdowns, port closures, and shipping delays. Analogous to our tariff exposure measure defined in Equation (1), we define COVID-19 exposure as:

$$CE_{f,p,t} = \sum_{c \in C^{18\text{-}19}_{f,p}} \omega^{18\text{-}19}_{f,p,c} \cdot SI_{c,t}, \tag{A.1}$$

where $\omega^{18\text{-}19}_{f,p,c}$ is firm f's pre-COVID-19 import share of product p from country c during 2018-2019, and $SI_{c,t}$ is the stringency index of country c at time t, aggregated at country-month level. By using pre-pandemic sourcing weights, this measure captures exogenous exposure to foreign lockdown severity through pre-existing supplier relationships.

Table A.2 Effect of Tariff Shocks on Top Supplier Share

	Top Supplier Share (TW1)			Top Supplier Share (TW2)		
	(1)	(2)	(3)	(4)	(5)	(6)
TE_t	-0.013			0.003		
	(-1.50)			(1.33)		
TE_{t-1}		-0.014			0.004	
		(-1.55)			(1.40)	
TE_{t-2}			-0.014			0.000
			(-1.58)			(-0.02)
ln_at	-0.008***	-0.008***	-0.008***	-0.007***	-0.007***	-0.007***
	(-5.24)	(-5.09)	(-5.07)	(-2.70)	(-2.70)	(-2.69)
inv_at	-0.036***	-0.032**	-0.028*	0.044***	0.044***	0.044***
	(-2.62)	(-2.29)	(-1.95)	(2.71)	(2.71)	(2.71)
ppe_at	0.039***	0.039***	0.039***	-0.006	-0.006	-0.006
	(4.91)	(4.91)	(4.84)	(-0.43)	(-0.44)	(-0.43)
roa	0.000	0.000	0.000	0.004	0.004	0.004
	(0.22)	(0.04)	(-0.13)	(0.60)	(0.60)	(0.60)
Observations	943,812	922,511	900,863	656,451	656,451	656,451
R-squared	0.580	0.581	0.582	0.587	0.587	0.587
Firm*Product FE	YES	YES	YES	YES	YES	YES
Product*Time FE	YES	YES	YES	YES	YES	YES

Notes. For TW1 and TW2, the sample periods are 2016-2019 and 2023-2025.11, respectively. The dataset for this table is organized at the firm-product(HS6)-year month-level. The dependent variable represents the top supplier share. Lagged firm control variables, firm and product(HS6)-year month fixed effects are included. The t-values are reported in parentheses. Standard errors are clustered at the firm-HS6-product level. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Empirical Specification. We begin with a pooled specification over the full sample period during 2016 to 2025:

$$Y_{f,p,t} = \beta_0 + \beta_1 TE1_{f,p,t} + \beta_2 CE_{f,p,t} + \beta_3 TE2_{f,p,t} + \beta_4 X_{f,t-1} + \alpha_{f,p} + \delta_{p,t} + \epsilon_{f,p,t}, \tag{A.2}$$

where $TE1_{f,p,t}$ and $TE2_{f,p,t}$ denote firm-product-time-level tariff exposure during TW1 and TW2, respectively; $X_{f,t-1}$ includes lagged firm controls (total assets, inventory, PPE, and ROA); and $\alpha_{f,p}$ and $\delta_{p,t}$ are firm×product and product×time fixed effects.

Since TW1 tariffs are a persistent treatment whose effects may evolve over time, and whose confounding structure differs across periods, we further estimate a specification that decomposes each shock into regime-specific effects: We break down the TW1 exposure into short-run (2018-2019), medium-run (2020-2022), and long-run (2023-2025) effects. We also decompose the impact of COVID-19 into two distinct periods: 2020-2021 and 2022:

$$\begin{aligned} Y_{f,p,t} = {} & \beta_0 + \beta_1 TE1_{f,p,t} \cdot \mathbf{1}_{(t \in \text{2016-2019})} + \beta_2 TE1_{f,p,t} \cdot \mathbf{1}_{(t \in \text{2020-2022})} + \beta_3 TE1_{f,p,t} \cdot \mathbf{1}_{(t \in \text{2023-2025})} \\ & + \beta_4 CE_{f,p,t} \cdot \mathbf{1}_{(t \in 2020-2021)} + \beta_5 CE_{f,p,t} \cdot \mathbf{1}_{(t \in 2022)} + \beta_6 TE2_{f,p,t} + \beta_7 X_{f,t-1} + \alpha_{f,p} + \delta_{p,t} + \epsilon_{f,p,t}. \end{aligned} \tag{A.3}$$

First, β_1 captures the contemporaneous response to TW1 tariffs (2018–2019), while β_2 and β_3 trace the persistent effects of TW1 into the pandemic and post-pandemic periods, respectively. Second, by separating COVID-19 effects into acute (β_4, capturing 2020-2021 when stringency peaked globally) and prolonged (β_5, capturing 2022), we allow for heterogeneous pandemic impacts across disruption phases. Third, β_6 identifies the incremental effect of TW2 tariffs after absorbing both the persistent legacy of TW1 and pandemic-induced restructuring, addressing whether TW2 drives further supply chain reconfiguration beyond what prior shocks already triggered.

Empirical Results. Tables A.3 and A.4 report the results. Three findings emerge. First, the TW1 estimates remain mostly consistent with our baseline: tariff exposure significantly increases the number of source countries and suppliers, suggesting that the initial tariff shock triggered geographic diversification. The sub-period decomposition reveals that supplier expansion is concentrated in the short run (2018-2019), whereas the increase in source countries persists into the medium and long run.

Second, COVID-19 exposure in the short run increases new supplier entry. In the prolonged phase (2022), the dominant effects shift to higher supplier turnover and exit rates, reflecting the unwinding of temporary pandemic-era relationships.

Third, the TW2 coefficients remain significant and are quantitatively larger than the COVID coefficients for supplier turnover and exit outcomes. This pattern indicates that the supply chain restructuring observed during TW2 is not simply a residual effect of pandemic adjustments but could reflect an additional, tariff-driven reconfiguration, characterized less by geographic expansion (which was already accomplished during TW1) and more by active supplier replacement and relationship re-optimization.

Table A.3 Impact of TW1, COVID-19, and TW2 on Supply Chain Reconfiguration

VARIABLES	(1) Num of Sourcing Countries	(2) Num of Suppliers	(3) Average Weight Per Supplier	(4) Supplier Turnover	(5) Supplier Entry	(6) Supplier Exit	(7) Supplier HHI	(8) Top Supplier Share
$TE1_t$	0.374***	0.286	-0.132	0.033	0.026	0.036*	-0.022*	-0.021**
	(6.17)	(1.24)	(-1.37)	(1.59)	(1.62)	(1.77)	(-1.71)	(-2.05)
$COVID_t$	0.010	-0.008	-0.002	0.015**	0.015***	0.016**	-0.002	-0.002
	(0.61)	(-0.14)	(-0.08)	(2.52)	(2.62)	(2.56)	(-0.59)	(-0.57)
$TE2_t$	-0.013	0.010	0.020	0.030***	0.014	0.033***	-0.006	-0.006
	(-0.69)	(0.16)	(0.52)	(3.76)	(1.62)	(3.91)	(-1.24)	(-1.33)
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,670,900	1,378,698	1,378,698	1,225,486	1,225,486	1,225,486	1,378,698	1,378,698
R-squared	0.645	0.657	0.698	0.509	0.321	0.486	0.532	0.512
Firm*Product FE	YES	YES	YES	YES	YES	YES	YES	YES
Product*Time FE	YES	YES	YES	YES	YES	YES	YES	YES

Notes. The sample period is 2016-2025.11. The dataset for this table is organized at the firm-product(HS6)-year month-level. Lagged firm control variables, firm and product(HS6)-year month fixed effects are included. The t-values are reported in parentheses. Standard errors are clustered at the firm-HS6-product level. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table A.4 Impact of TW1 (After Decomposing Periods), COVID-19, and TW2 on Supply Chain Reconfiguration

VARIABLES	(1) Num of Sourcing Countries	(2) Num of Suppliers	(3) Average Weight Per Supplier	(4) Supplier Turnover	(5) Supplier Entry	(6) Supplier Exit	(7) Supplier HHI	(8) Top Supplier Share
$TE1_t$(2016-19)	0.228***	0.508***	-0.193*	0.019	-0.006	0.020	-0.020	-0.016
	(3.94)	(2.87)	(-1.78)	(0.73)	(-0.30)	(0.77)	(-1.40)	(-1.36)
$TE1_t$(2020-22)	0.307***	0.186	-0.129	0.037	0.030	0.039*	-0.013	-0.015
	(4.70)	(0.79)	(-1.22)	(1.63)	(1.55)	(1.72)	(-0.94)	(-1.28)
$TE1_t$(2023-25)	0.489***	0.296	-0.112	0.034	0.036*	0.040	-0.030*	-0.029**
	(6.24)	(0.95)	(-0.93)	(1.33)	(1.76)	(1.57)	(-1.85)	(-2.19)
$COVID_t$(2020-2021)	0.017	0.063	-0.014	0.012	0.021***	0.012	-0.005	-0.004
	(0.89)	(1.14)	(-0.41)	(1.55)	(2.87)	(1.48)	(-1.00)	(-0.94)
$COVID_t$(2022)	0.032	-0.023	0.006	0.016*	0.008	0.018**	-0.004	-0.003
	(1.39)	(-0.28)	(0.18)	(1.85)	(0.97)	(2.03)	(-0.72)	(-0.69)
$TE2_t$	-0.024	0.009	0.018	0.030***	0.013	0.032***	-0.006	-0.005
	(-1.25)	(0.16)	(0.47)	(3.75)	(1.50)	(3.88)	(-1.10)	(-1.16)
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,670,900	1,378,698	1,378,698	1,225,486	1,225,486	1,225,486	1,378,698	1,378,698
R-squared	0.645	0.657	0.698	0.509	0.321	0.486	0.532	0.512
Firm*Product FE	YES	YES	YES	YES	YES	YES	YES	YES
Product*Time FE	YES	YES	YES	YES	YES	YES	YES	YES

Notes. The sample period is 2016-2025.11. The dataset for this table is organized at the firm-product(HS6)-year month-level. Lagged firm control variables, firm and product(HS6)-year month fixed effects are included. The t-values are reported in parentheses. Standard errors are clustered at the firm-HS6-product level. The *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.