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Tariff Shocks and Export Values in China's Electronics Sector Before and During the US-China Trade War from 2015 to 2025

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Abstract. This paper evaluates the impact of the US-China trade war on China's electronics exports, with a particular focus on whether such effects vary by products' pre-existing reliance on the US market. This study covers 46 electronic product categories and 7 major destination markets. By using the HS4 product-destination-year panel, the Difference-in-Difference (DID) model is applied to estimate the effects of trade war shocks. The baseline results show that US electronics imports from China decreased by approximately 23.3% compared to other six major markets after the trade war in 2018, supporting the hypothesis that the trade war significantly reduced China's electronics exports to the US. The parallel-trend test reveals no significant pre-policy differences, while the placebo test provides additional useful support for the baseline result. However, the interaction between the trade war shock and the dependence on US market during the pre-policy period is statistically insignificant, illustrating that products that depended more on the US market initially did not experience more significantly negative effects. Overall, the findings underscore the negative shocks of the trade war to China's electronics exports, while offering limited support for heterogeneous effects based on pre-policy US market exposure.

Keywords: US-China trade war, Tariff shocks, Electronics exports, Difference-in-Differences model, Market dependence

1. Introduction

The role of trade policy in driving global trade and value chains has grown markedly in recent years. A key turning point came in 2018, when the US launched several rounds of additional tariffs on Chinese products under Section 301. From 2018 to 2019, four rounds of tariffs gradually expanded the tariff coverage, with many goods even facing additional tariffs of up to 25%. These measures greatly increased export costs of Chinese firms. Among all affected industries, the electronics sector has attracted particular attention as it accounted for 28% of China's merchandise exports and relied heavily on global value chains and foreign intermediate inputs, making it particularly vulnerable to changes in trade policies. Studying how tariff shocks affect export performance in China's electronics sector merits attention for its pivotal role in propelling technological advancement and the digital economy, while also constituting a linchpin of global production networks. Given the

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strategic and geopolitical significance of China and the United States, shifts in trade policy have implications for bilateral commerce, cross-border supply chains, and the broader international economic order.

While a growing body of literature has explored the consequences of the trade war for exports, firm-level outcomes, and supply chain reconfiguration, product-specific evidence—particularly regarding China's electronics sector—remains scarce. This study addresses this gap by assessing whether US imports of Chinese electronic products declined more sharply than those destined for other major markets, and whether such declines were amplified among products that relied more heavily on the US market prior to the policy shock.

This essay commences with a critical review of the literature, proceeds to detail the data and econometric approach, and employs a Difference-in-Difference (DID) design to identify the causal impact of the US-China trade war on China's electronics exports.

2. Literature review

2.1. Firm-level effects of tariff shocks

Previous studies suggest that the US-China trade war has generated significant microeconomic effects on firms, particularly through its impact on export performance, profitability and innovation. Exporters usually respond to higher tariffs by exporting to substitute markets rather than lowering the prices. However, these adjustments failed to stop firms from declining their income, profits and capital accumulation [1, 2]. This indicates that although firms react actively to tariff shocks, the measures taken were far from enough to offset the external economic costs. Beyond firms' short-term performance, the US-China trade war also obviously reduced Chinese new firm entries, especially in industries rely on exports, showing that long-lasting trade barriers may restrict business expansion and weaken market dynamic. Additionally, the increasing operating costs due to increasing tariffs has reduced the innovation efficiency of China's information and communications technology (ICT) firms, which suggests that tariff shocks may weaken firms' long-term competitiveness [3]. Taken together, these study findings show that tariff shocks could generate great impacts on business performances, affecting both export and financial performance, and firm entries as well as innovation abilities [4].

2.2. Welfare effects of tariff shocks

Previous studies have shown that tariff shocks affect firm-level outcomes and lead to broader welfare losses by reducing productivity and household consumption. Higher trade barriers distort resource allocation, thereby weakening productivity growth [5]. Since tariffs raise product prices, households may reduce their spending, resulting in a decline in aggregate demand. Overall, tariff shocks impose economic costs beyond individual firms by reducing household welfare and the efficiency of the broader economy.

2.3. Tariff pass-through and pricing behavior

Additionally, the extent to which tariff shocks affect firms partly depend on pricing behaviors and the extent to which tariffs are passed through. The impacts on trade and prices generated by tariff shocks differ according to products and firms, thereby leading to different reactions to tariff shocks [6]. Recent evidence from the US trade policy also demonstrates that foreign exporters did not

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decrease the prices significantly after imposing the tariffs, consequently, the extra costs brought by tariffs are mainly reflected on import costs paid by the US importers. Nevertheless, the pass-through to retail prices was relatively limited, suggesting that part of tariff pressure was absorbed by reducing retail profit margins [7]. Therefore, the influences of tariff shocks depend on both tariff rates and firms' pricing responses.

2.4. Firms' adjustment strategies

Previous studies also provide evidence that firms adjusted actively to tariff shocks to mitigate the negative impacts of them, although the effectiveness of the strategies differ across firms. Firms may usually reorganize their production chain by reallocating production, diversifying suppliers and sourcing intermediate from other countries [8]. Similarly, reorganizing supply-chains has played a vital role in strengthening firms' resilience when facing trade barriers, allowing firms to better adapt to uncertainty and external shocks [9]. However, these adjustments are still limited by the stability of supply-chains, as the supply-chain disruptions could also prevent firms from obtaining intermediate goods and thereby increase production costs, highlighting the importance of stable access to upstream inputs [10]. Overall, these studies suggest that firms and products differ in their ability to respond to tariff shocks, emphasizing the importance of examining heterogeneous export responses to trade policy changes.

3. Theoretical framework and research hypotheses

3.1. Theoretical framework

3.1.1. Characteristics of electronics industry

The electronics industry is deeply integrated into global value chains, with production processes spanning multiple countries and intermediate goods frequently crossing national borders. Firms thereby, benefit from this structure as it reduces production costs through international specialization, while being more sensitive to global policy trade and the interruption of supply-chain [10, 11]. Therefore, the electronics industry itself is often vulnerable to international trade shocks.

3.1.2. The electronics industry as an appropriate research setting

The electronics industry is a suitable object as it accounts for an important share of China's exports, affecting the overall export performance. Furthermore, the industry relies on global specialization, while the availability of alternative suppliers in other markets intensifies competition. Consequently, once the US increases tariffs in China's exports, their products will be affected and become less competitive. Therefore, the electronics industry becomes a suitable object which observes how tariff shocks influence export performance.

3.1.3. Transmission mechanism of tariff shocks

Tariff shocks will increase China's import costs in the US market, thereby affecting China's export performance. When additional tariffs were imposed, products not subject to the same tariffs performed more competitively compared to Chinese products. Therefore, US importers may reduce orders from Chinese suppliers or even substitute them with other suppliers, reducing China's exports

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to the US. Empirical evidence from the trade-war episode reveals that Chinese exports to the US contracted considerably, while those destined for other economies expanded in tandem [12].

Tariffs and sustained policy ambiguity may also prompt enterprises to reconfigure their procurement and value-chain strategies. Firms may search for alternative suppliers or reorganize sourcing relationships to minimize the negative effects of trade barriers, although such adjustments involve search and switching costs [8]. Therefore, through reduced competitiveness, the trade-war shock is expected to reduce US imports of Chinese electronic products relative to other major destination markets.

3.1.4. US Market dependence and heterogeneous effects

The impact of the trade-war shocks may differ across products according to their pre-policy dependence on the U.S. market. Products with greater U.S. market dependence have higher exposure to changes in U.S. trade policy and demand conditions. When access to the U.S. market is disrupted, exporters may attempt to redirect exports towards alternative destinations, but such adjustments may vary substantially across products [12]. Therefore, products that relied more heavily on the U.S. market before the trade war are expected to experience a stronger negative export response after the policy shock.

3.2. Research hypotheses

Following the escalation of China-U.S. trade tensions in 2018, the United States imposed additional tariffs on selected Chinese goods. These tariffs directly increased import costs and could affect U.S. trade in Chinese electronic products through order delays, supply-chain relocation, and substitution toward alternative import sources. In the absence of this shock, U.S. imports of Chinese electronics and imports by other major developed markets would be expected to follow similar common trends. The additional post-policy change in the United States relative to these control markets can therefore be interpreted as the effect of the trade-war shock. Accordingly, the following hypothesis is proposed:

• H1: After the onset of the trade war, U.S. imports of Chinese electronic products declined significantly relative to the control markets.

Products with greater dependence on the U.S. market face higher risks from order concentration and greater market-switching costs; they may therefore experience a stronger adverse shock. Accordingly, the following hypothesis is proposed:

• H2: The greater a product's pre-policy dependence on the U.S. market, the stronger the negative effect of the trade war.

4. Methodology

4.1. Research design

4.1.1. Model specification

This study treats the 2018 trade war as a quasi-natural experiment and constructs an HS4 product-destination-year panel. The United States is the treatment group, while Germany, Japan, South Korea, the United Kingdom, Canada, and Australia form the control group. The years 2015-2017 constitute the pre-policy period, and 2018 onward constitutes the post-policy period.

The baseline two-way fixed-effects model is specified as follows:

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$$ln(1 + Export_{pdt}) = \alpha + \beta_1 DID_{dt} + \mu_{pd} + \lambda_t + \varepsilon_{pdt} \quad (1)$$

where p, d and t denote the HS4 product, destination country, and year, respectively; μ_{pd} denotes product-destination fixed effects, and λ_t denotes year fixed effects. The core DID coefficient β_1 captures the additional change in United States imports of Chinese electronic products after 2018 relative to the six control countries. Standard errors are clustered at the product-destination level.

To test whether pre-policy dependence on the U.S. market amplifies the shock, the following model is estimated:

$$ln(1 + Export_{pdt}) = \alpha + \beta_1 DID_{dt} + \beta_2 (DID_{dt} \times \widetilde{Dep_p}) + \mu_{pd} + \lambda_t + \varepsilon_{pdt} \quad (2)$$

where $\widetilde{Dep_p}$ is the mean-centered dependence measure; as Dep is time-invariant at the product level, its main effect is absorbed by the product-destination fixed effects; the estimable term is the interaction $DID_{dt} \times \widetilde{Dep_p}$.

4.1.2. Variable definitions

Table 1 provides a comprehensive overview of the principal variables employed in the empirical analysis, including their definitions, measurement methods, and construction procedures. By clarifying how each variable is operationalized, the table facilitates interpretation of the descriptive statistics, econometric specifications, and corresponding regression results reported in the subsequent analysis.

Table 1. Variable definitions

Variable type	Symbol	Definition
Dependent variable	$ln(1 + Export_{pdt})$	Natural logarithm of one plus the import value of HS4 product p from China, reported by destination d in year t.
Core variable	DID_{dt}	Equals 1 for U.S. observations from 2018 onward and 0 otherwise.
Dependence	Dep_p	Average U.S. share of total imports by the seven sample destinations for product p during 2015–2017.
Heterogeneity term	$DID_{dt} \times \widetilde{Dep_p}$	Interaction between DID and mean-centered pre-policy U.S. market dependence. It tests whether more U.S.-dependent products experienced a different treatment effect.

4.1.3. Sample selection and data sources

The main DID sample covers 46 HS4 products within HS85, seven destination countries, and seven years from 2015 to 2021, yielding 2,254 product-destination-year observations and 322 clusters. Trade data are obtained from UN Comtrade, while the CNY/USD exchange rate and the GDP series for China and the United States come from the World Bank's World Development Indicators.

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4.1.4. Descriptive statistics

Table 2 presents descriptive statistics for the principal variables used in the DID sample, summarizing their distributions, variation, central tendencies, and overall characteristics across observations.

Table 2. Descriptive statistics for the main DID sample

Variable	N	Mean	Std. Dev	Minimum	Median	Maximum
$ln(1 + Export_{pdt})$	2254	18880	1963	11893	18925	25012
$\mathrm{Export}_{\mathrm{pdt}}$	2254	9305	39812	0.001	1.656	728.452
Dep_p	2254	0.441	0.151	0.106	0.471	0.683
DID_{dt}	2254	0.082	0.274	0.000	0.000	1.000

4.2. Empirical analysis and tests

4.2.1. Trade trend

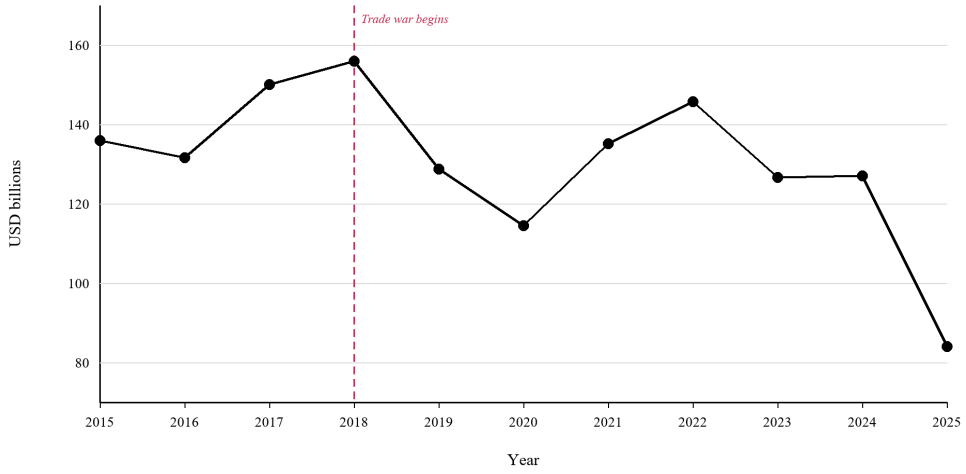

Figure 1. U.S. imports of HS85 products from China, 2015-2025

As shown in Figure 1, U.S. imports of HS85 products from China rose from USD 136.01 billion in 2015 to USD 155.95 billion in 2018. They declined in 2020, recovered temporarily during 2021–2022, and fell to USD 84.03 billion by 2025, representing a 46.1% decrease from 2018. This uneven trend suggests that simple pre- and post-policy comparisons may confound the trade-war effect with pandemic disruptions, demand cycles, and supply-chain adjustments, supporting the use of a DID design with control markets.

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4.2.2. Baseline regression results

Column (1) of Table 3 reports a DID coefficient of -0.265, with a clustered standard error of 0.062 and $p < 0.001$. Converting the log estimate using $100[e^{\beta_1} - 1]$ yields a 23.3% decline. After accounting for common year shocks and time-invariant product-destination differences, U.S. imports of Chinese electronics fell significantly relative to the six control markets after 2018. The transformed 95% confidence interval ranges from -32.1% to -13.4%, thereby supporting H1.

The R-squared of approximately 0.981 mainly reflects the explanatory power of the product-destination fixed effects for persistent level differences; it should not be interpreted as evidence that the policy variable alone explains 98.1% of the variation.

Table 3. Baseline DID regression results

Variable	(1) Baseline DID	(2) DID with Dep Heterogeneity
DID	-0.265***	-0.265***
	(0.062)	(0.062)
DID x Dep (centered)		0.131
		(0.428)
Product-destination fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Number of clusters	322	322
Observations	2,254	2,254
R-squared	0.981	0.981

4.2.3. Parallel-trends test

The validity of the DIDs approach hinges on the parallel trend assumption that treatment and control groups would have followed similar trajectories absent the tariff shock. To assess this, this paper adapts an event-study framework with 2017 as the baseline year, interacting the US treatment dummy with a full set of year indicators. The estimated coefficients for the pre-2018 periods serve as a test for pre-existing trend divergence, while those for the post-2018 periods trace the evolution of the treatment effect over time (as shown in Figure 2).

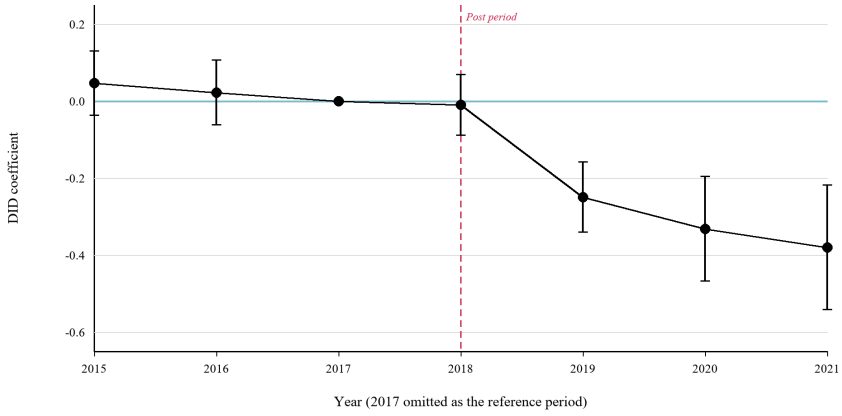

Figure 2. Event-study estimates and the parallel-trends test (2017 as the reference period)

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From Table 4, the estimated coefficients for 2015 and 2016 stand at 0.047 and 0.023, respectively, with neither reaching statistical significance. This finding is corroborated by a joint test ($p = 0.498$), confirming the absence of any discernible pre-treatment trend divergence. Turning to the post-shock period, the 2018 coefficient is negligible, while the estimates turn markedly negative from 2019 onward, reaching -0.380 in 2021, a pattern indicative of a steadily intensifying effect over time. Because only three pre-policy years are available, the test has limited statistical power. The appropriate conclusion is therefore that the parallel-trends assumption is not rejected, rather than that it has been conclusively proven.

Table 4. Event-study coefficients

Year	Coefficient	Clustered SE	p-value	95% Confidence Interval
2015	0.047	0.043	0.273	[-0.037, 0.130]
2016	0.023	0.043	0.595	[-0.062, 0.107]
2017	0.000	-	-	Reference period
2018	-0.009	0.040	0.819	[-0.088, 0.070]
2019	-0.249***	0.046	0.000	[-0.340, -0.158]
2020	-0.332***	0.069	0.000	[-0.467, -0.196]
2021	-0.380***	0.083	0.000	[-0.542, -0.218]

4.2.4. Placebo test

In the present study, treatment is assigned at the destination-country level, and only one of the seven destinations - the United States - is treated. Randomly assigning treatment to products would therefore be inconsistent with the actual treatment mechanism. To preserve the level of assignment, each of the seven destinations is treated in turn as the sole pseudo-treated group. All seven feasible assignments are evaluated through exact permutation, and the resulting pseudo-coefficients are compared with the actual U.S. coefficient (as shown in Figure 3).

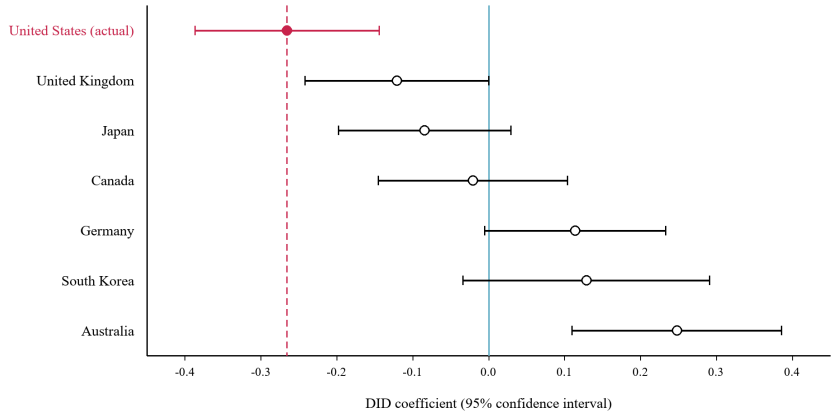

Figure 3. Placebo test based on rotating the pseudo-treated destination

In Table 5, the actual U.S. coefficient is -0.265, whose absolute value is the largest among the seven feasible assignments. The six pseudo-treated coefficients are generally closer to zero or have the opposite sign. The exact randomization test gives $p = 0.143$. This pattern provides directional support, but it does not reach the conventional 5% randomization significance level because the

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smallest theoretically attainable p-value with seven assignments is 1/7. The placebo result should therefore not be described as completely ruling out other influences. A more accurate interpretation is that the actual treatment effect is pronounced within the limited set of permutations, while the small number of destination countries constrains the precision of randomization inference.

Table 5. Placebo results from rotating the pseudo-treated destination

Destination	Treatment	Coefficient	Standard Error	p-value	95% Confidence Interval
United States	Yes	-0.265***	0.062	0.000	[-0.387, -0.144]
Germany	No	0.114*	0.061	0.061	[-0.005, 0.233]
Japan	No	-0.084	0.058	0.146	[-0.197, 0.029]
South Korea	No	0.129	0.083	0.120	[-0.033, 0.291]
UK	No	-0.121*	0.062	0.050	[-0.242, 0.000]
Canada	No	-0.021	0.064	0.747	[-0.145, 0.104]
Australia	No	0.248***	0.070	0.000	[0.110, 0.386]

4.2.5. Heterogeneity by market dependence

In column (2) of Table 3, the DID coefficient remains -0.265 and is significant at the 1% level, indicating that the average treatment effect is essentially unchanged after the dependence interaction is added. The DID x Dep coefficient is 0.131, with a standard error of 0.428, p = 0.760, and a 95% confidence interval of [-0.708, 0.969]. The interaction is statistically insignificant, and its point estimate has the opposite sign from the negative effect predicted by H2. There is therefore no evidence that greater pre-policy exposure to the U.S. market significantly amplified the trade-war shock; H2 is not supported.

This result does not imply that dependence mechanisms do not exist. The current Dep measure captures market exposure rather than foreign input content on the production side, and the HS4 classification remains relatively broad.

5. Recommendations

5.1. Firms' resilience

According to the empirical results, US imports of China's electronic products declined significantly relative to other major markets after the outbreak of the trade war. Therefore, China's electronic firms should diversify their export destinations and strengthen supply-chain resilience to lower the exposure to adverse policy shocks. For example, by expanding overseas markets, firms are able to build a more balanced export structure, therefore reducing the potential impacts of trade restrictions from any other markets. Meanwhile, firms should diversify their supplier networks to increase sourcing flexibility and reduce their reliance on specific suppliers or countries. Furthermore, improving supply-chain monitoring and developing alternative sourcing options could also allow firms to respond more quickly to tariff shocks and other global policy changes.

5.2. Policy support

For policymakers, facilitating firms' entry into alternative overseas markets and reducing the costs of export diversification and supply-chain reorganization would help firms adjust. For example, the

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government can alleviate information asymmetry and provide more detailed information about overseas markets for firms to develop alternative markets and respond to external shocks more effectively. Moreover, policy support can also promote technological improvements and more flexible supply-chain arrangements, thus increasing the long-term competitiveness of the electronics industry. Since the heterogeneous analysis did not find significantly stronger impacts on products with greater dependence on the US market, policymakers should focus more on enhancing the overall adaptability and resilience of electronic exporters, instead of targeting firms simply according to their previous dependence on the US market.

6. Conclusion

This study examines whether the US–China trade war reduced Chinese electronics exports to the United States and whether products more dependent on the US market before 2018 were more severely affected. Using an HS4 product–destination–year panel covering 46 HS85 categories, seven markets, and 2015–2021, it applies a two-way fixed-effects DID model, with the United States as the treatment group and 2018 as the policy onset. The results show that US imports of Chinese electronics fell by approximately 23.3% relative to six control markets. Event-study estimates reveal no significant pre-policy trends and increasingly negative effects after 2019, while the placebo test provides directional support. The dependence interaction is insignificant, supporting H1 but not H2. The study recommends market diversification, flexible sourcing, stronger supply-chain monitoring, and policies that enhance exporters' overall resilience.

However, in this paper, the HS4 classification may conceal product-level heterogeneity, while the dependence measure captures export-market exposure but not imported-input reliance or firm-level concentration. Although the title and descriptive trend extend to 2025, the causal panel ends in 2021, excluding later tariff escalation and supply-chain relocation. Identification also relies on one treated destination and six controls; COVID-19, trade diversion, and destination-specific demand shocks may not be fully absorbed. The seven-assignment placebo test is low-powered, as is the parallel-trends test with only three pre-policy years.

Future research should combine HS6 or firm-level customs data with actual product-specific tariff rates and extend causal analysis through 2025. Dynamic DID, synthetic-control, or triple-difference designs could better separate tariff effects from pandemic and macroeconomic shocks. Further work should examine export margins, pricing, third-country rerouting, input dependence, ownership, technology intensity, and supply-chain restructuring to clarify which mechanisms generate resilience or vulnerability under prolonged trade-policy uncertainty.

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