Reallocation or Diversification? U.S. Tariffs and the Geography of Dependence on China

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Abstract

When a tariff reduces imports from a targeted country, importers may diversify their supply base or may simply record the same dependence at a different border. This paper asks which of the two followed the U.S. tariffs on China introduced in 2018. Using the sequential-production theory of global value chains of Antràs and de Gortari (2020) as the single organizing framework, I derive implications for where U.S. sourcing should move: toward suppliers close to Chinese upstream stages, and toward suppliers close to the U.S. market. The empirical design is a balanced monthly panel of U.S. goods imports from China, six alternative suppliers (Vietnam, Mexico, India, Taiwan, Thailand and Malaysia) and the rest of the world, from January 2013 to December 2025 (8 units, 156 months). It is estimated by two-way fixed effects with Driscoll-Kraay standard errors, complemented by an event study and permutation inference. China's share of U.S. goods imports fell from 21.6 percent in 2017 to 13.5 percent in 2024 and 9.0 percent in 2025. Of the 8.1 percentage point loss to 2024, 5.1 points went to the five Asian alternatives, 2.1 to Mexico and 0.9 to the rest of the world. The combined share of China and the five Asian suppliers during 2020 to 2024 is statistically indistinguishable from its pre-tariff average (difference 0.02 percentage points, p = 0.98). The evidence favors geographic reallocation within the Asian production network over diversification away from it, with Mexico as a partial exception.

Keywords: tariffs; supply-chain diversification; global value chains; U.S.-China trade; panel fixed effects

Introduction

Trade policy is now routinely defended as a tool of supply-chain resilience. The argument runs as follows. A tariff raises the cost of buying from a dominant supplier, importers move to other sources, and the importing economy becomes less exposed to a shock in the first supplier. The argument rests on an assumption that is rarely stated, namely that the alternative sources are independent of the supplier being penalized. A global value chain places that assumption in doubt. A product assembled in Vietnam or Taiwan may embody components made in China, in which case a change in the origin recorded at the U.S. border can coexist with little change in underlying dependence.

The size of the bilateral shift is not in dispute. Freund, Mattoo, Mulabdic and Ruta (2024) report that China's share of U.S. imports fell from 22 percent to 16 percent between 2017 and 2022, attribute the decline to U.S. tariffs, and find that countries replacing China tend to be

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deeply integrated into Chinese supply chains and to experience faster import growth from China. Fajgelbaum et al. (2024) show that bystander countries gained export opportunities rather than merely receiving diverted flows. What remain to be documented in a transparent and replicable way is where the lost share went, how much of it stayed inside the same regional production network, and how robust the conclusions are to the strong pre-existing trends in the data.

The measures relevant to this study are the Section 301 tariffs on Chinese goods, which Bown (2021) documents together with the Phase One agreement. Tariffs of 25 percent took effect on a first list of products with about 34 billion dollars of annual imports in July 2018 and on a second list with about 16 billion dollars in August 2018. A third list covering about 200 billion dollars of imports was taxed at 10 percent from September 2018, and the rate rose to 25 percent in May 2019. A fourth list was taxed at 15 percent from September 2019 and the rate was reduced to 7.5 percent in February 2020 when the Phase One agreement came into force. Section 232 duties on steel and aluminum were imposed in 2018 and applied to many trading partners, which is relevant because they affect non-Chinese suppliers of the same products. Additional tariff measures were introduced in 2025 and applied to many trading partners, not only to China.

The timing gives the analysis a natural phase structure. January 2013 to June 2018 is the pre-tariff period. July 2018 to December 2019 is the escalation phase. January 2020 to December 2024 is the persistence phase, during which the Section 301 duties remained in place at elevated levels. The calendar year 2025 is treated as a separate phase because the measures introduced that year were not specific to China and therefore do not provide the same contrast between China and the alternative suppliers.

This paper makes three contributions. First, I decompose China's lost share of U.S. goods imports using official customs-basis series that sum to the world total in every month. Second, I test, within a single panel fixed-effects framework, whether the combined share of China and its five Asian alternatives fell, indicating diversification, or remained stable, indicating reallocation within the same production network. Third, I address inference with one treated unit and a small cross-section by reporting Driscoll–Kraay standard errors, an event study with lead tests, unit-specific trend sensitivity, and permutation inference.

Empirical Literature

A substantial body of literature examines the effects of the 2018–2019 U.S.–China trade war on import prices, welfare, domestic production, and international trade. Amiti, Redding, and Weinstein (2019) use detailed U.S. import data and price information to examine the effects of the 2018 tariff increases. They find nearly complete pass-through of tariffs into U.S. import prices and estimate that the resulting reduction in U.S. real income reached approximately $1.4 billion per month by the end of 2018. Fajgelbaum, Goldberg, Kennedy, and Khandelwal (2020), in The Return to Protectionism, combine detailed trade and tariff data with a quantitative general-equilibrium model to estimate the trade and welfare effects of the trade war. They find that the tariffs reduced imports from targeted countries, while retaliatory measures reduced U.S. exports, and estimate aggregate real-income losses from the tariff measures. Their analysis also shows that the costs and benefits varied across U.S. regions according to their exposure to the tariffs. Cavallo, Gopinath, Neiman, and Tang (2021) use border and retail price data to investigate how tariff increases affected prices at different stages of distribution. They find that tariff pass-through at the border was nearly complete, whereas retail prices increased considerably less, suggesting that firms absorbed part of the additional costs through lower margins. Flaaen and Pierce (2024) use industry-level data to examine the effects of import protection, tariffs on intermediate inputs, and retaliatory tariffs on U.S. manufacturing. They find that industries more exposed to input tariffs and retaliation experienced adverse employment effects, offsetting the employment benefits associated with protection from import competition.

Research on international trade reallocation examines how the tariff increases affected export opportunities and sourcing patterns across countries. Fajgelbaum, Goldberg, Kennedy, Khandelwal, and Taglioni (2024) use product-level trade data to investigate export responses by economies affected by U.S. and Chinese tariffs. They find that the trade war created export opportunities for third countries and that country-specific tariff elasticities explain a substantial share of the variation in export responses. Alfaro and Chor (2023) document changes in U.S. sourcing patterns between 2017 and 2022, including a decline in direct sourcing from China and increasing import shares for Vietnam and Mexico. Freund et al. (2024), in Is US Trade Policy Reshaping Global Supply Chains?, use ten-digit U.S. import data covering 2017–2022 to examine the decline in China's share of U.S. imports and the characteristics of alternative suppliers. They find that tariffs contributed to the decline in China's import share and that alternative suppliers included large developing economies with

revealed comparative advantage in the affected products. Their findings also indicate that these suppliers remained connected to Chinese production networks. Gopinath, Gourinchas, Presbitero, and Topalova (2025) examine changes in international trade and investment associated with geopolitical fragmentation. Their analysis documents shifts in trade and investment patterns across geopolitical groups and examines the role of connector countries in maintaining economic links between otherwise increasingly fragmented economies.

The measurement of international production relationships is examined in the literature on global value chains. Yi (2003) develops a theoretical model of vertical specialization in which intermediate goods cross national borders multiple times during production. His findings show that production fragmentation can amplify the response of trade flows to tariff changes. Johnson and Noguera (2012) use international input-output data to measure trade in value added and demonstrate how bilateral trade measured in value-added terms differs from conventional gross trade statistics. Their results show that accounting for value added changes the measured importance of bilateral trading relationships. Koopman, Wang, and Wei (2014) develop an accounting framework that decomposes gross exports into domestic and foreign value added and other components. Their framework demonstrates how gross trade statistics can overstate domestic value added and obscure the contribution of foreign inputs to exports. Baldwin and Venables (2013) examine how the organization of production across countries shapes international trade, distinguishing between sequential production chains, which they describe as snakes, and production networks in which multiple components converge at a common assembly stage, which they describe as *spiders*. Their analysis shows how the structure of production networks determines the way production costs and trade barriers affect different stages of the production process. Antràs and Chor (2022) review theoretical and empirical research on global value chains, examining how firms allocate production stages across countries and organize transactions along the supply chain. Their review highlights the importance of firms' organizational decisions and the sequential structure of production in shaping international trade. Antràs and de Gortari (2020) develop a quantitative model of global production in which trade costs and the geographical location of production stages jointly determine the allocation of production across countries. Their results show that countries' participation in global value chains depends not only on their production costs but also on their position within the wider production network. Viner (1950), in his analysis of customs unions, distinguishes between trade creation, in which preferential trade arrangements shift purchases toward lower-cost producers, and trade

diversion, in which preferences redirect purchases from more efficient external suppliers toward less efficient member-country suppliers. This distinction provides a theoretical basis for examining how discriminatory tariffs alter sourcing patterns and redirect trade between countries.

Bertrand, Duflo, and Mullainathan (2004) examine the reliability of difference-in-differences estimates using placebo-law experiments. They find that serial correlation can substantially increase the likelihood of falsely detecting statistically significant effects when conventional standard errors are used. Conley and Taber (2011) investigate inference in settings with a small number of treated groups. Their proposed method uses the distribution of outcomes among comparison groups to approximate the sampling distribution of treatment-effect estimates when conventional large-sample methods are unreliable. Driscoll and Kraay (1998) develop a covariance estimator that accommodates cross-sectional dependence and serial correlation in panel data. Their approach provides a way to calculate standard errors that account for these forms of dependence under the conditions required by the estimator. Hoechle (2007) implements the Driscoll–Kraay approach in Stata and examines its application to fixed-effects panel regressions, demonstrating its use in empirical research involving panel data with temporal and cross-sectional dependence.

Theoretical Framework and Hypotheses

I use a single framework: the multi-stage general-equilibrium model of global value chains in Antràs and de Gortari (2020). In that model a final good is produced through an ordered sequence of stages and each stage can be located in any country. The optimal location of a stage depends not only on its marginal cost but also on the proximity of that location to the preceding and the subsequent locations of production; because trade costs are incurred each time the accumulating good crosses a border. A central result is that downstream stages are optimally located in relatively central locations, that is, places with low trade costs to the other stages and to the final market.

The model is not a model of tariffs, and I use it as a lens in the following sense. A U.S. tariff on goods shipped from China is an additional trade cost on the last border crossing of the chain. Final-stage activity that was located in China then faces a higher cost of reaching the U.S. market. The framework predicts that downstream stages relocate to places that combine two features: low trade costs to the U.S. market and proximity to the upstream stages on which they depend. The upstream stages, whose output is shipped to the new location and not

to the United States, are not directly taxed and need not move. Two destinations follow from this logic. Asian economies near the Chinese upstream base offer proximity to preceding stages. Mexico offers proximity to the U.S. market. Both are consistent with the model, and they carry different implications for dependence on China.

Let s_it denote the share of U.S. goods imports supplied by unit i in month t. The units are China, six alternative suppliers (Vietnam, Mexico, India, Taiwan, Thailand, Malaysia) and the rest of the world (ROW). I define the five Asian suppliers as Vietnam, India, Taiwan, Thailand and Malaysia, which is the list in the research question without Mexico. The hypotheses are as follows.

H1 (bilateral decoupling): U.S. imports from China fall relative to imports from the rest of the world during the tariff phases.

H2 (reallocation to alternatives): U.S. imports from the alternative suppliers rise relative to imports from the rest of the world.

H3 (reallocation within the network): The five Asian suppliers absorb most of China's lost share, so that the combined share of China and the five Asian suppliers does not fall. Under diversification, by contrast, the combined share falls and the gains accrue to suppliers outside the network.

H4 (proximity to the destination): Mexico gains share during the tariff phases.

H1 and H2 address bilateral decoupling, while H3 distinguishes between reallocation and diversification and provides the central hypothesis underlying the paper's conclusion. The framework also yields a fifth proposition: that Asian suppliers increase their imports of Chinese upstream goods. Testing this proposition would require country-by-year data on China's exports to these suppliers, which could not be obtained from the sources available for this study. It is therefore not tested directly.

The existing literature establishes that U.S. imports from China declined following the introduction of the Section 301 tariffs and that alternative supplier, particularly countries integrated into Chinese production networks, gained market share. What remains less clear is whether this shift represents diversification away from China centered production networks or a reallocation of sourcing within those networks. A decline in China's bilateral share does not by itself distinguish between these possibilities. If U.S. importers increasingly source

from Asian suppliers that continue to rely on Chinese upstream inputs, the recorded country of origin changes while underlying production network dependence may remain substantial.

I address this distinction by examining whether the decline in China's share of U.S. goods imports was accompanied by a corresponding decline in the combined share of China and five Asian suppliers: Vietnam, India, Taiwan, Thailand, and Malaysia. A decline in the combined share is consistent with diversification, while a stable combined share is consistent with reallocation within the broader production network. Mexico is considered separately because its proximity to the U.S. market provides a different mechanism for adjustment.

The empirical design also addresses the challenges created by the small comparison group and the long monthly time dimension. I use a panel fixed effects framework and supplement the main estimates with an event study with lead tests, unit specific trend specifications, Driscoll Kraay standard errors, and permutation inference. These approaches do not resolve the limitation that gross bilateral trade data cannot directly measure the Chinese value added embodied in imports from third countries. They do, however, provide a systematic test of whether the observed shift in sourcing is more consistent with diversification or with reallocation within a production network that remains connected to China.

Data

All outcome data are monthly values of U.S. general imports for consumption, customs value basis, in millions of U.S. dollars, not seasonally adjusted. The data are produced by the U.S. Census Bureau and the U.S. Bureau of Economic Analysis (BEA) and were retrieved from the Federal Reserve Bank of St. Louis's FRED database on 4 October 2026. The panel is balanced, with N = 8 units and T = 156 months (January 2013 to December 2025), giving 1,248 observations.

Table 1: Data sources and panel structure

Variable	FRED series	Definition	Period	Role
China	IMPCH	U.S. imports from China	2013m1 to 2025m12	Treated unit
Vietnam	IMP5520	U.S. imports from Vietnam	2013m1 to 2025m12	Alternative
Mexico	IMPMX	U.S. imports from Mexico	2013m1 to 2025m12	Alternative
India	IMP5330	U.S. imports from India	2013m1 to 2025m12	Alternative
Taiwan	IMP5830	U.S. imports from Taiwan	2013m1 to 2025m12	Alternative
Thailand	IMP5490	U.S. imports from Thailand	2013m1 to 2025m12	Alternative
Malaysia	IMP5570	U.S. imports from Malaysia	2013m1 to 2025m12	Alternative
World	IMP0015	U.S. imports from all countries (NSA)	2013m1 to 2025m12	Denominator
ROW	derived	World minus the seven named exporters	2013m1 to 2025m12	Baseline unit

Notes: Source for all series: U.S. Census Bureau and U.S. Bureau of Economic Analysis, U.S. International Trade in Goods and Services, via FRED. Values are in millions of U.S. dollars, not seasonally adjusted. The raw series run to July 2026 (Malaysia June 2026).

The rest of the world is computed as the world total minus the seven named exporters. It is positive in every month, with a minimum of $91.6 billion**.** The shares of the eight units sum to 100 percent in every month. Several checks were conducted on the transcribed series. Each series contains the full number of monthly observations. The 2014 and 2015 monthly averages of the China series equal the annual averages reported by FRED for the same series, $39,039.57 million and $40,266.80 million, respectively**.** The 2023 total for China is $427.2 billion, consistent with the U.S. Census Bureau figure reported by Statista. The corresponding U.S. merchandize import total from the world in 2013 is $2,268.0 billion. All derived variables, annual tables, and estimation panels are generated through formulas.

The phases are defined by dummy variables: *esc* equals one from July 2018 to December 2019, *pers* from January 2020 to December 2024, and *y25* for calendar 2025. The pre-tariff period, January 2013 to June 2018, comprising 66 months, is the omitted category. Because the data are recorded by country of origin of shipment at the U.S. border, they identify where goods are recorded when entering the United States, not the origin of the value added embodied in those goods.

Empirical Strategy

Model A: relative import values

The baseline model compares each named exporter with the rest of the world, in each tariff phase, relative to the pre-tariff period, absorbing common shocks with month effects:

$$ln\ M_it = \alpha_i + \gamma_t + \Sigma_j \Sigma_p \beta_jp\ (\ D_j \times Phase_p,t\ ) + \varepsilon_it \qquad (1)$$

where M_it is U.S. imports from unit i in month t, α_i is a unit fixed effect, γ_t is a month fixed effect, D_j indicates unit j among the seven named exporters, and $Phase_p,t$ indicates phase p (escalation, persistence, 2025). The unit effects remove all time-invariant differences in the level of imports, the month effects remove every shock that affects U.S. imports from all units alike (U.S. demand, the business cycle, the pandemic, the dollar), and β_jp is therefore the change in imports from unit j in phase p, relative to the rest of the world and to the pre-tariff period. For H1 the coefficient on China is expected to be negative. For H2 and H4 the coefficients on the alternatives are expected to be positive. A coefficient b corresponds to a percentage effect of 100(exp(b) - 1).

Model B: shares and the network test

H3 concerns the sum of shares, which is not a linear function of the log coefficients. I therefore estimate a share model with unit effects only, because shares are already normalized by the world total:

$$s_{it} = \alpha_i + \sum_{j=1..8} \sum_p \varphi_{jp} (D_j \times Phase_{p,t}) + u_{it} \qquad (2)$$

where s_{it} is in percentage points and the sum now includes the rest of the world. Each φ_{jp} is the average change in unit j's share in phase p relative to its own pre-tariff mean. Because shares add to 100 in every month, the eight φ coefficients in each phase add to zero, so the gains and losses can be compared directly. H3 is tested with a Wald test of the hypothesis that $\varphi_{China,p}$ plus the five Asian φ_{jp} sum to zero. A negative sum indicates diversification away from the network, and a sum of zero indicates reallocation within it.

Event study

To examine dynamics and test for differential pre-trends I estimate

$$\ln M_{it} = \alpha_i + \gamma_t + \sum_{y \neq 2017} \theta^{CHN}_y (CHN_i \times 1[year = y]) + \sum_{y \neq 2017} \theta^{ALT}_y (ALT_i \times 1[year = y]) + \varepsilon_{it} \qquad (3)$$

where CHN_i indicates China and ALT_i indicates the six alternatives pooled, with 2017 as the omitted year. The lead coefficients for 2013 to 2016 test whether China and the alternatives were already diverging from the rest of the world before the tariffs. A joint chi-square test of the four leads is reported for each group.

Inference

All standard errors are Driscoll-Kraay (Driscoll and Kraay, 1998) with a Bartlett kernel and four lags, which is consistent with the rule of thumb floor(4(T/100)^(2/9)) = 4 for T = 156. They allow for serial correlation within units and for cross-sectional dependence across units, which is the relevant concern because the eight series share the U.S. business cycle. With only eight units, however, the asymptotics of these standard errors rely on the long time dimension, and the single treated unit makes inference fragile in the sense of Conley and Taber (2011). For that reason I add permutation (placebo) inference. Each of the eight units is treated in turn as the single treated unit, the corresponding unit-by-phase effects are estimated against all other units with unit and month effects, and China's estimate is ranked within the eight. With eight units the smallest attainable p-value is 0.125.

Robustness and identification

The identifying assumption is that, absent the tariffs, the log of imports from each named exporter would have evolved in parallel with the rest of the world after removing unit and month effects. The event-study leads probe that assumption. Because the leads are informative about trends that continue after 2018, I examine four departures from the baseline. First, I drop 2020 and 2021 to remove the pandemic. Second, I start the sample in 2015, after which the event-study leads are close to zero. Third, I add unit-specific linear trends estimated jointly with the phase effects. Fourth, I estimate unit-specific slopes on the pre-tariff months only (2013m1 to 2018m6), remove them from the log of imports for all months, and re-estimate Model A. The third approach can absorb part of a genuine post-tariff effect, and the fourth extrapolates pre-2018 growth over seven years, which is likely to overstate the counterfactual for fast-growing suppliers. The baseline and the fourth specification therefore bracket the plausible range of effects, and I report all of them.

Results

Descriptive facts

Table 2 and Figure 1 show the annual share of U.S. goods imports by origin. China's share rose from 19.4 percent in 2013 to a peak of 21.6 percent in 2017, fell to 18.0 percent in 2019, 13.5 percent in 2024 and 9.0 percent in 2025. The dollar value of imports from China in 2024 (440.3 billion dollars) is almost identical to the value in 2013 (440.4 billion), whereas total U.S. goods imports rose from 2,268.0 to 3,263.9 billion dollars, an increase of 44 percent. Imports from Vietnam rose from 24.7 billion dollars in 2013 to 136.3 billion in 2024 and 193.9 billion in 2025. Imports from Taiwan rose from 37.9 billion to 116.3 billion in 2024 and 201.4 billion in 2025. Mexico rose from 280.6 billion to 503.1 billion in 2024, and its share of 15.4 percent in 2024 exceeded China's from 2023 onward.

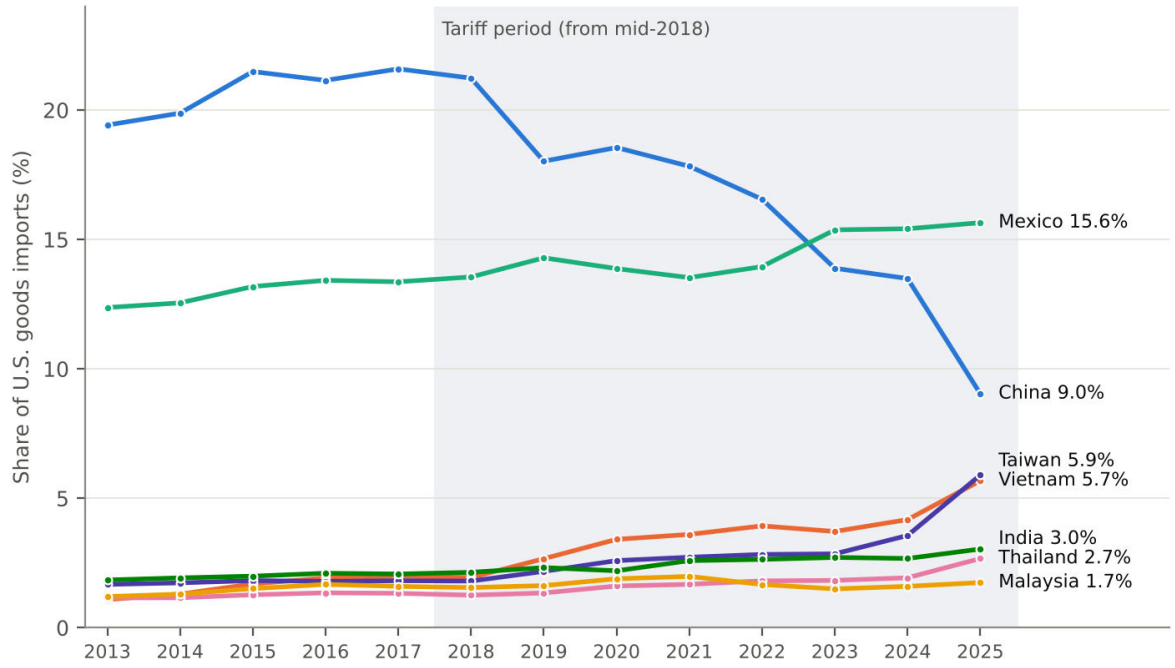


Figure 1: Share of U.S. goods imports by origin, 2013 to 2025. The rest of the world (56 to 61 percent) is omitted to preserve the scale. Source: author's calculations from Census Bureau and BEA data via FRED.

Table 2: Share of U.S. goods imports by origin, annual, percent

Year	China	Vietnam	Mexico	India	Taiwan	Thailand	Malaysia	ROW	Five Asian	China + five Asian
2013	19.42	1.09	12.37	1.84	1.67	1.15	1.20	61.25	6.96	26.38
2014	19.88	1.30	12.55	1.92	1.73	1.16	1.30	60.16	7.41	27.29
2015	21.49	1.69	13.18	1.99	1.82	1.27	1.51	57.05	8.28	29.77
2016	21.15	1.92	13.42	2.10	1.79	1.35	1.67	56.59	8.84	29.99
2017	21.59	1.99	13.36	2.08	1.81	1.33	1.60	56.24	8.80	30.39
2018	21.23	1.94	13.55	2.14	1.80	1.26	1.55	56.53	8.69	29.92
2019	18.02	2.67	14.29	2.32	2.18	1.34	1.63	57.55	10.13	28.16
2020	18.55	3.41	13.87	2.20	2.59	1.61	1.89	55.87	11.71	30.26
2021	17.83	3.60	13.53	2.59	2.72	1.67	1.98	56.07	12.57	30.40
2022	16.55	3.93	13.95	2.64	2.83	1.81	1.67	56.61	12.88	29.44
2023	13.89	3.72	15.37	2.72	2.85	1.83	1.50	58.13	12.61	26.50
2024	13.49	4.18	15.41	2.67	3.56	1.93	1.60	57.15	13.94	27.43
2025	9.04	5.68	15.65	3.04	5.90	2.67	1.74	56.28	19.03	28.07

Notes: Annual shares computed from monthly customs-basis values. Five Asian = Vietnam, India, Taiwan, Thailand, Malaysia. The eight units sum to 100 percent.

Table 3 and Figure 2 decompose China's lost share exactly, relative to 2017. By 2024 China had lost 8.10 percentage points. The five Asian suppliers gained 5.14 points (63 percent of the loss), Mexico 2.05 points (25 percent) and the rest of the world 0.91 points (11 percent). By 2025 China had lost 12.55 points, of which the five Asian suppliers absorbed 10.23 (81 percent), Mexico 2.28 (18 percent) and the rest of the world 0.04. The decomposition is an accounting identity and does not rely on any estimated model, which makes it the most robust finding of the paper.

Table 3: Change in share of U.S. goods imports relative to 2017, percentage points

Year (vs 2017)	China	Five Asian suppliers	Mexico	Rest of world
2019	-3.57	+1.33	+0.93	+1.31
2022	-5.04	+4.08	+0.59	+0.37
2024	-8.10	+5.14	+2.05	+0.91
2025	-12.55	+10.23	+2.28	+0.04

Notes: Differences of the annual shares in Table 2. Rows sum to zero.

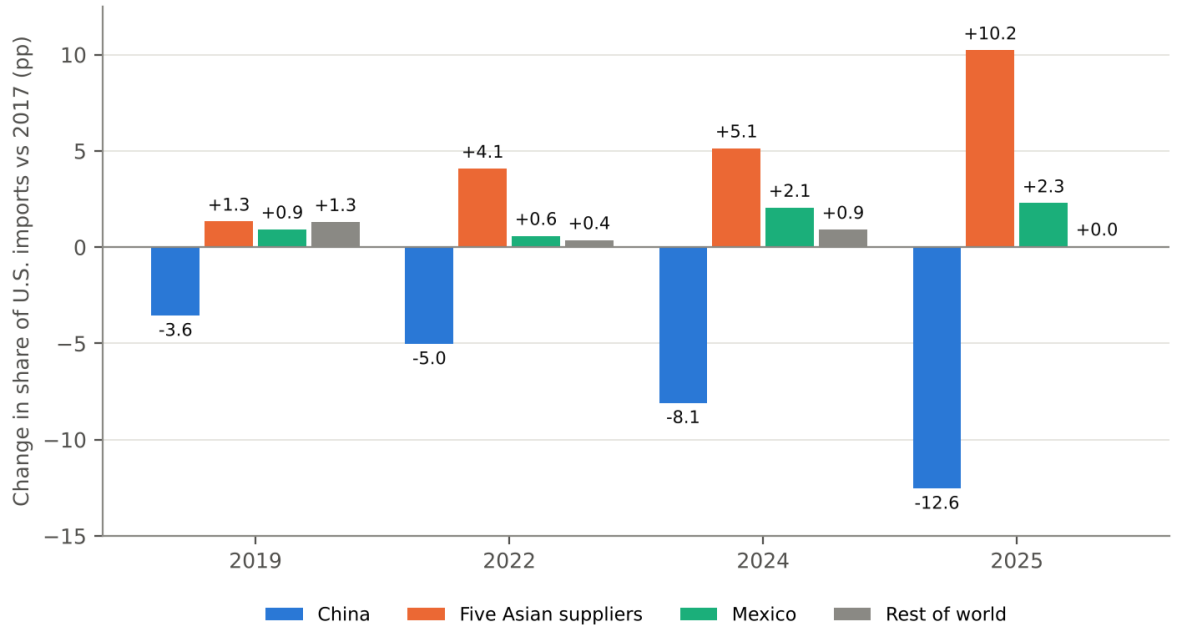


Figure 2: Where China's lost share went, change relative to 2017 in percentage points. Source: author's calculations.

Model A: relative import values

Table 4 reports the estimates of equation (1). Relative to the rest of the world, U.S. imports from China were 4.3 percent lower in the escalation phase (not statistically significant), 21.2 percent lower in the persistence phase and 55.2 percent lower in 2025. The persistence and 2025 coefficients are significant at the 1 percent level, which supports H1. The alternatives all gain: in the persistence phase imports from Vietnam are 143 percent higher relative to the rest of the world, Taiwan 68 percent, Thailand 45 percent, India 30 percent, Malaysia 21 percent and Mexico 13 percent. These results support H2 and H4 in the baseline specification. The within R-squared is 0.693 with 1,248 observations. Section 7.5 shows that these gains are sensitive to the treatment of pre-existing trends.

Table 4: Model A: log U.S. imports, two-way fixed effects (coefficients and Driscoll-Kraay standard errors)

Unit	Escalation (2018m7-2019m12)	Persistence (2020m1-2024m12)	2025	Persistence, % effect
China	-0.0436 (0.0672)	-0.2388*** (0.0609)	-0.8041*** (0.0518)	-21.2
Vietnam	0.4512*** (0.1011)	0.8891*** (0.0850)	1.3158*** (0.1474)	143.3
Mexico	0.0945*** (0.0219)	0.1202*** (0.0292)	0.2236*** (0.0719)	12.8

India	0.1383*** (0.0299)	0.2653*** (0.0395)	0.4542*** (0.0498)	30.4
Taiwan	0.1776*** (0.0405)	0.5157*** (0.0412)	1.2176*** (0.1826)	67.5
Thailand	0.0695* (0.0364)	0.3692*** (0.0351)	0.7826*** (0.1592)	44.7
Malaysia	0.1087* (0.0602)	0.1876*** (0.0615)	0.2199*** (0.0827)	20.6

Notes: Dependent variable ln(imports in millions of USD); N = 1,248 (8 units x 156 months); unit and month fixed effects; baseline is the rest of the world in the pre-tariff period (2013m1 to 2018m6). Standard errors in parentheses are Driscoll-Kraay with a Bartlett kernel and four lags. *** p<0.01, ** p<0.05, * p<0.10. The last column converts the persistence coefficient to a percentage effect, 100(exp(b) - 1).

Event study and pre-trends

Figure 3 plots the event-study coefficients of equation (3). After 2017, China's coefficient falls to -0.20 in 2019, -0.47 in 2023, -0.49 in 2024 and -0.88 in 2025. The pooled alternatives rise from 0.09 in 2019 to 0.22 in 2020, 0.29 in 2022, 0.35 in 2024 and 0.59 in 2025. The leads, however, are not flat. The joint test of the four leads rejects equality with zero for China (chi-square(4) = 11.5, p = 0.021) and for the alternatives (chi-square(4) = 256.6, p < 0.001). Inspection shows that the rejections come from 2013 and 2014, when imports from both groups were growing faster than imports from the rest of the world. From 2015 to 2018 China's coefficients lie between -0.03 and 0.00 and the alternatives' between -0.07 and 0.00, so the series are close to parallel in the three years before the tariffs.

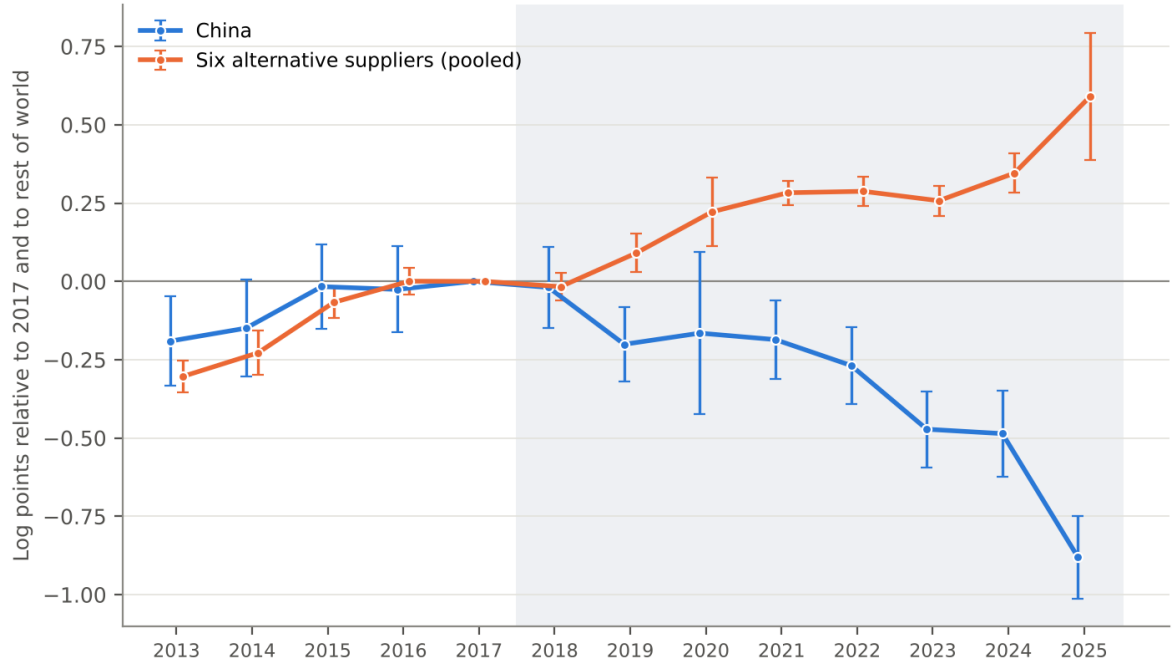


Figure 3: Event-study coefficients (log points relative to 2017 and to the rest of the world), with 95 percent Driscoll-Kraay confidence intervals. Unit and month fixed effects. The shaded area marks the tariff period.

Reallocation within the network or diversification (H3)

Table 5 reports the estimates of equation (2) aggregated by group. During the persistence phase China's share is 4.60 percentage points lower than its pre-tariff mean (p < 0.01), and

the five Asian suppliers' combined share is 4.62 points higher ($p < 0.01$). The combined share of China and the five Asian suppliers differs from its pre-tariff average by 0.02 percentage points (standard error 0.81, $p = 0.98$), so that H3 is not rejected: the five Asian suppliers offset China's loss in full. The corresponding estimates are 0.31 points ($p = 0.72$) in the escalation phase and -0.55 points ($p = 0.65$) in 2025. Mexico gains 1.37 points in the persistence phase and 2.69 points in 2025 ($p < 0.01$), which supports H4. The rest of the world loses 1.39 points in the persistence phase ($p = 0.07$), and the combined share of China and all six alternatives is higher by 1.39 points ($p = 0.07$). In other words, over 2020 to 2024 the only gain not offset inside the network was Mexico's, and it was matched by a loss of the rest of the world rather than by China's own loss.

Table 5: Model B: change in share of U.S. goods imports relative to the pre-tariff mean, percentage points

Group	Escalation	Persistence	2025
China	-1.25 (1.00)	-4.60*** (0.78)	-11.66*** (0.67)
Five Asian suppliers (VN, IN, TW, TH, MY)	1.56*** (0.38)	4.62*** (0.30)	11.11*** (1.55)
China + five Asian suppliers	0.31 (0.87)	0.02 (0.81)	-0.55 (1.22)
Mexico	0.98*** (0.24)	1.37*** (0.30)	2.69*** (0.58)
Six alternatives (incl. Mexico)	2.54*** (0.58)	5.99*** (0.54)	13.81*** (2.10)
China + six alternatives	1.29 (0.80)	1.39* (0.77)	2.15 (1.73)
Rest of world	-1.29 (0.80)	-1.39* (0.77)	-2.15 (1.73)

Notes: Sums of the φ coefficients of equation (2), with Wald-test standard errors in parentheses (Driscoll-Kraay, four lags). N = 1,248; unit fixed effects. *** p<0.01, ** p<0.05, * p<0.10..

The year-by-year picture in Table 2 qualifies the average. The combined share of China and the five Asian suppliers was 30.4 percent in 2017 and 2021, fell to 26.5 percent in 2023 and 27.4 percent in 2024, and recovered to 28.1 percent in 2025. The pre-tariff average that the test uses is lower than the 2017 peak because the combined share was rising from 26.4 percent in 2013. The finding is therefore not that the network share never moved, but that over the persistence phase as a whole it is indistinguishable from its pre-tariff average, and that the share of the five Asian suppliers (13.9 percent in 2024 and 19.0 percent in 2025) grew in step with China's fall.

Robustness

Table 6 reports the persistence-phase and 2025 coefficients of Model A under five specifications. China's coefficient is negative in all five, significant at the 1 percent level in four, and insignificant in the specification with jointly estimated unit trends (-0.147), where the 2025 coefficient remains significant (-0.672, $p < 0.01$). Dropping the pandemic years strengthens the persistence estimate for China (-0.332). Extrapolating the pre-tariff trends

produces an estimate of -0.529 for the persistence phase and -1.223 for 2025. H1 is therefore the most robust of the hypotheses.

The gains of the alternative suppliers are not robust in the same way. Table 7 shows that Vietnam, Malaysia, India, Mexico and Taiwan were already growing faster than the rest of the world before the tariffs, as was Thailand, at 16.9, 9.4, 5.6, 5.0, 4.0 and 3.4 percent per year respectively for Vietnam, Malaysia, Thailand, India, Mexico and Taiwan (China itself grew 4.4 percent per year faster). Once those trends are allowed for, the persistence-phase gains of Vietnam, India, Mexico and Malaysia vanish or reverse (for Vietnam 0.141 with joint trends and -0.164 against the extrapolated trend), and Thailand's is indistinguishable from zero. Only Taiwan retains a positive and significant gain in every specification (0.173 with joint trends, 0.292 against the extrapolated trend, and 0.895 in 2025). Because extrapolating seven years of 16.9 percent annual growth for Vietnam almost certainly overstates its counterfactual, the true effect for Vietnam lies between the baseline and the extrapolated estimate. The accurate summary is that much of the growth of the Asian suppliers continued trends that began before the tariffs, that the tariffs coincided with a break in China's own trend, and that Taiwan is the clearest case of acceleration.

Table 6: Robustness of the Model A estimates (coefficients)

Coefficient	Baseline	Excl. 2020-21	From 2015	Joint unit trends	Pre-trend extrapolated
China, persistence	-0.239***	-0.332***	-0.292***	-0.147	-0.529***
Vietnam, persistence	0.889***	0.927***	0.700***	0.141	-0.164**
Mexico, persistence	0.120***	0.149***	0.070***	-0.126**	-0.147***
India, persistence	0.265***	0.306***	0.205***	-0.034	-0.065**
Taiwan, persistence	0.516***	0.563***	0.471***	0.173**	0.292***
Thailand, persistence	0.369***	0.408***	0.299***	0.030	0.004
Malaysia, persistence	0.188***	0.100*	0.075*	0.007	-0.421***
China, 2025	-0.804***	-0.804***	-0.857***	-0.672***	-1.223***
Vietnam, 2025	1.316***	1.316***	1.127***	0.235	-0.206*
Taiwan, 2025	1.218***	1.218***	1.173***	0.722***	0.895***

Notes: Each column re-estimates equation (1). Excl. 2020-21 drops the pandemic years. From 2015 starts the sample in January 2015. Joint unit trends adds unit-specific linear trends (rest of the world omitted). Pre-trend extrapolated removes unit slopes estimated on 2013m1 to 2018m6 from the dependent variable before estimation (standard errors ignore first-step uncertainty). *** p<0.01, ** p<0.05, * p<0.10.

Table 7: Pre-tariff trends relative to the rest of the world, 2013m1 to 2018m6

Unit	Slope (log points per month)	Std. err.	Annualized %
China	0.0036	0.0012	4.4
Vietnam	0.0130	0.0019	16.9
Mexico	0.0033	0.0004	4.0
India	0.0041	0.0007	5.0
Taiwan	0.0028	0.0007	3.4
Thailand	0.0045	0.0009	5.6
Malaysia	0.0075	0.0011	9.4

ROW	0.0000	n.a. (baseline)	0.0

Notes: Slopes of ln(imports) on unit-specific linear trends with unit and month fixed effects, estimated on the 66 pre-tariff months. The annualized percentage is 100(exp(12 x slope) - 1).

Permutation inference

Table 8 reports the placebo estimates. In each phase China has the most negative estimate of the eight units, which gives a one-sided permutation p-value of 0.125, the minimum attainable with eight units. The two-sided p-value is 0.25 in the escalation and persistence phases because Vietnam's positive estimate is larger in absolute value than China's negative one, and 0.125 in 2025. The permutation evidence therefore says that China's decline is the most extreme among the eight units but cannot, with this number of units, deliver conventional significance. The Driscoll-Kraay results in Table 4 should be read with this limit in mind.

Table 8: Permutation (placebo) estimates: each unit treated in turn

Unit	Escalation	Persistence	2025
China	-0.192	-0.574	-1.406
Vietnam	0.373	0.715	1.017
Mexico	-0.034	-0.164	-0.232
India	0.016	0.002	0.032
Taiwan	0.061	0.288	0.904
Thailand	-0.063	0.121	0.407
Malaysia	-0.018	-0.087	-0.236
ROW	-0.142	-0.301	-0.487
China rank: one-sided p	0.125	0.125	0.125
China rank: two-sided p	0.250	0.250	0.125

Notes: Each row reports the unit-by-phase coefficient when that unit is treated as the single treated unit, estimated against all other units with unit and month fixed effects (ln imports). One-sided p is the share of the eight estimates at least as negative as China. Two-sided p is the share with absolute value at least as large as China.

Reliance of the Asian suppliers on China: a cross-section

The country-by-year data needed to test whether the alternative suppliers increased their imports from China could not be retrieved. One cross-section was obtained: China's merchandise exports to each partner in 2023 (Trendeconomy, based on UN Comtrade). Relative to the partner's own exports to the United States in 2023 (from the data above), China's exports are 1.20 times as large for Vietnam, 1.41 times for India, 1.35 times for Thailand and 1.89 times for Malaysia, but 0.17 times for Mexico. The source does not list Taiwan separately. These ratios compare total Chinese exports to the partner with the partner's exports to the United States, and Chinese exports include goods that are not used in production for re-export. They are a scale indicator for a single year. They show that the commercial ties between China and the Asian suppliers are large relative to the suppliers'

U.S.-bound exports and much larger than Mexico's, which is consistent with the interpretation in Section 8 but does not establish a change over time.

Table 9: China exports to the alternative suppliers, 2023 (descriptive)

Partner	China exports to partner (billion USD)	Partner exports to U.S. (billion USD)	Ratio
Vietnam	137.6	114.4	1.20
Mexico	81.5	472.9	0.17
India	117.7	83.5	1.41
Taiwan	not listed separately in source	87.8	not available
Thailand	75.7	56.2	1.35
Malaysia	87.4	46.2	1.89

Notes: China exports: Trendeconomy, Merchandise Exports by Country (HS), China, 2023. Partner exports to the U.S.: Census Bureau customs-basis imports, annual sum from the workbook. For Taiwan the source reports 68.5 billion USD under "Other Asia, nes". The ratio is a scale indicator, not a measure of Chinese content.

Discussion

The evidence supports a specific reading of the post-2018 changes in U.S. sourcing. China's decline is the most robust result in every specification and is large: 9.0 percent of U.S. goods imports in 2025 against 21.6 percent in 2017. The accounting decomposition shows that the five Asian suppliers absorbed 63 percent of the loss to 2024 and 81 percent to 2025, and the Wald test shows that the combined share of China and these suppliers during 2020 to 2024 is indistinguishable from its pre-tariff average. That is the pattern the framework of Antràs and de Gortari (2020) predicts for downstream stages that relocate close to the preceding stages that remain in China. It is also the pattern that Freund et al. (2024) document with ten-digit data for 2017 to 2022, where replacement suppliers are integrated in Chinese supply chains. The cross-section in Table 9 is consistent with deep commercial ties, but it cannot establish that the ties strengthened.

Two qualifications are necessary. The first concerns the gains of the individual suppliers. Table 6 and Table 7 show that most of the Asian suppliers were growing faster than the rest of the world before 2018, so the baseline estimates in Table 4 overstate the part of their gains that can be associated with the tariffs. Taiwan is the exception, and the relative decline of China is robust. The conclusion about reallocation within the network rests on the accounting decomposition and on the combined share, which do not depend on the extrapolation of trends, and not on the supplier-specific coefficients. The second qualification concerns Mexico. Mexico's share gain is consistent with the nearshoring prediction of the framework (H4) and with the evidence of nearshoring to border nations in Freund et al. (2024), but it

comes mainly at the expense of the rest of the world in the persistence phase and, like the other suppliers, it is sensitive to its pre-tariff trend.

Conclusion

The question examined in this paper is whether U.S. tariffs on China produced genuine diversification of supply chains or primarily changed the location through which existing production networks operate. Using a balanced monthly panel of eight origins over 156 months, I find that China's share of U.S. goods imports fell by more than half between 2017 and 2025. Five Asian suppliers absorbed almost two thirds of China's lost share by 2024 and four fifths by 2025. Moreover, the combined share of China and these five suppliers during 2020 to 2024 is statistically indistinguishable from its pre-tariff level. Mexico also gained import share.

Policy Implications

The main policy implication is that changes in bilateral trade shares should not be treated as sufficient evidence of supply-chain diversification. A decline in imports from a targeted country can coexist with continued dependence on the same production network when alternative suppliers remain closely connected to the targeted country. For supply-chain resilience, policymakers therefore need to look beyond the recorded country of origin and consider the broader network through which production is organized.

This suggests that the effectiveness of tariffs as a diversification instrument depends on the extent to which alternative suppliers have independent upstream capacity. If production is relocated from China to countries that continue to rely heavily on Chinese inputs, tariffs may reduce direct bilateral exposure without substantially reducing network-level dependence. Policies intended to increase resilience may therefore need to be accompanied by measures that expand alternative sources of upstream inputs and improve the availability of value-added and input-level trade data.

Limitations

Several limitations qualify these conclusions. First, gross import values by origin cannot reveal how much Chinese value added is embodied in exports from the alternative suppliers. Value-added accounting in the manner of Johnson and Noguera (2012) and Koopman, Wang

and Wei (2014), or country-year data on China's exports to the alternative suppliers, would allow the connector proposition to be tested more directly.

Second, the design contains one treated unit. The permutation evidence shows that China is the most extreme of the eight units, but it cannot provide conventional statistical significance. The standard errors reported in Tables 4 to 6 should therefore be interpreted with this limitation in mind.

Third, the 2025 phase combines China-specific measures with measures that applied to many trading partners. The 2025 coefficients therefore represent a different policy contrast from those estimated for the earlier phases.

Fourth, transshipment of Chinese goods through third countries could inflate the recorded imports of the alternative suppliers. The available data cannot rule out this possibility.

Fifth, the sample ends in December 2025. The results should therefore be interpreted as describing the adjustment observed during the period studied rather than as evidence of the longer-run configuration of global supply chains.

These limitations are important for interpreting the findings. The evidence does not establish the amount of Chinese value added embodied in imports from the alternative suppliers. It does, however, show that the substantial decline in China's bilateral share was accompanied by persistent combined exposure to China and the five Asian suppliers during 2020 to 2024. The distinction between bilateral decoupling and broader supply-chain diversification is therefore central to evaluating the effects of tariff policy.

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