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A Quantitative Analysis of the US–China Trade Tension

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Abstract

How would an escalation of trade tensions between the world's two largest economies reshape global trade patterns and welfare? This study quantified the global effects of potential tariff increases under the second Trump administration using a quantitative general equilibrium model that captured input–output trade linkages. A simulation of a 30 percent increase in US tariffs on Chinese imports indicated that China's exports to the US would fall by 59.1 percent for intermediate goods and 52.7 percent for final goods, with significant diversion toward Mexico and Canada. At the same time, US imports would shift toward Association of Southeast Asian Nations countries, South Korea, and a few other economies. Certain third countries would experience modest welfare improvements but broader tariff escalation scenarios would result in welfare losses for all economies. These findings underscore the critical importance of maintaining open trade polices and stable international trade relations for global economic welfare. Dialogue and cooperation between the US and China are essential to navigate trade complexities and foster a more resilient and prosperous global economy.

Keywords: global reallocation, structural model, US–China trade tension, welfare effects
JEL codes: F01, F13, F14

I. Introduction

The US–China trade tension, which began in 2018, has been unprecedented in scale and intensity. By 2019, over two-thirds of Chinese imports into the US were subject to additional duties. Seven years into the trade tension, these tariffs remained in place, with

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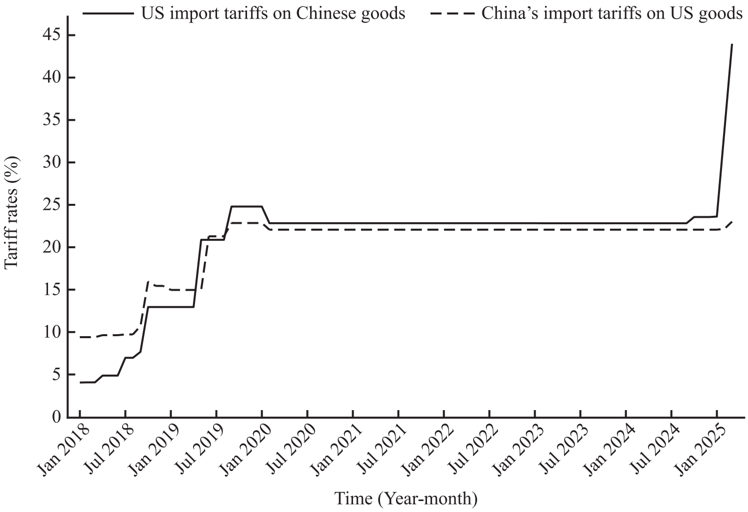
the Biden administration expanding the list to include semiconductors and new-energy vehicles. As shown in Figure 1, by the end of 2024, the average US tariff on Chinese exports exceeded 23 percent.

A renewed escalation occurred in early 2025, with US–China trade tensions intensifying markedly. In February and March, the US imposed two successive rounds of additional 10 percent tariffs on Chinese imports, resulting in a total of 20 percent in new tariffs. On April 2, the confrontation reached a new height with the announcement of the "Liberation Day" tariff policy. Under this framework, the US introduced a baseline 10 percent tariff on nearly all imports, with higher rates applied to countries running large bilateral trade surpluses with the US. China was immediately targeted with a reciprocal tariff rate of 34 percent, which was subsequently increased to 125 percent before being reduced to 10 percent by mid-May.[1] The cumulative new tariffs imposed on Chinese goods in 2025 totaled approximately 30 percent.

Figure 1. Changes in import tariffs imposed by the US and China



Sources: Authors' calculations based on data from the Tariff Policy Commission of the State Council of China and the US International Trade Commission (USITC).

Notes: This figure shows the simple average tariffs imposed by the US and China from January 2018 to March 2025, before the "Liberation Day" announcement and the negotiations afterwards. As of May 14, 2025, the simple average tariff of the US on China was 53.1 percent; the simple average tariff of China on the US was 33 percent.

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[1] Following the joint statement on China–US economic and trade meeting in Geneva, 10 percent was imposed from the original 34 percent proposal, while the remaining 24 percent was suspended for an initial 90-day period. This suspension was further extended for another 90 days beginning August 12, 2025, as agreed at the Stockholm trade talks.

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Unlike the initial waves of tariffs introduced in 2018–2019, this new tariff regime was broader in geographic and sectoral scope. It applied more uniformly across goods and extended to a wide array of US trading partners, not just China. Given the economic size of the US and China – the world's largest importer and largest exporter, respectively – such a dramatic escalation is poised to generate significant distortions in global trade flows and alter the structure of international economic integration.

How would an escalated trade conflict between the world's two largest economies reshape global trade and alter global welfare? To address this question, this study developed a multicountry, multisector general equilibrium model with input–output (IO) linkages. Building on the Armington framework (Armington, 1969; Caliendo and Parro, 2015), the model distinguishes between intermediate and final goods – a distinction that is essential for two reasons. First, intermediate goods are central to modern global value chains and often cross borders multiple times (Antràs and Chor, 2019). Their pervasive exposure to trade barriers amplifies the transmission of tariff shocks. Second, the composition of US–China trade is structurally asymmetric. The US imports a relatively high share of final consumption goods from China – approximately one-third of its total imports. In contrast, more than 80 percent of China's imports from the US are intermediates. Capturing this asymmetry and the role of intermediates is critical for assessing the consequences of tariff escalation across countries and sectors.

The model was calibrated to global trade data and incorporated detailed product-level tariff schedules to reflect observed trade patterns. Within this framework, three main counterfactual scenarios were simulated: (i) a 30 percent increase in US tariffs on Chinese imports, reflecting the cumulative tariff hikes enacted in early 2025; (ii) a more substantial 54 percent tariff increase, corresponding to a scenario in which the 90-day pause in escalation would be lifted and an additional 24 percent tariff imposed; and (iii) the comprehensive "Liberation Day" tariff regime, under which the US would initiate a full-scale trade war against all major trading partners.

The analysis also examined potential Chinese policy responses to these trade shocks, both retaliatory and mitigating. These included the imposition of retaliatory tariffs on US goods and strengthening economic cooperation with other economies, such as deeper integration with Regional Comprehensive Economic Partnership (RCEP) member countries. The study also assessed the potential impact of US alliance-based trade restrictions and export controls.

The analysis yielded four main findings. First, a 30 percent increase in US tariffs on Chinese goods would reduce China's exports to the US by 59.1 percent for intermediate goods and 52.7 percent for final goods. These declines would be offset partially by trade diversion: Chinese exports would be redirected toward alternative markets, particularly

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Mexico and Canada. Simultaneously, US import demand would shift toward Chinese Taiwan province, South Korea, and Association of Southeast Asian Nations (ASEAN) economies.

Second, several third countries would benefit from these reallocation effects. Under a 30 percent US tariff increase on China, Mexico, ASEAN, and India would experience welfare gains of 0.123 percent, 0.038 percent, and 0.037 percent, respectively, as they capture market shares previously held by Chinese exporters. This third-country effect underscores the broader general equilibrium spillovers of bilateral trade tensions.

Third, under a more comprehensive escalation – such as the "Liberation Day" tariff scenario – all countries would incur welfare losses. In this case, China's indirect export channels would also be disrupted. For instance, China's intermediate exports to Mexico and Canada would fall by 18.7 percent and 6.0 percent, respectively, limiting its ability to circumvent US tariffs through trade with third countries.

Fourth, although a 30 percent tariff increase would reduce China's welfare by 0.131 percent, these losses can be offset partially through expanded trade openness. If China were to eliminate bilateral tariffs with other RCEP member states, its welfare loss would be reduced to 0.059 percent. This result highlights the potential for regional integration to serve as a buffer against adverse trade shocks.

These findings demonstrate the far-reaching consequences of escalating US tariffs and the resulting retaliatory responses. As far as the authors are aware, this paper provides one of the first quantification studies of the "Liberation Day" tariffs. By distinguishing between intermediate and final goods, the analysis emphasizes the disproportionate impact of trade barriers on global supply chains. The model reveals significant reallocation of trade flows, with third countries gaining at the expense of the primary participants in the trade war. In particular, it indicates that the broader scope and uniform structure of the Trump 2.0 tariffs would induce larger distortions in global trade patterns than those implemented during the initial 2018–2019 episode. Moreover, the extension of tariffs to third countries would further constrain China's ability to export to the US indirectly, exacerbating disruptions to supply chains. Finally, the substantial welfare losses associated with the "Liberation Day" regime underscore the global economic costs of aggressive protectionism.

This paper contributes mainly to two strands of literature. The first examines the trade and welfare effects of trade policies using quantitative structural models. For example, Caliendo and Parro (2015) analyzed the welfare implications of tariff changes following the establishment of the North American Free Trade Agreement. Ossa (2014) employed a multicountry, multiindustry general equilibrium model to explore cooperative and noncooperative trade policies, focusing on optimal tariffs, trade wars, and negotiations. Guo et al. (2018) estimated the welfare impact of a 45 percent

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tariff imposed by the US on China using a multisector, multicountry general equilibrium model. Similarly, Fajgelbaum et al. (2020) and Caliendo and Parro (2023) analyzed the welfare effects of US–China trade frictions during 2018–2019. Building on this foundation, the current study extends these models by distinguishing between the trade elasticities of intermediate and final goods. This distinction is critical because intermediate goods, integral to global supply chains, exhibit greater sensitivity to tariff increases than final goods. The results highlight the disproportionate impact of disruptions in intermediate goods trade on global trade flows, emphasizing their essential role in supply chain stability.

The second strand of the literature explores the broader economic impacts of US–China trade frictions. Comprehensive reviews of the US–China trade conflict have been provided by Fajgelbaum and Khandelwal (2022), Caliendo and Parro (2023), and Ma and Ning (2024). Existing studies have demonstrated that US tariff hikes significantly reduced trade volumes while leaving pre-tax import prices largely unchanged, implying that US importers bore the full tariff costs (Amiti et al., 2019, 2020; Fajgelbaum et al., 2020; Cavallo et al., 2021; Ma and Meng, 2023; Jiao et al., 2024). Similarly, China's retaliatory tariffs sharply curtailed US imports, with the full burden passed on to Chinese import prices (Ma et al., 2021). Beyond trade volumes and prices, these frictions affected employment (He et al., 2021; Flaaen and Pierce, 2024), investment (Amiti et al., 2021; Benguria et al., 2022), stock returns (Chen and Nie, 2023; Huang et al., 2023), consumption (Waugh, 2019), consumer prices (Ma et al., 2024), and innovation (Kong et al., 2024). Welfare losses from the US–China trade conflict are generally modest (Fajgelbaum et al., 2020; Chang et al., 2021; Georgiadis et al., 2021), but the literature documents extensive evidence of trade diversion and supply chain reorganization. For instance, Fajgelbaum et al. (2024) found that US–China trade frictions increased the "third-country" exports to the US and other global markets. Although the center of gravity of US imports has shifted from China to low-cost producers like Vietnam and Mexico, these emerging suppliers remain tightly linked to China's supply chains (Alfaro and Chor, 2023; Freund et al., 2024). These studies rely primarily on regression techniques to analyze trade reallocation patterns. In contrast, the current paper adopts a structural model, which enables it to move beyond the partial equilibrium perspective and adpots a general equilibrium framework that captures global interdependencies and spillover effects.

Unlike prior studies that primarily focus on aggregate welfare effects or employ reduced-form regression techniques to analyze trade reallocation, this study used a structural model to quantify the reallocation effects of escalating trade tensions and their welfare implications for third countries. Its findings indicate that tariff escalations can

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not only directly impact the economies involved but can also induce significant trade flow reconfigurations through third countries, generating widespread spillover effects. These results have important implications for global supply chain security and can inform trade policy adjustments.

The remainder of the paper is organized as follows: Section II describes stylized facts. Section III introduces the model and calibration. Section IV presents the counterfactual scenarios and quantifies the trade and welfare effects of US tariff shocks. Section V provides several further analyses. Section VI concludes.

II. Stylized facts on US–China trade and tariff shocks

This section presents four stylized facts that illustrate the central role of intermediate and final goods in US–China trade, and the reallocation of trade flows in response to tariff shocks. These empirical patterns provide the foundation for the quantitative framework developed in the subsequent sections.

Fact 1: Intermediate goods dominate US–China trade, with notable asymmetries in trade composition.

Trade between the US and China is heavily concentrated in intermediate goods, although the composition differs substantially by direction. In 2017, the US imported USD 505.4 billion in goods from China, with intermediate goods accounting for 64.2 percent and consumer goods for 35.3 percent.[2] In contrast, China's imports from the US totaled USD 153.9 billion, with intermediate goods comprising a much larger share (84.0 percent) and consumer goods only 7.1 percent. This asymmetry reflects the structural roles of the two economies in global value chains: China as a major producer and assembler of final goods for export, and the US as a supplier of high-value intermediates and the largest market for finished products.

Fact 2: The US tariffs primarily targeted Chinese intermediate goods whereas China retaliated against US final goods.

During the 2018–2019 escalation of US–China trade tensions, both countries imposed multiple rounds of tariffs – seven by the US, including under Section 201 of the Trade Act of 1974 and Section 232 of the Trade Expansion Act of 1962, and six retaliatory rounds by China.[3] A sectoral decomposition of the tariff schedules revealed

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[2] Following the United Nations Broad Economic Categories (BEC) classification, capital goods and intermediate goods are both classified as intermediate goods.

[3] China did not retaliate against the Section 201 tariffs imposed by the US in February 2018; for details on tariff rates and affected products see Ma and Ning (2024).

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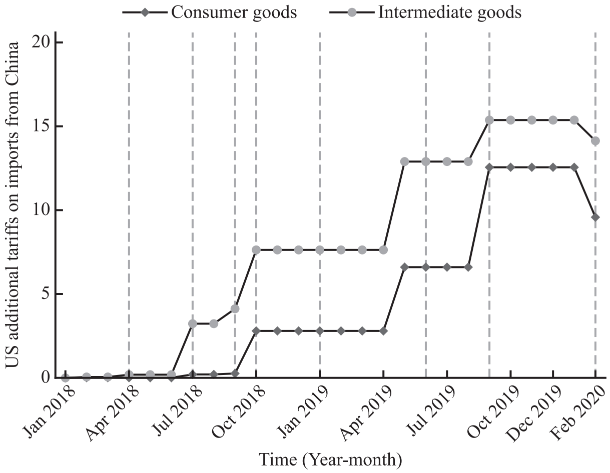
an asymmetric strategy: US tariffs disproportionately targeted Chinese intermediate goods whereas China focused its retaliation on US consumer goods.

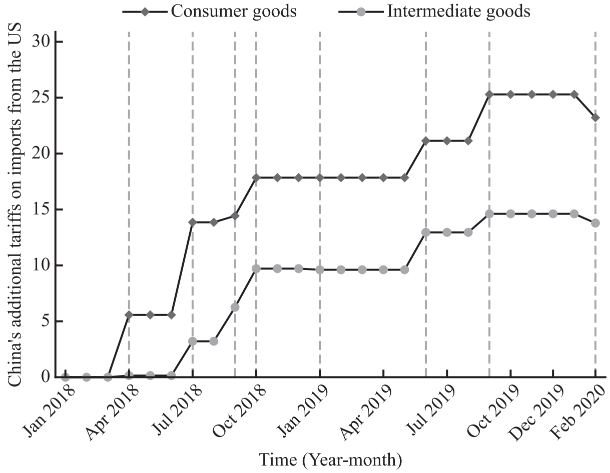
By February 2020, the average additional US tariff (i.e., excluding the Most Favored Nation tariffs) on Chinese intermediate goods had risen to 14.1 percent in comparison with 9.6 percent on consumer goods. In contrast, China imposed tariffs of 23.2 percent on US consumer goods and 13.8 percent on intermediate goods (Figure 2). This asymmetry

Figure 2. Additional tariffs imposed by the US and China: 2018–2020

a. Additional tariffs imposed by the US on China



b. Retaliatory tariffs imposed by China on the US



Sources: Authors' calculations based on the data from the Tariff Policy Commission of the State Council of China and USITC.

Notes: In Figure 2a, the weighted average additional tariffs were calculated by using US imports from China in 2017 as weights. In Figure 2b, the weighted average tariffs were calculated using China's ordinary imports from the US in 2017 as weights.

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reflects the underlying trade structures, with US imports from China tilted toward intermediates and China's imports from the US containing a relatively larger share of consumer goods. The model employed for the analysis in this study accounts for this heterogeneity by allowing differentiated trade elasticities across intermediate and final goods, thereby capturing their distinct responses to tariff shocks.

Fact 3: US–China bilateral trade shares declined sharply between 2017 and 2024.

Bilateral trade between the US and China contracted markedly in the aftermath of successive tariff increases. As shown in Table 1, China's share of total US intermediate goods imports fell from 22.1 percent in 2017 to 12.6 percent by 2024 and its share of US consumer goods imports declined from 31.6 percent to 21.2 percent. On the other side, China's reliance on US imports also weakened: the US share of China's intermediate goods imports fell from 7.8 percent to 6.1 percent, and the share of consumer goods fell from 8.9 percent to 8.0 percent over the same period.

These bilateral contractions in trade reflect the reorientation of global trade patterns in response to tariff shocks and are consistent with the trade diversion effects captured in the general equilibrium simulations. The subsequent sections build on these shifts to evaluate counterfactual scenarios of tariff escalation and policy responses.

Table 1. Change in import shares between the US and China

Year	US share of imports from China (%)		China's share of imports from the US (%)	
	Intermediate goods	Consumer goods	Intermediate goods	Consumer goods
2017	22.1	31.6	7.8	8.9
2018	21.6	31.4	6.9	8.1
2019	18.0	27.7	5.6	7.0
2020	18.2	27.1	6.2	7.6
2021	17.5	25.9	6.3	8.2
2022	16.0	24.6	6.2	8.0
2023	13.6	21.5	6.1	8.0
2024	12.6	21.2	6.1	8.0

Sources: Authors' calculations based on the data from the Chinese Customs Office and USITC.

Fact 4: Tariff shocks have diverted trade toward third countries.

The imposition of tariffs has triggered a reallocation of trade flows toward third-country markets. On the US side, imports have shifted away from China and toward alternative suppliers such as Vietnam, Mexico, and Chinese Taiwan province. Panel A of Table 2 shows that from 2017 to 2024, China's share of US intermediate goods imports declined by 9.3 percentage points while imports from Chinese Taiwan

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province and Vietnam increased by 2.5 percentage points each. For final goods, China's share fell by 10.4 percentage points, with Vietnam and Mexico gaining 2.4 and 1.9 percentage points, respectively.

On the export side, China reoriented trade away from the US toward new markets. As shown in Panel B of Table 2, the US share of China's intermediate goods exports declined by 4.6 percentage points, while exports to Vietnam and Russia rose by 1.8 and 1.5 percentage points. For final goods, the US share dropped by 2.4 percentage points, offset by gains to Malaysia (1.4 percentage points) and Mexico (1.3 percentage points).

These patterns of trade diversion underscore a central mechanism of this study's analysis: as tariffs disrupt bilateral flows, trade is rerouted through third countries.

Table 2. Top 10 regions with the largest increase in trade market share (2017–2024)

Panel A: Top 10 regions with the largest increase in US import (change of the market share)			
Country/region	Intermediate goods	Country/region	Consumer goods
Chinese Taiwan province	2.5	Vietnam	2.4
Vietnam	2.5	Mexico	1.9
Ireland	1.8	Canada	0.9
Mexico	1.7	South Korea	0.9
Thailand	0.9	Singapore	0.8
Canada	0.8	Italy	0.8
India	0.7	India	0.7
Switzerland	0.7	Cambodia	0.7
Singapore	0.5	Slovenia	0.7
South Korea	0.3	Hungary	0.6
China	–9.3	China	–10.4
Panel B: Top 10 regions with the largest increase in China's export (change of the market share)			
Country	Intermediate goods	Country	Consumer goods
Vietnam	1.8	Malaysia	1.4
Russia	1.5	Mexico	1.3
Indonesia	0.8	Singapore	0.9
Brazil	0.8	Thailand	0.8
Mexico	0.7	Kyrgyz Republic	0.7
India	0.7	Kazakhstan	0.6
United Arab Emirates	0.7	Poland	0.5
Malaysia	0.7	Vietnam	0.5
Saudi Arabia	0.7	Brazil	0.5
Thailand	0.6	Indonesia	0.4
US	–4.6	US	–2.4

Sources: Authors' calculations based on data from the Chinese Customs Office and USITC.

III. Model

Building on the standard Armington framework (Armington, 1969; Caliendo and Parro, 2015), this study developed a multicountry, multisector general equilibrium model with IO linkages to capture trade in intermediate goods. The model extended Caliendo and Parro (2015) along two key dimensions. First, it adopted a constant elasticity of substitution (CES) production structure rather than the Cobb–Douglas formulation used in the original Caliendo and Parro model. This specification provides greater flexibility in capturing substitution patterns across inputs and allows for more general equilibrium interactions. Second, motivated by the empirical patterns documented in Section II, this study explicitly distinguished between intermediate and final goods by introducing separate trade elasticities for each. This extension is crucial for analyzing the asymmetric effects of tariff shocks, particularly given the structural differences between US and Chinese trade portfolios.

1. Model setup

(1) Households

There are N countries indexed by i, n, m, and J sectors indexed by k, j. Each country produced a distinct variety in each sector. It was assumed that the representative agent in each country has Cobb–Douglas preferences over final composite goods from different sectors. Within each sector, preferences over varieties from different countries follow a CES structure, and the composite final good j in country n is then aggregated across varieties of sector j from all countries, as given by

$$Q_n^{j,F} = \left(\sum_{i=1}^{N} \left(q_{in}^{j} \right)^{\frac{\sigma^j - 1}{\sigma^j}} \right)^{\frac{\sigma^j}{\sigma^j - 1}}, \tag{1}$$

where q_{in}^{j} denotes the quantity of variety j produced by country i and consumed in country n. The parameter $\sigma^j > 1$ is the elasticity of substitution across varieties. The price index of the composite final goods is given by

$$P_n^{j,F} = \left(\sum_{i=1}^{N} \left(p_{in}^{j} \right)^{1-\sigma^j} \right)^{\frac{1}{1-\sigma^j}}. \tag{2}$$

Table 3 provides descriptions of the model's variables and key parameters. Appendix A1 derives the representative consumer's demand function and the final goods price index.

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(2) Firms

Firms utilize labor and composite intermediate goods (also referred to as materials) from all sectors to produce the varieties. It was assumed that production exhibits constant returns to scale and markets are perfectly competitive. Each country *i* is endowed with L_i units of labor, which was supplied inelastically and was perfectly mobile across sectors. Firms in country *i* sector *j* produced a distinct variety. It was assumed that the product function is nested CES,[4] with the elasticity of substitution between labor and materials denoted by η. Then the unit input cost can be expressed as a nested CES aggregation form given by

$$C_i^j = \left[\psi_i^j w_i^{1-\eta} + \sum\nolimits_{k=1} \psi_i^{kj} \left(p_i^{k,I} \right)^{1-\eta} \right]^{\frac{1}{1-\eta}}, \tag{3}$$

$$p_i^{k,I} = \left(\sum\nolimits_{n=1}^{N} \left(p_{ni}^{k} \right)^{1-\theta^k} \right)^{\frac{1}{1-\theta^k}}, \tag{4}$$

where and ψ_i^j are ψ_i^{kj} the labor weights and material weights varying by sector and country; w_i denotes the wage rate of in country *i*, and $p_i^{k,I}$ is the price of composite intermediate goods from sector *k*. Let γ_i^j denote the labor share, representing the share of labor costs in the total production costs; and $\gamma_i^{k,j}$ is the cost share of intermediate inputs, defined as the cost share of inputs from sector *k* in the total production cost of variety *j* in country *i*. The cost minimization condition implies that

$$\gamma_i^j = \frac{\psi_i^j w_i^{1-\eta}}{\left(c_i^j \right)^{1-\eta}}; \gamma_i^{k,j} = \frac{\psi_i^{kj} \left(p_i^{k,I} \right)^{1-\eta}}{\left(c_i^j \right)^{1-\eta}}. \tag{5}$$

The model outlined in this study, in comparison with that of Caliendo and Parro (2015), distinguishes between the elasticity of substitution for composite final goods and composite intermediate goods (i.e., σ^j and θ^j), which helps to capture the differences in production and trade between intermediate and final goods.

(3) International trade costs

Trade in goods is costly. Two types of trade costs were distinguished: iceberg trade costs and *ad valorem* flat-rate tariffs. Iceberg costs are measured in physical units, meaning that a unit of tradeable goods in sector *j* shipped from country *i* to country *n* requires the production of $d_{in}^j \geqslant 1$ units in country *i*, with $d_{in}^j = 1$. Goods imported by country *n* from country *i* are also subject to an *ad valorem* tariff τ_{in}^j applicable over unit prices. Combining both trade costs, the price p_{in}^j can be expressed as:

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[4] Appendix A1 details the production functions of the firms.

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$$p_{in}^{j} = \left(1 + \tau_{in}^{j}\right) d_{in}^{j} c_{i}^{j} / A_{i}^{j}. \tag{6}$$

Let $\kappa_{in}^{j} = (1 + \tau_{in}^{j})d_{in}$, where $\kappa_{in}^{j} > 1$ for $i \neq n$ and $\kappa_{ii}^{j} = 1$. Tariff revenues are assumed to be redistributed equally to the workers of a country on a lump-sum basis.

(4) Expenditure share

The expenditure share of final goods from country *i* sector *j* is given by $\pi_{in}^{j,F} = X_{in}^{i,F} / X_{n}^{j,F}$, where $X_{in}^{j,F}$ denotes the expenditure on final goods in country *n* from country *i* sector *j*, and $X_{n}^{j,F}$ is the total expenditure on final goods in country *n* for sector *j*. Similarly, the expenditure share of intermediate goods from country *i* sector *j* is given by $\pi_{in}^{j,I} = X_{in}^{i,I} / X_{n}^{j,I}$, where $X_{in}^{j,I}$ represents the expenditure on intermediate goods in country *n* from country *i* sector *j*, and $X_{n}^{j,I}$ is the total expenditure on intermediate goods in country *n* for sector *j*. Both the composite final goods and composite intermediate goods follow a CES aggregation, as follows:

$$\pi_{in}^{j,F} = \frac{\left(k_{in}^{j} c_{i}^{j} / A_{i}^{j}\right)^{1-\sigma^{j}}}{\sum_{m=1}^{N} \left(k_{mn}^{j} c_{m}^{j} / A_{m}^{j}\right)^{1-\sigma^{j}}}, \pi_{in}^{j,I} = \frac{\left(k_{in}^{j} c_{i}^{j} / A_{i}^{j}\right)^{1-\sigma^{j}}}{\sum_{m=1}^{N} \left(k_{mn}^{j} c_{m}^{j} / A_{m}^{j}\right)^{1-\sigma^{j}}}. \tag{7}$$

As Equation (7) shows, it is possible to distinguish between bilateral trade shares of intermediate goods, $\pi_{in}^{j,I}$, and final goods, $\pi_{in}^{j,F}$, with both taking the form of a multisector version of a gravity equation. An increase in tariffs has a direct effect on trade shares via κ_{in}^{j} by raising the relative costs of importing intermediate and final goods. The indirect effect arises through the input cost c_{i}^{j}, which captures all the relevant information contained in the IO tables.

Table 3. Descriptions of variables and key parameters

Variable	Description
q_{in}^{j}	Quantity of variety *j* produced by country *i* and consumed in country *n*
I_n	Final absorption in country *n*
$Q_{n}^{j,F}$	Composite final good *j* in country *n*
$Q_{i}^{kj,I}$	Composite intermediate input from sector *k* used for the production of variety *j* in country *i*
p_{in}^{j}	Price of variety *j* produced by country *i* and consumed in country *n*
$P_{n}^{j,F}$	Price index of the composite final goods *j* in country *n*
$P_{i}^{k,I}$	Price index of the composite intermediate goods *k* in country *i*
A_{i}^{j}	Constant productivity in country *i* sector *j*
L_i	Labor supply in country *i*
w_i	Wage rate in country *i*
c_{i}^{j}	Unit input cost of variety *j* in country *i*

(Continued on the next page)

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(Table 3 continued)

Variable	Description
d_{in}^{j}	Iceberg costs, meaning that shipping 1 unit of tradable good *j* from country *i* to country *n* requires producing $d_{in}^{j} \geqslant 1$ units in country *i*
τ_{in}^{j}	*Ad valorem* tariff imposed by country *n* on imports of variety *j* from country *i*
$\pi_{in}^{j,F}$	Expenditure share of country *n* on final goods from country *i* sector *j*
$\pi_{in}^{j,I}$	Expenditure share of country *n* on intermediate goods from country *i* sector *j*
$X_{in}^{j,F}$	Expenditure on final goods in country *n* from country *i* sector *j*
$X_{in}^{j,I}$	Expenditure on intermediate goods in country *n* from country *i* sector *j*
$X_{n}^{j,F}$	Total expenditure on final goods in country *n* for sector *j*
$X_{n}^{j,I}$	Total expenditure on intermediate goods in country *n* for sector *j*
Key parameters	
σ^{j}	Elasticity of substitution for composite final goods in sector *j*
θ^{j}	Elasticity of substitution for composite intermediate goods in sector *j*
η	Elasticity of substitution between labor and materials
γ_{i}^{j}	Share of labor input in the gross output of sector *j* in country *i*
$\gamma_{i}^{k,j}$	Share of intermediate input from sector *k* in the gross output of sector *j* in country *i*

Note: This table presents descriptions of the variables and key parameters in the model.

2. Equilibrium

X_{in}^{j} denotes the total expenditure of country *n* on goods *j* from country *i*, comprising household expenditure on final composite goods ($X_{in}^{j,F}$) and firms' expenditure on composite intermediate goods ($X_{in}^{j,I}$). The goods market-clearing condition implies:

$$X_{n}^{j,I} = \sum\nolimits_{k=1}^{J} \gamma_{n}^{jk} \sum\nolimits_{i=1}^{N} \frac{X_{ni}^{k}}{1+\tau_{ni}^{k}}, X_{n}^{j,F} = \alpha_{n}^{j} I_{n}, \tag{8}$$

where $X_{ni}^{k} = X_{ni}^{k,F} + X_{ni}^{k,I} = \pi_{ni}^{k,F} X_{i}^{k,F} + \pi_{ni}^{k,I} X_{i}^{k,I}, I_{n} = w_{n} L_{n} + \sum\nolimits_{j=1}^{J} \sum\nolimits_{i=1}^{N} \tau_{in}^{j} X_{in}^{j} / (1+\tau_{in}^{j})$ represents final absorption in country *n*.

Finally, labor market clearing implies:

$$w_{i} L_{i} = \sum\nolimits_{j=1}^{J} \gamma_{i}^{j} \sum\nolimits_{n=1}^{N} \frac{X_{in}^{j}}{1+\tau_{in}^{j}}. \tag{9}$$

Given L_n, A_i^j, d_{in}^j, and τ_{in}^j, an equilibrium is a wage vector $w \in R_{++}^{N}$, price index of final composite goods $\{P_{i}^{j,F}\}_{i \in N, j \in J}$, and price index of intermediate composite goods $\{P_{i}^{j,I}\}_{i \in N, j \in J}$ that satisfy Equations (2), (4)–(9) for all *j*, *i*.

3. Data and calibration

The exact hat algebra method (Dekle et al., 2008) was used to solve the equilibrium in relative changes (Appendix A2). A key advantage of this method is that it does not require estimating every technological parameter (e.g., A_i^j, L_n) and minimizing the data requirements to calibrate the model. To quantify the impact of escalating US–China trade conflict, the required data are tariff level and tariff changes ($\tau_{in}^j, \hat{\tau}_{in}^j$), cost share ($\gamma_i^j, \gamma_i^{k,j}$), consumption share (α_n^j), beginning-of-period expenditure $X_{in}^{j,I}, X_{in}^{j,F}$, and the Armington elasticities σ^j and θ^j. All variables, except for σ^j and θ^j could be observed directly from the tariff data and inter-country IO (ICIO) tables.

(1) Inter-country input–output tables

The quantitative model was calibrated using the 2020 OECD ICIO Tables (OECD 2023 edition).[5] To simplify the analysis and capture key global economic interactions, the data were aggregated to a world with 13 major economies: Australia, ASEAN countries, Brazil, Canada, China, Chinese Taiwan province, EU, India, Japan, Mexico, South Korea, the US, and the rest of the world (ROW). Using the OECD ICIO database, internationally comparable data on country-sector production, value-added, bilateral trade flows, and IO linkages were extracted. The parameters α_n^j and γ_n^{jk}, as well as expenditure X_{in}^j were derived directly from the ICIO tables.

(2) Tariff data

The study used Most Favored Nation tariff data from 2020, sourced from the World Integrated Trade Solution (WITS). Between 2018 to 2019, the US imposed seven rounds of tariffs on China, and China implemented corresponding countermeasures, imposing six rounds of retaliatory tariffs on the US.[6] Although a Phase One Agreement was reached between the US and China in January 2020, most of these tariffs were not removed. To estimate the impact of potential future US tariff increases from this, it was also necessary to account for the tariffs imposed during the 2018–2019 US–China trade conflict. The additional tariffs introduced during the trade conflict were obtained from the US International Trade Commission (USITC) and Tariff Policy Commission of the State Council of China. The tariff data were harmonized with the IO data by mapping HS 6-digit product codes in the tariff dataset to 2-digit ISIC Revision 4 codes used in the IO data. Subsequently, using

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[5] The original dataset included 45 industries and 77 countries. For this study, the data were aggregated into 13 economies and 41 industries, comprising 19 tradable and 22 nontradable sectors. The aggregation combined two agricultural sectors – "agriculture, hunting, forestry" and "fishing and aquaculture" – and three mining sectors – "mining and quarrying, energy producing products," "mining and quarrying, nonenergy producing products," and "mining support service activities." The final category, "activities of households as employers; undifferentiated goods- and services-producing activities of households for own use," is excluded due to the large number of zero observations.

[6] Ma and Ning (2024) provided a detailed review of the timeline and tariff rates associated with each round of tariff impositions.

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the import value of each HS 6-digit product from the corresponding country as weights, the weighted average tariffs were calculated for 13 economies and 41 industries.

(3) Elasticities

Following the literature, the elasticity of substitution between labor and intermediate inputs (η) was assumed to be 0.5 (Baqaee and Farhi, 2024). For elasticity of substitution across varieties (σ^j, θ^j), the estimates provided by Broda and Weinstein (2006) were used, aggregated to intermediate inputs and final goods based on the BEC classification for each industry. The median elasticity of substitution across industries for final goods (σ^j) was 5.87, and that for intermediate inputs (θ^j) was 8.56.[7] With these elasticities, the exact hat algebra approach was used to solve the model.

IV. Quantitative analysis

Using the trade elasticities, the analysis quantified the trade and welfare effects of potential future increases in US tariffs on China or other countries.

1. Counterfactual scenarios

Since the beginning of 2025, US trade policy has undergone a series of significant adjustments, which have further escalated trade tensions with China and affected other major trading partners.

Throughout February and March 2025, the US imposed additional tariffs of 10 percent on all Chinese imports in each month, citing issues such as fentanyl, resulting in a cumulative increase of 20 percent in new tariffs on Chinese goods. On April 2, 2025, President Trump declared “Liberation Day” and announced the implementation of “reciprocal tariffs,” which aimed to reduce the US trade deficit by setting a baseline 10 percent tariff on imports from all countries. As part of this policy, differentiated tariffs were imposed based on each country’s trade surplus with the US. China faced a reciprocal tariff rate of 34 percent, which was raised several times within just a few days, peaking at 125 percent on April 10. Until the joint statement of the China–US Geneva economic and trade talks on May 12 and the subsequent China–US tariff adjustment on May 14, the US reciprocal tariff on China was reduced to 10 percent, and another 24 percent reciprocal tariff was suspended for 90 days.

The US also introduced tariff measures targeting its North American partners. On January 20, 2025, President Trump announced a 25 percent tariff on imports from Canada

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[7] Table B1 in the Appendix provides the elasticities of substitution for each sector in detail.

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and Mexico, which came into effect on March 4, 2025. Importantly, products that qualified under the US−Mexico−Canada agreement were exempt from these tariffs. Canada and Mexico were excluded from the reciprocal tariff policy introduced on "Liberation Day."

The transition from Trump 1.0 to 2.0 tariffs represents a shift in both the scope and targeting of US trade policy. One of the key differences is the broader national coverage under Trump 2.0. Trump 1.0 primarily targeted China but the new tariffs expanded to include all other trade partners. Another key difference is that whereas Trump 1.0 tariffs often targeted specific products or industries, the tariffs under Trump 2.0 are more generalized, typically taking the form of a uniform tariff across a broad range of goods. This broader and less specific application may lead to greater economic distortions and disruptions in global supply chains.

To assess the potential impacts of these policies, three scenarios were defined along two dimensions. The first dimension was tariff rates, comprising a potential 30 percent import tariff on China,[8] and a potential 54 percent tariff, which reflects the lifting of the 90-day pause in escalation and the imposition of an additional 24 percent in duties. The second dimension was the scope of the tariffs, indicating whether they applied solely to China or extended to other trading partners.

These three scenarios are summarized in Table 4. Scenarios 1 and 2 only considered the US imposing additional tariffs on China, while scenario 3 considered the broader US tariff increases on all countries. The three scenarios are as follows: (i) scenario 1 − the US imposes a 30 percent additional tariff on all imports from China; (ii) scenario 2 − the US imposes a 54 percent additional tariff on imports from China; (iii) scenario 3 − the US imposes a 30 percent additional tariff on all imports from China, a 25 percent additional tariff on all imports from Canada and Mexico, and a 10 percent additional tariff on imports from all other countries.

Table 4. The three counterfactual scenarios for quantitative analysis

Scenario	Description
Scenario 1	The US imposes a 30% additional tariff on China
Scenario 2	The US imposes a 54% additional tariff on China
Scenario 3	The US imposes a 30% additional tariff on China, 25% on Canada and Mexico, and 10% on imports from all other countries

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[8] On February 4 and March 4, 2025, the US imposed two consecutive rounds of additional 10 percent tariffs on all Chinese imports. As of May 14, 2025, the reciprocal tariff rate on Chinese goods was reduced to 10 percent. Overall, the new tariffs imposed on Chinese imports by the US in 2025 amounted to approximately 30 percent as of May 14. Accounting for tariff exemptions and Section 232 tariffs, the effective tariff rates were calculated and the corresponding welfare effects quantified. Table 9 and Table B4 in the Appendix provide details.

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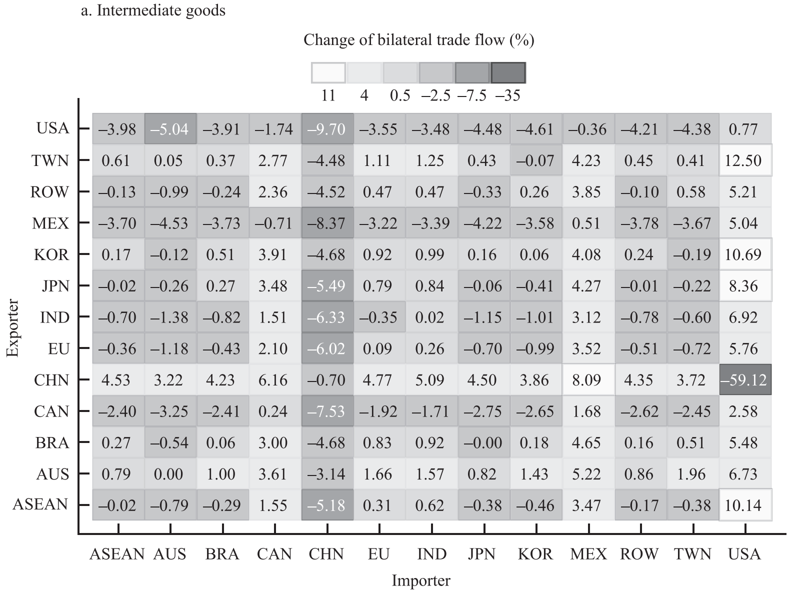
2. Trade flow reallocation

Figure 3 illustrates the change in bilateral trade flows under the counterfactual scenario of a 30 percent additional US tariff on Chinese imports, distinguishing between intermediate and final goods. As shown in Figure 3a, China's intermediate goods exports to the US decline significantly by approximately 59.1 percent, with a portion of these exports being redirected to third countries. The largest increases are seen in exports to Mexico (+8.1 percent) and Canada (+6.2 percent), reflecting a trade diversion effect. As for US imports, the shift from China to alternative sources is evident, with increased imports of intermediate goods from Chinese Taiwan province (+12.5 percent), South Korea (+10.7 percent), and ASEAN (+10.1 percent). In terms of final goods, China's exports to the US drop by 52.7 percent, but its exports to Mexico (+4.7 percent) and Canada (+4.2 percent) increase. Meanwhile, the US increases its final goods imports from ASEAN by 14.2 percent, marking the largest increase among the regions.

Figure 4 presents the trade effects for scenario 2, in which the US imposes an additional 54 percent tariff on imports from China. The resulting trade pattern changes are similar to those observed in scenario 1; however, the higher tariff leads to a pronounced decline in China's exports to the US, with intermediate goods falling by 72.0 percent and final goods by 67.9 percent. Some of China's exports shift to other economies, particularly Mexico, Canada, and India. The US imports shift from the Chinese mainland to Chinese Taiwan province, South Korea, ASEAN, and other economies.

Figure 3. The effect on trade flow under scenario 1



a. Intermediate goods

	ASEAN	AUS	BRA	CAN	CHN	EU	IND	JPN	KOR	MEX	ROW	TWN	USA
USA	–3.98	–5.04	–3.91	–1.74	–9.70	–3.55	–3.48	–4.48	–4.61	–0.36	–4.21	–4.38	0.77
TWN	0.61	0.05	0.37	2.77	–4.48	1.11	1.25	0.43	–0.07	4.23	0.45	0.41	12.50
ROW	–0.13	–0.99	–0.24	2.36	–4.52	0.47	0.47	–0.33	0.26	3.85	–0.10	0.58	5.21
MEX	–3.70	–4.53	–3.73	–0.71	–8.37	–3.22	–3.39	–4.22	–3.58	0.51	–3.78	–3.67	5.04
KOR	0.17	–0.12	0.51	3.91	–4.68	0.92	0.99	0.16	0.06	4.08	0.24	–0.19	10.69
JPN	–0.02	–0.26	0.27	3.48	–5.49	0.79	0.84	–0.06	–0.41	4.27	–0.01	–0.22	8.36
IND	–0.70	–1.38	–0.82	1.51	–6.33	–0.35	0.02	–1.15	–1.01	3.12	–0.78	–0.60	6.92
EU	–0.36	–1.18	–0.43	2.10	–6.02	0.09	0.26	–0.70	–0.99	3.52	–0.51	–0.72	5.76
CHN	4.53	3.22	4.23	6.16	–0.70	4.77	5.09	4.50	3.86	8.09	4.35	3.72	–59.12
CAN	–2.40	–3.25	–2.41	0.24	–7.53	–1.92	–1.71	–2.75	–2.65	1.68	–2.62	–2.45	2.58
BRA	0.27	–0.54	0.06	3.00	–4.68	0.83	0.92	–0.00	0.18	4.65	0.16	0.51	5.48
AUS	0.79	0.00	1.00	3.61	–3.14	1.66	1.57	0.82	1.43	5.22	0.86	1.96	6.73
ASEAN	–0.02	–0.79	–0.29	1.55	–5.18	0.31	0.62	–0.38	–0.46	3.47	–0.17	–0.38	10.14

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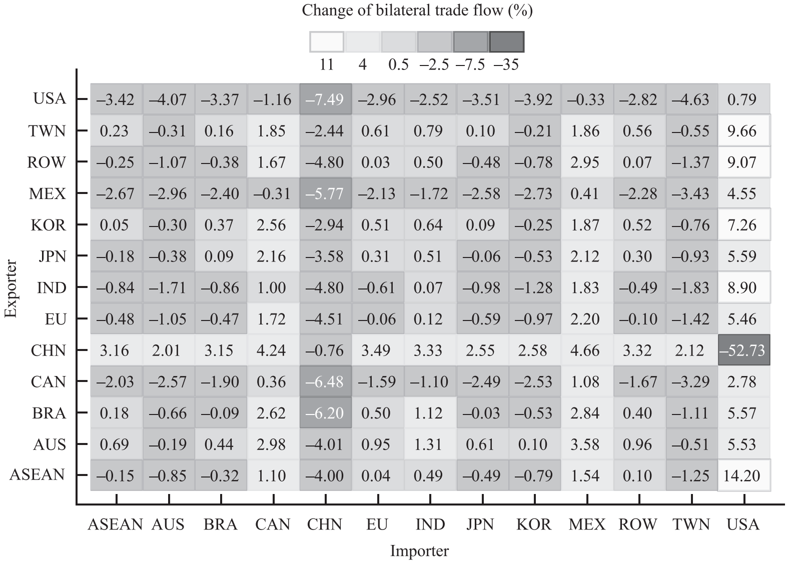


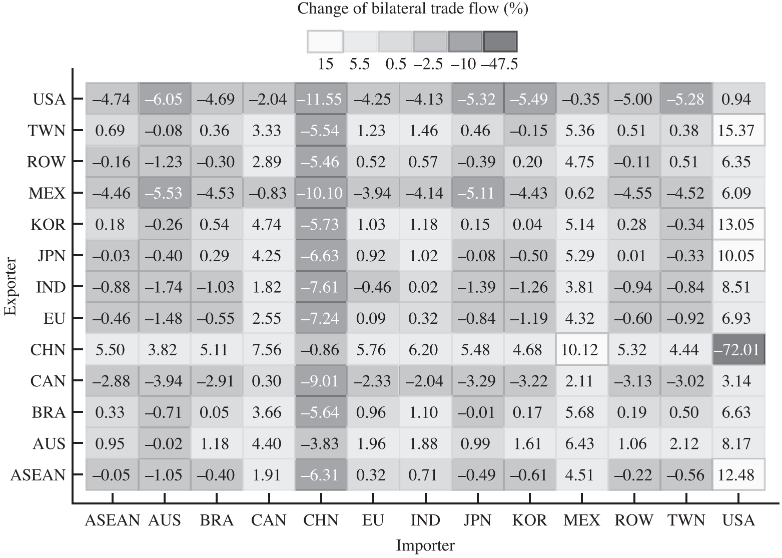
b. Final goods

	ASEAN	AUS	BRA	CAN	CHN	EU	IND	JPN	KOR	MEX	ROW	TWN	USA
USA	–3.42	–4.07	–3.37	–1.16	–7.49	–2.96	–2.52	–3.51	–3.92	–0.33	–2.82	–4.63	0.79
TWN	0.23	–0.31	0.16	1.85	–2.44	0.61	0.79	0.10	–0.21	1.86	0.56	–0.55	9.66
ROW	–0.25	–1.07	–0.38	1.67	–4.80	0.03	0.50	–0.48	–0.78	2.95	0.07	–1.37	9.07
MEX	–2.67	–2.96	–2.40	–0.31	–5.77	–2.13	–1.72	–2.58	–2.73	0.41	–2.28	–3.43	4.55
KOR	0.05	–0.30	0.37	2.56	–2.94	0.51	0.64	0.09	–0.25	1.87	0.52	–0.76	7.26
JPN	–0.18	–0.38	0.09	2.16	–3.58	0.31	0.51	–0.06	–0.53	2.12	0.30	–0.93	5.59
IND	–0.84	–1.71	–0.86	1.00	–4.80	–0.61	0.07	–0.98	–1.28	1.83	–0.49	–1.83	8.90
EU	–0.48	–1.05	–0.47	1.72	–4.51	–0.06	0.12	–0.59	–0.97	2.20	–0.10	–1.42	5.46
CHN	3.16	2.01	3.15	4.24	–0.76	3.49	3.33	2.55	2.58	4.66	3.32	2.12	–52.73
CAN	–2.03	–2.57	–1.90	0.36	–6.48	–1.59	–1.10	–2.49	–2.53	1.08	–1.67	–3.29	2.78
BRA	0.18	–0.66	–0.09	2.62	–6.20	0.50	1.12	–0.03	–0.53	2.84	0.40	–1.11	5.57
AUS	0.69	–0.19	0.44	2.98	–4.01	0.95	1.31	0.61	0.10	3.58	0.96	–0.51	5.53
ASEAN	–0.15	–0.85	–0.32	1.10	–4.00	0.04	0.49	–0.49	–0.79	1.54	0.10	–1.25	14.20

Sources: Authors' calculations based on OECD-ICIO (2020) and WITS.

Notes: This figure illustrates the changes in bilateral trade flows under scenario 1, where the US imposes a 30 percent additional tariff on China. Country/region names in the figure are abbreviations using ISO country codes. ROW, the rest of the world.

Figure 4. The effect on trade flow under scenario 2



a. Intermediate goods

	ASEAN	AUS	BRA	CAN	CHN	EU	IND	JPN	KOR	MEX	ROW	TWN	USA
USA	–4.74	–6.05	–4.69	–2.04	–11.55	–4.25	–4.13	–5.32	–5.49	–0.35	–5.00	–5.28	0.94
TWN	0.69	–0.08	0.36	3.33	–5.54	1.23	1.46	0.46	–0.15	5.36	0.51	0.38	15.37
ROW	–0.16	–1.23	–0.30	2.89	–5.46	0.52	0.57	–0.39	0.20	4.75	–0.11	0.51	6.35
MEX	–4.46	–5.53	–4.53	–0.83	–10.10	–3.94	–4.14	–5.11	–4.43	0.62	–4.55	–4.52	6.09
KOR	0.18	–0.26	0.54	4.74	–5.73	1.03	1.18	0.15	0.04	5.14	0.28	–0.34	13.05
JPN	–0.03	–0.40	0.29	4.25	–6.63	0.92	1.02	–0.08	–0.50	5.29	0.01	–0.33	10.05
IND	–0.88	–1.74	–1.03	1.82	–7.61	–0.46	0.02	–1.39	–1.26	3.81	–0.94	–0.84	8.51
EU	–0.46	–1.48	–0.55	2.55	–7.24	0.09	0.32	–0.84	–1.19	4.32	–0.60	–0.92	6.93
CHN	5.50	3.82	5.11	7.56	–0.86	5.76	6.20	5.48	4.68	10.12	5.32	4.44	–72.01
CAN	–2.88	–3.94	–2.91	0.30	–9.01	–2.33	–2.04	–3.29	–3.22	2.11	–3.13	–3.02	3.14
BRA	0.33	–0.71	0.05	3.66	–5.64	0.96	1.10	–0.01	0.17	5.68	0.19	0.50	6.63
AUS	0.95	–0.02	1.18	4.40	–3.83	1.96	1.88	0.99	1.61	6.43	1.06	2.12	8.17
ASEAN	–0.05	–1.05	–0.40	1.91	–6.31	0.32	0.71	–0.49	–0.61	4.51	–0.22	–0.56	12.48

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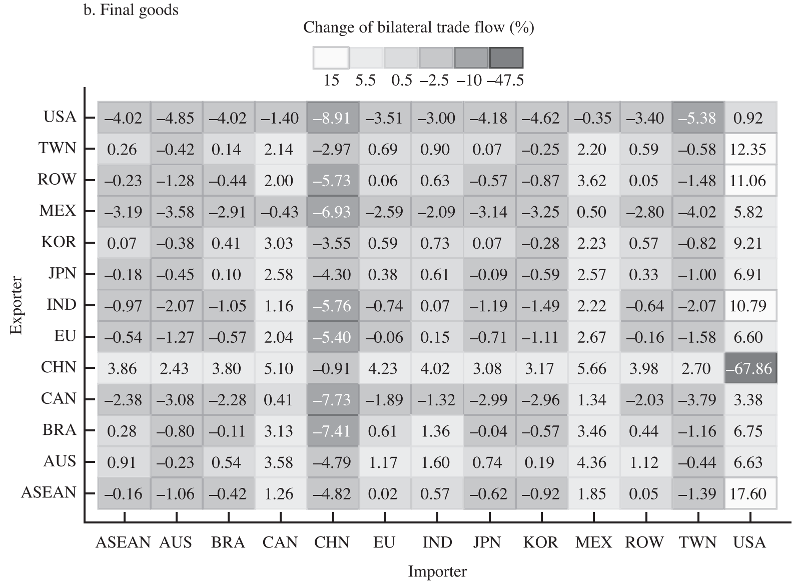

b. Final goods

	ASEAN	AUS	BRA	CAN	CHN	EU	IND	JPN	KOR	MEX	ROW	TWN	USA
USA	–4.02	–4.85	–4.02	–1.40	–8.91	–3.51	–3.00	–4.18	–4.62	–0.35	–3.40	–5.38	0.92
TWN	0.26	–0.42	0.14	2.14	–2.97	0.69	0.90	0.07	–0.25	2.20	0.59	–0.58	12.35
ROW	–0.23	–1.28	–0.44	2.00	–5.73	0.06	0.63	–0.57	–0.87	3.62	0.05	–1.48	11.06
MEX	–3.19	–3.58	–2.91	–0.43	–6.93	–2.59	–2.09	–3.14	–3.25	0.50	–2.80	–4.02	5.82
KOR	0.07	–0.38	0.41	3.03	–3.55	0.59	0.73	0.07	–0.28	2.23	0.57	–0.82	9.21
JPN	–0.18	–0.45	0.10	2.58	–4.30	0.38	0.61	–0.09	–0.59	2.57	0.33	–1.00	6.91
IND	–0.97	–2.07	–1.05	1.16	–5.76	–0.74	0.07	–1.19	–1.49	2.22	–0.64	–2.07	10.79
EU	–0.54	–1.27	–0.57	2.04	–5.40	–0.06	0.15	–0.71	–1.11	2.67	–0.16	–1.58	6.60
CHN	3.86	2.43	3.80	5.10	–0.91	4.23	4.02	3.08	3.17	5.66	3.98	2.70	–67.86
CAN	–2.38	–3.08	–2.28	0.41	–7.73	–1.89	–1.32	–2.99	–2.96	1.34	–2.03	–3.79	3.38
BRA	0.28	–0.80	–0.11	3.13	–7.41	0.61	1.36	–0.04	–0.57	3.46	0.44	–1.16	6.75
AUS	0.91	–0.23	0.54	3.58	–4.79	1.17	1.60	0.74	0.19	4.36	1.12	–0.44	6.63
ASEAN	–0.16	–1.06	–0.42	1.26	–4.82	0.02	0.57	–0.62	–0.92	1.85	0.05	–1.39	17.60

Sources: Authors' calculations based on OECD-ICIO (2020) and WITS.

Notes: This figure illustrates the changes in bilateral trade flows under scenario 2, where a 54 percent additional tariff is imposed by the US on China. Country/region names in the figure are abbreviations using ISO country codes. ROW, the rest of the world.

However, if the US increases tariffs on imports from all countries, the trade pattern changes significantly. Figure 5 quantifies the impact of the US "Liberation Day" tariffs.[9] Specifically, it assumes that the US imposes an additional 30 percent tariff on imports from China, 25 percent on imports from Canada and Mexico, and 10 percent on imports from all other economies.

In this scenario, US imports decline sharply, particularly from China, Mexico, and Canada. China's exports of intermediate goods to Mexico and Canada also fall substantially – by 18.7 percent and 6.0 percent, respectively. This indicates that, unlike the scenarios where tariffs target only China, China's capacity to utilize Mexico and Canada as third-party re-export channels to the US is now significantly restricted. Moreover, both Mexico and Canada see not only a decrease in imports from China but also a sharp drop in imports from other economies. This may be attributed to higher US tariffs reducing their exports to the US, which in turn lowers their demand for imported intermediate goods.

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[9] The quantification of the "Liberation Day" tariffs also incorporates the US International Emergency Economic Powers Act tariffs imposed on China in February and March 2025 and the 25 percent tariffs imposed on Canada and Mexico in March 2025.

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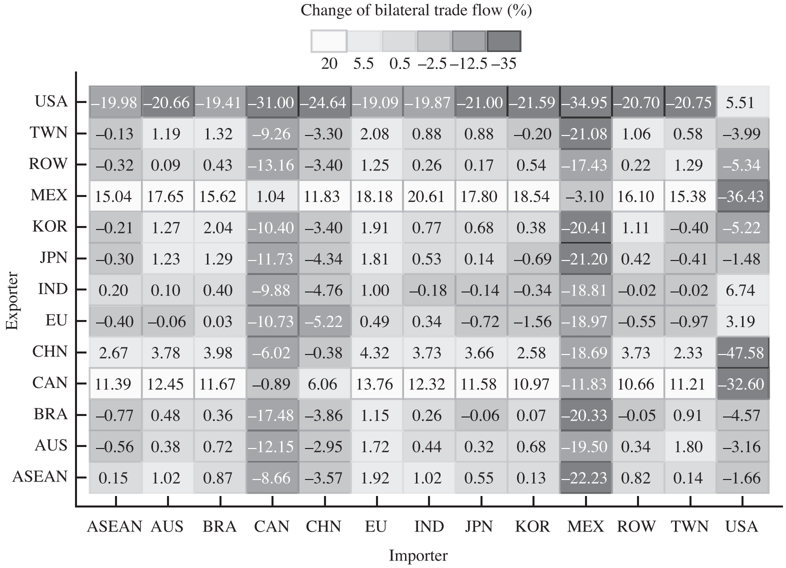
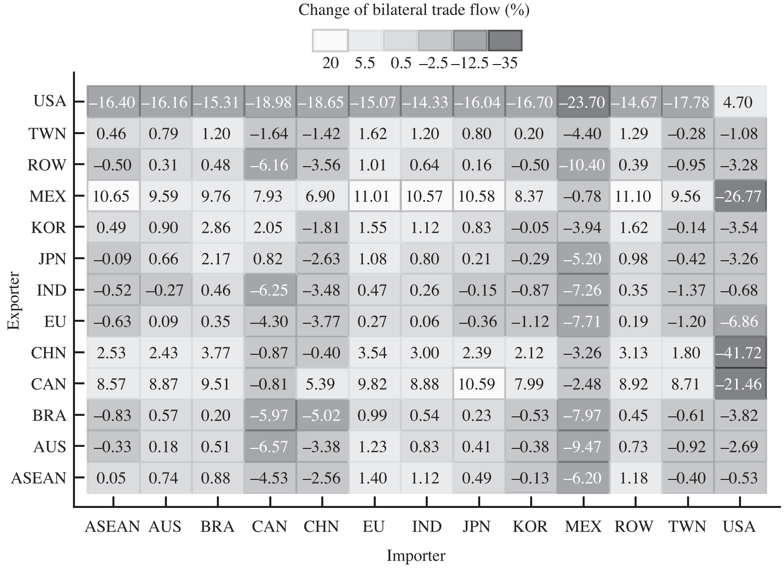
Figure 5. The effect on trade flow under scenario 3

a. Intermediate goods



	ASEAN	AUS	BRA	CAN	CHN	EU	IND	JPN	KOR	MEX	ROW	TWN	USA
USA	–19.98	–20.66	–19.41	–31.00	–24.64	–19.09	–19.87	–21.00	–21.59	–34.95	–20.70	–20.75	5.51
TWN	–0.13	1.19	1.32	–9.26	–3.30	2.08	0.88	0.88	–0.20	–21.08	1.06	0.58	–3.99
ROW	–0.32	0.09	0.43	–13.16	–3.40	1.25	0.26	0.17	0.54	–17.43	0.22	1.29	–5.34
MEX	15.04	17.65	15.62	1.04	11.83	18.18	20.61	17.80	18.54	–3.10	16.10	15.38	–36.43
KOR	–0.21	1.27	2.04	–10.40	–3.40	1.91	0.77	0.68	0.38	–20.41	1.11	–0.40	–5.22
JPN	–0.30	1.23	1.29	–11.73	–4.34	1.81	0.53	0.14	–0.69	–21.20	0.42	–0.41	–1.48
IND	0.20	0.10	0.40	–9.88	–4.76	1.00	–0.18	–0.14	–0.34	–18.81	–0.02	–0.02	6.74
EU	–0.40	–0.06	0.03	–10.73	–5.22	0.49	0.34	–0.72	–1.56	–18.97	–0.55	–0.97	3.19
CHN	2.67	3.78	3.98	–6.02	–0.38	4.32	3.73	3.66	2.58	–18.69	3.73	2.33	–47.58
CAN	11.39	12.45	11.67	–0.89	6.06	13.76	12.32	11.58	10.97	–11.83	10.66	11.21	–32.60
BRA	–0.77	0.48	0.36	–17.48	–3.86	1.15	0.26	–0.06	0.07	–20.33	–0.05	0.91	–4.57
AUS	–0.56	0.38	0.72	–12.15	–2.95	1.72	0.44	0.32	0.68	–19.50	0.34	1.80	–3.16
ASEAN	0.15	1.02	0.87	–8.66	–3.57	1.92	1.02	0.55	0.13	–22.23	0.82	0.14	–1.66

b. Final goods



	ASEAN	AUS	BRA	CAN	CHN	EU	IND	JPN	KOR	MEX	ROW	TWN	USA
USA	–16.40	–16.16	–15.31	–18.98	–18.65	–15.07	–14.33	–16.04	–16.70	–23.70	–14.67	–17.78	4.70
TWN	0.46	0.79	1.20	–1.64	–1.42	1.62	1.20	0.80	0.20	–4.40	1.29	–0.28	–1.08
ROW	–0.50	0.31	0.48	–6.16	–3.56	1.01	0.64	0.16	–0.50	–10.40	0.39	–0.95	–3.28
MEX	10.65	9.59	9.76	7.93	6.90	11.01	10.57	10.58	8.37	–0.78	11.10	9.56	–26.77
KOR	0.49	0.90	2.86	2.05	–1.81	1.55	1.12	0.83	–0.05	–3.94	1.62	–0.14	–3.54
JPN	–0.09	0.66	2.17	0.82	–2.63	1.08	0.80	0.21	–0.29	–5.20	0.98	–0.42	–3.26
IND	–0.52	–0.27	0.46	–6.25	–3.48	0.47	0.26	–0.15	–0.87	–7.26	0.35	–1.37	–0.68
EU	–0.63	0.09	0.35	–4.30	–3.77	0.27	0.06	–0.36	–1.12	–7.71	0.19	–1.20	–6.86
CHN	2.53	2.43	3.77	–0.87	–0.40	3.54	3.00	2.39	2.12	–3.26	3.13	1.80	–41.72
CAN	8.57	8.87	9.51	–0.81	5.39	9.82	8.88	10.59	7.99	–2.48	8.92	8.71	–21.46
BRA	–0.83	0.57	0.20	–5.97	–5.02	0.99	0.54	0.23	–0.53	–7.97	0.45	–0.61	–3.82
AUS	–0.33	0.18	0.51	–6.57	–3.38	1.23	0.83	0.41	–0.38	–9.47	0.73	–0.92	–2.69
ASEAN	0.05	0.74	0.88	–4.53	–2.56	1.40	1.12	0.49	–0.13	–6.20	1.18	–0.40	–0.53

Sources: Authors' calculations based on OECD-ICIO (2020) and WITS.

Notes: This figure illustrates the changes in bilateral trade flows under scenario 3, which involves a 30 percent additional tariff imposed by the US on China, a 25 percent additional tariff on Canada and Mexico, and a 10 percent additional tariff imposed on other economies. Country/region names in the figure are abbreviations using ISO country codes. ROW, the rest of the world.

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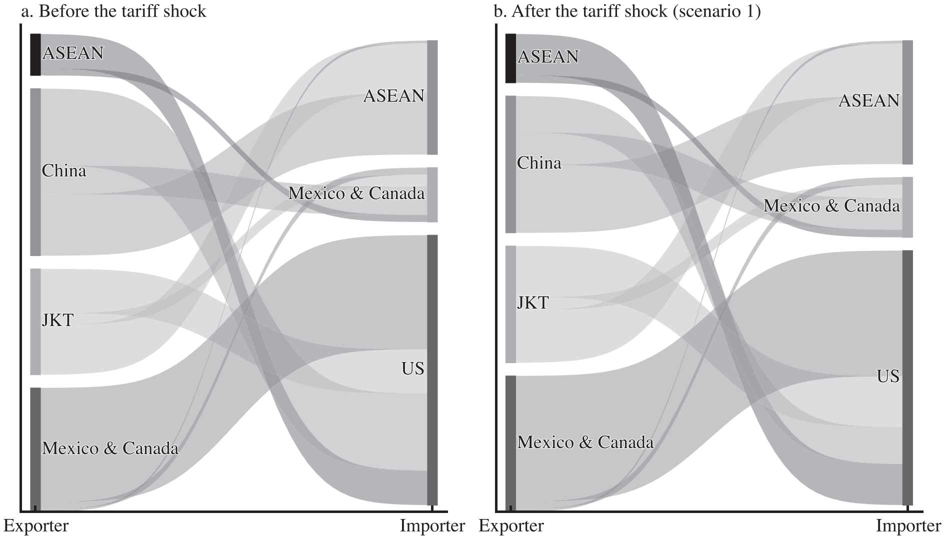
In addition to these changes in import patterns, the study found that US exports experience a substantial decline. One possible explanation is that higher tariffs reduce imports of intermediate goods, disrupting US upstream supply chains. This disruption limits the availability of critical inputs for downstream production and ultimately undermines US export capacity (Handley et al., 2025).

Figure 6 uses Sankey diagrams to illustrate changes in trade flows between major economies. Figure 6a depicts the trade flows between countries before trade friction, based on 2020 OECD-ICIO data used in the calibrated model. Figure 6b shows the import and export flows under scenario 1. Comparing Figures 6a and 6b reveals the reallocation of trade flows following the tariff shock. Consistent with Figure 3, it can be observed that US imports from China decrease significantly, whereas imports from regions such as the ASEAN economies, Canada, Chinese Taiwan province, Japan, Mexico, and South Korea increase. Figure B1 in the Appendix presents trade flows under scenarios 2 and 3. The changes in trade patterns observed in scenario 2 are similar to those in scenario 1. In scenario 3, however, US imports from Canada and Mexico also decline, aligning with the results shown in Figure 5.

Figure 6. The changes in trade flows


a. Before the tariff shock

b. After the tariff shock (scenario 1)

Sources: Authors' calculations based on OECD-ICIO (2020) and WITS.

Notes: This figure illustrates the bilateral trade flows before and after tariff shock under scenario 1. To highlight the trade pattern changes among major countries, Chinese Taiwan province, Japan, and South Korea have been grouped together (abbreviated as JKT). Only the trade flows of selected major economies are presented. For details on scenarios 2 and 3, see Figure B1 in the Appendix. For a comprehensive view of trade flows covering all economies, see Figure B2 in the Appendix.

3. Welfare effects

Welfare of the representative consumer in country n is denoted as I_n/P_n, where I_n represents the consumer's income, including both wages and tariff revenue, and P_n is the consumption price index. Consumers purchase final goods at the price $P_n^{j,F}$, and under Cobb–Douglas preferences, the consumer price index is defined as $P_n = \Pi_j \left(p_n^{j,F}/\alpha_n^j\right)^{\alpha_n^j}$.

Columns (1)–(3) in Table 5 present the welfare effects of unilateral tariffs. Specifically, column (1) illustrates the welfare impact of a 30 percent US additional tariff on Chinese imports, showing a welfare loss of 0.131 percent for China and 0.183 percent for the US. However, the tariff conflicts between the two largest economies may also benefit other regions, leading to welfare increases in Mexico (0.123 percent), the ASEAN economies (0.038 percent), and others. These welfare gains are likely driven by trade diversion, as shown in Figures 3a and 3b, where an increase in US imports from these countries as substitutes for imports from China may be observed. Column (2) examines the welfare impact of a 54 percent US additional tariff on Chinese imports. The welfare losses in this scenario are larger than those in scenario 1, with China experiencing a loss of 0.157 percent and the US facing a loss of 0.279 percent. Mexico enjoys the largest welfare gain, at 0.152 percent, followed by the ASEAN economies (0.049 percent).

Table 5. The welfare effects of different scenarios (change in welfare, %)

Region / Country	Scenario 1 China 30% (1)	Scenario 2 China 54% (2)	Scenario 3 "Liberation Day" tariffs (3)
Australia	–0.011	–0.014	–0.058
ASEAN	0.038	0.049	–0.110
Brazil	–0.007	–0.008	–0.095
Canada	0.029	0.035	–0.793
China	–0.131	–0.157	–0.151
Chinese Taiwan province	–0.048	–0.052	–0.228
EU	0.007	0.009	–0.056
India	0.037	0.046	–0.027
Japan	0.003	0.004	–0.059
Mexico	0.123	0.152	–1.195
South Korea	–0.007	–0.006	–0.151
US	–0.183	–0.279	–0.075
ROW	0.009	0.011	–0.073

Sources: Authors' calculations based on OECD-ICIO (2020) and WITS.

Notes: This table presents the welfare changes under three counterfactual scenarios; the welfare is defined as real income: I_n/P_n. ROW, the rest of the world.

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Column (3) reports the welfare losses under scenario 3, which assumes that the US imposes not only a 30 percent additional tariff on China but also a 25 percent tariff on imports from Canada and Mexico, and a 10 percent tariff on all other economies. In this scenario, all countries experience welfare losses, with particularly pronounced declines for Mexico, Canada, and Chinese Taiwan province, whose welfare decrease by 1.195 percent, 0.793 percent, and 0.228 percent, respectively.

Welfare changes were also decomposed following the approach of Caliendo and Parro (2015), dividing welfare impacts into two components: terms of trade effects and volume of trade effects.[10] Terms of trade effects capture the impact of tariff changes on the relative prices of a country's exports and imports, and their subsequent effect on welfare. An improvement in terms of trade – where export prices rise relative to import prices – boosts trade revenues and enhances welfare, whereas a deterioration in terms of trade – where export prices fall – reduces welfare. In contrast, volume of trade effects reflect how tariff changes influence the volume of trade and the resulting changes in real income. Lower tariffs that increase trade volumes lead to higher real income and improved welfare, whereas higher tariffs that suppress trade volumes reduce real income and harm welfare.

As shown in Panel A of Table 6, China's welfare loss is primarily driven by the terms of trade deterioration, which accounts for approximately 80 percent of the total welfare decline. In contrast, as presented in Panel B of Table 6, the welfare change in the US is mainly attributed to the reduction in trade volume. The US experiences

Table 6. Welfare decomposition for China and the US (%)

Welfare decomposition	Scenario 1 China 30% (1)	Scenario 2 China 54% (2)	Scenario 3 "Liberation Day" tariffs (3)
Panel A: China			
Welfare change	–0.131	–0.157	–0.151
Terms of trade effects	–0.109	–0.130	–0.115
Volume of trade effects	–0.022	–0.027	–0.036
Panel B: US			
Welfare change	–0.183	–0.279	–0.075
Terms of trade effects	0.052	0.053	0.129
Volume of trade effects	–0.235	–0.332	–0.204

Sources: Authors' calculations based on OECD-ICIO (2020) and WITS.
Note: This table shows welfare decomposition for China and the US.

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[10] Due to a small decomposition error, the sum of the two effects may not exactly equal the total welfare change. In this paper, the residual is distributed proportionally across the two components.

an improvement in terms of trade (i.e., cheaper imported goods and more expensive exported goods) but this gain is insufficient to offset the overall welfare loss caused by the declining trade volume.

4. Other economic outcomes

Table 7 summarizes the impacts on other economic variables including percentage changes in total output, value added, real wages, price index, exports, and imports. As Panel A of Table 7 shows, scenario 2 results in the most significant overall economic impact on China, with total output declining by 1.24 percent and value added decreasing by 1 percent. However, due to a decline in the price index and deflationary effects, the reduction in real wages is relatively smaller, at 0.13 percent. In terms of trade, the total imports of China drop sharply by 6.25 percent, while exports decline by 6.68 percent.

Table 7. The changes in other economic outcomes (%)

Outcome	Scenario 1 China 30% (1)	Scenario 2 China 54% (2)	Scenario 3 “Liberation Day” tariffs (3)
Panel A: China			
Total output	–1.001	–1.242	–0.658
Value added	–0.827	–1.003	–0.480
Real wages	–0.111	–0.133	–0.117
Price index	–0.716	–0.870	–0.363
Exports	–5.206	–6.682	–4.768
Imports	–5.180	–6.248	–5.205
Panel B: US			
Total output	0.513	0.604	3.473
Value added	0.496	0.581	3.103
Real wages	–0.154	–0.199	–0.496
Price index	0.651	0.782	3.617
Exports	–3.642	–4.333	–20.540
Imports	–3.761	–4.899	–15.857

Sources: Authors’ calculations based on OECD-ICIO (2020) and WITS.

Note: This table shows other economic outcomes for China and the US, including total output, value added, real wages, price index, exports, and imports.

For the US, as shown in Panel B of Table 7, unilateral tariffs on China lead to a slight increase in its nominal output and value added. However, due to a rise in the price index and inflationary pressures, its real wages decline. The largest decrease in

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real wages occurs under scenario 3, falling by 0.5 percent, which coincides with the largest increase in the price index, rising by 3.6 percent. In this scenario, the US also experiences the most significant reductions in trade, with imports and exports decreasing by 15.9 percent and 20.5 percent, respectively.

Tables B2 and B3 in the Appendix present the changes in total output and total exports across manufacturing sectors for China and the US under scenarios 1 to 3. For China, the manufacturing sectors experiencing the largest declines in total output are “other manufacturing,” “textiles and leather,” and “electronic and optical.” Specifically, under a scenario where the US imposes a 30 percent tariff on Chinese goods, the total output of these sectors declines by 5.95 percent, 3.90 percent and 3.73 percent, respectively. These declines can be attributed to the high dependence of these sectors on exports to the US, and their integration into global value chains, which may make them vulnerable to trade disruptions. In terms of exports, the largest declines are observed in “pharmaceuticals,” “wood,” and “other manufacturing,” with declines of 20.13 percent, 17.14 percent, and 16.04 percent under scenario 1. The sharp drop in “pharmaceuticals” exports highlights the sensitivity of this sector to tariff increases.

In the US, total output under scenario 1 increases by 22.84 percent in “textiles and leather,” by 10.70 percent in “electrical equipment,” and by 8.94 percent in “electronic and optical.” These increases can be attributed partly to import substitution, as reduced Chinese imports create opportunities for domestic producers to capture market share and meet local demand. However, under scenario 1, exports from the “electrical equipment” sector decline by 7.66 percent, those from “textiles and leather” fall by 6.11 percent, and those from “pharmaceuticals” decrease by 5.95 percent. The export contraction in these sectors is likely driven by increased production costs resulting from tariffs on Chinese intermediate inputs, which undermines the price competitiveness of downstream US exports in global markets (Handley et al., 2025).

5. Robustness checks

In the baseline analysis, the elasticities of substitution across varieties (σ^j, θ^j) are based on the estimates provided by Broda and Weinstein (2006). As a robustness check, the elasticities estimated by Soderbery (2015) are used instead, aggregated into intermediate inputs and final goods according to the BEC classification for each industry. Columns (1) to (3) of Table 8 show the results, which suggest that the welfare changes for each country remain similar to the baseline, demonstrating the robustness of the findings.

A further robustness check was conducted using homogeneous substitution elasticity, with σ^j and θ^j set to their median baseline values of 5.87 and 8.56.

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Columns (4) to (6) of Table 8 report the results, further confirming the robustness of the findings.

Table 8. Robustness check: Different trade elasticity (welfare change, %)

	Heterogeneous elasticity			Homogeneous elasticity		
	Scenario 1 (1)	Scenario 2 (2)	Scenario 3 (3)	Scenario 1 (4)	Scenario 2 (5)	Scenario 3 (6)
Australia	–0.010	–0.012	–0.056	–0.013	–0.015	–0.056
ASEAN	0.041	0.050	–0.112	0.033	0.044	–0.113
Brazil	–0.007	–0.008	–0.097	–0.006	–0.007	–0.094
Canada	0.030	0.036	–0.775	0.032	0.038	–0.795
China	–0.136	–0.159	–0.159	–0.133	–0.159	–0.153
Chinese Taiwan province	–0.043	–0.046	–0.235	–0.051	–0.055	–0.239
EU	0.007	0.008	–0.057	0.006	0.008	–0.051
India	0.038	0.045	–0.028	0.036	0.045	–0.020
Japan	0.005	0.006	–0.070	0.003	0.004	–0.058
Mexico	0.131	0.158	–1.221	0.129	0.159	–1.216
South Korea	0.001	0.003	–0.171	–0.010	–0.009	–0.156
US	–0.196	–0.283	–0.103	–0.184	–0.280	–0.078
ROW	0.011	0.012	–0.070	0.007	0.009	–0.068

Sources: Authors' calculations based on OECD-ICIO (2020) and WITS.

Notes: This table shows the robustness checks for different trade elasticity. ROW, the rest of the world.

In the baseline scenario, the US was assumed to impose a 30 percent tariff on Chinese imports. However, due to tariff exemptions, as of May 14, 2025, the actual additional tariffs imposed by the US on China were slightly less than 30 percent. As of May 14, 2025, the simple average US tariff on Chinese goods was 53.1 percent, and the trade-weighted average tariff stood at 42.3 percent.[11] To better reflect these conditions, the analysis incorporated these exemptions and calculated the effective tariff increases for each industry. The results presented in column (1) of Table 9 remain consistent with the baseline findings.

Building on this, column (2) incorporates China's actual retaliatory measures.[12] As a result, the welfare loss for the US worsens to –0.2 percent, while China's welfare loss

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[11] Table B4 in the Appendix presents the industry-specific tariffs between China and the US as of May 14, 2025.

[12] Specifically, in February and March 2025, China responded to the US 20 percent International Emergency Economic Powers Act tariffs with targeted countermeasures, imposing tariffs on coal, natural gas, crude oil, agricultural machinery, and certain agricultural products. On May 14, 2025, China adjusted its reciprocal tariffs on the US to 10 percent. As of May 14, 2025, China's simple average tariff on US goods was 33 percent and the trade-weighted average tariff was 30.1 percent.

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also worsens to –0.161 percent. Finally, column (3) extends the analysis in column (2) by considering US reciprocal tariffs on other countries: 25 percent on Canada and Mexico, and 10 percent on all other countries. The results are similar to those in scenario 3 of the baseline findings.

Table 9. Robustness check: Actual tariffs in 2025 (welfare change, %)

	Actual tariffs (by industry) (1)	With China's retaliation (2)	Actual "Liberation Day" tariffs (3)
Australia	–0.011	–0.007	–0.054
ASEAN	0.039	0.038	–0.110
Brazil	–0.007	–0.004	–0.093
Canada	0.029	0.023	–0.796
China	–0.130	–0.161	–0.175
Chinese Taiwan province	–0.047	–0.035	–0.216
EU	0.007	0.006	–0.057
India	0.038	0.033	–0.031
Japan	0.003	0.003	–0.058
Mexico	0.123	0.109	–1.204
South Korea	–0.007	–0.003	–0.147
US	–0.183	–0.200	–0.094
ROW	0.010	0.010	–0.072

Sources: Authors' calculations based on OECD-ICIO (2020) and WITS.

Note: This table shows the robustness checks for actual tariffs as of May 14, 2025.

V. Extended analysis

1. Analysis of possible countermeasures

This subsection discusses potential measures that China could adopt, using scenario 1 – where the US imposes a 30 percent tariff on Chinese goods – as an example.[13] The discussion focuses on two main strategies: imposing retaliatory tariffs and promoting trade liberalization with other countries. Specifically, the following five countermeasures were considered: (i) China imposes reciprocal countermeasures by

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[13] The welfare changes for each country under tit-for-tat retaliation in scenarios 2 to 3 are also reported in Table B5 in the Appendix. In the tit-for-tat retaliation in scenario 2, where China imposed an additional 54 percent tariff on the US as retaliation, China's welfare declines by 0.269 percent, whereas the US welfare declines by 0.312 percent. In the tit-for-tat retaliation in scenario 3 – where China imposes an additional 30 percent tariff on the US, Mexico, and Canada each impose a 25 percent additional tariff, and other economies impose a 10 percent additional tariff on the US – China's welfare declines by 0.204 percent and US welfare declines by 0.328 percent.

introducing a 30 percent tariff on all US products; (ii) China imposes a 50 percent tariff on US agricultural imports;[14] (iii) China further advances the implementation of the RCEP, with the model assuming that bilateral tariffs between China and other RCEP member countries (ASEAN, Japan, South Korea, and Australia) are reduced to zero;[15] (iv) China deepens partnerships with countries involved in the Belt and Road Initiative, with the model assuming that tariffs between China and ASEAN, as well as between China and the ROW, are reduced to zero;[16] and (v) China enhances strategic cooperation with the EU, with the model assuming that bilateral tariffs between China and the EU are reduced to zero.

Table 10 shows the results. In column (1), it is assumed that China implements reciprocal countermeasures by imposing a 30 percent tariff on all US imports, the welfare loss for the US is the largest at –0.214 percent. However, China's welfare loss declines further to –0.213 percent, compared to scenario 1. If China applies countermeasures

Table 10. The welfare effects of countermeasures (change in welfare, %)

Region	Reciprocal (1)	Agricultural 50% (2)	RCEP (3)	BRI (4)	EU (5)
Australia	–0.006	–0.011	0.025	–0.010	–0.012
ASEAN	0.037	0.037	–0.001	0.006	0.032
Brazil	–0.002	–0.004	–0.004	–0.010	–0.007
Canada	0.018	0.027	0.022	0.022	0.031
China	–0.213	–0.157	–0.059	–0.073	–0.113
Chinese Taiwan province	–0.022	–0.047	–0.061	–0.044	–0.059
EU	0.005	0.006	0.002	0.002	0.034
India	0.028	0.035	0.026	0.026	0.034
Japan	0.004	0.002	0.073	0.000	0.000
Mexico	0.097	0.118	0.099	0.108	0.126
South Korea	0.002	–0.008	0.407	–0.012	–0.013
US	–0.214	–0.189	–0.126	–0.184	–0.181
ROW	0.010	0.009	0.008	–0.001	0.004

Notes: This table presents the welfare changes under five counterfactual scenarios; the welfare is defined as real income: I_n/P_n. BRI, Belt and Road Initiative; RCEP, Regional Comprehensive Economic Partnership; ROW, the rest of the world.

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[14] The agricultural sector corresponds to OECD-ICIO sectors A01_02 "agriculture, hunting, forestry" and A03 "fishing and aquaculture." For the analysis, these two sectors were aggregated into a single sector.

[15] Among RCEP member countries, New Zealand is included in the ROW category in the model and is not considered separately.

[16] For Belt and Road Initiative countries, the calibrated data mainly include ASEAN countries and those categorized as ROW.

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to specific sectors, such as imposing a 50 percent tariff on agricultural imports from the US (column (2)), the welfare losses for the US and China are 0.189 percent and 0.157 percent, respectively.

On the other hand, China can effectively reduce its welfare losses by adopting measures to expand openness. As shown in column (3), assuming that bilateral tariffs between China and other RCEP member countries are reduced to zero, China's welfare loss decreases to 0.059 percent, the smallest among all scenarios. Meanwhile, the US welfare loss also decreases to 0.126 percent. In column (4), assuming bilateral tariffs between China and Belt and Road Initiative countries are reduced to zero, China's welfare loss also remains relatively low at –0.073 percent, whereas the US welfare loss is –0.184 percent. Finally, column (5) quantifies the impact of eliminating bilateral tariffs between China and the European Union. Under this scenario, China's welfare loss is –0.113 percent and the US welfare loss remains almost unchanged at –0.181 percent.

2. Tariff alliance and nontariff barriers

This subsection analyzes additional potential trade policy scenarios. Panel A of Table 11 quantifies the impact of a tariff alliance, defined here as a coordinated effort by the US and its partners to impose tariffs jointly on China. Two scenarios are considered. In the first scenario, the US, Canada, and Mexico each impose an additional 30 percent tariff on Chinese imports. As column (1) shows, China's welfare loss is 0.188 percent, whereas the US experiences a welfare loss of 0.182 percent. Canada and Mexico also suffer substantial welfare losses in this scenario. In the second scenario, the US and its free trade agreement (FTA) partners jointly impose an additional 30 percent tariff on China.[17] As reported in column (2), China's welfare loss increases further to 0.279 percent, whereas the US welfare loss is 0.177 percent.

In addition to tariffs, nontariff barriers were also considered. Specifically, it was assumed that the US not only imposes an additional 30 percent tariff on imports from China but also enforces export controls on chips destined for China. As the OECD-ICIO database used for calibration does not feature a standalone chip industry, the quantitative analysis assumes US export restrictions on China's electronics sector instead.[18] As column (3) of Table 11 shows, under this scenario, China's welfare loss further increases

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[17] The US FTA partners considered in this study include Canada, Mexico, South Korea, and Australia. Other FTA countries, such as Singapore, are grouped under ASEAN or the ROW and are not examined separately.

[18] The industries related to chip products in the OECD-ICIO database include "computer, electronic and optical equipment" and "electrical equipment." In 2024, chips accounted for 32.9 percent and 53.1 percent of China's imports from the US in these two industries, respectively. The quantitative analysis assumed that the iceberg trade cost for China's imports from the US in these two industries increases to 999 times original levels.

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to 0.158 percent in comparison with scenario 1, and the US also experiences a slightly larger welfare loss, rising to 0.190 percent.

Table 11. Reciprocal tariffs and nontariff barriers (welfare change, %)

	Tariff alliance		Export control
	US, Canada, and Mexico (1)	US FTA partners (2)	Electronics (3)
Australia	–0.019	–0.244	–0.012
ASEAN	0.064	0.087	0.041
Brazil	–0.007	–0.013	–0.007
Canada	–0.190	–0.187	0.027
China	–0.188	–0.279	–0.158
Chinese Taiwan province	–0.037	–0.039	–0.024
EU	0.012	0.021	0.006
India	0.050	0.062	0.035
Japan	0.008	0.016	0.004
Mexico	–0.158	–0.147	0.117
South Korea	0.010	–0.207	0.002
US	–0.182	–0.177	–0.190
ROW	0.010	0.014	0.008

Sources: Authors' calculations based on OECD-ICIO (2020) and WITS.

Notes: Columns (1) and (2) show the counterfactual scenarios of tariff alliance, while column (3) presents the counterfactual scenarios of export control. FTA, Free Trade Agreement; ROW, the rest of the world.

3. Comparison between Trumps 1.0 and 2.0 tariffs

The economic impact of Trump 2.0 tariffs differs markedly from that of Trump 1.0 in four key dimensions. First, Trump 2.0 tariffs are broader in scope, targeting not only China but also other major trading partners. As the quantitative analysis shows, when tariffs apply only to China (scenario 1), its intermediate exports to Mexico and Canada rise significantly. However, when tariffs expand to include these third countries (scenario 3), China's indirect exports via trade diversion are sharply curtailed.

Second, the scale and intensity of Trump 2.0 tariffs surpass those of the 2018–2019 trade conflict. In February and March 2025, the US imposed an additional 20 percent tariff on all Chinese products – already exceeding the total tariff increases during Trump 1.0.[19] The welfare consequences are also more severe: under scenario 2, a 54 percent tariff leads to a 0.157 percent welfare loss for China, compared to 0.122 percent in Li et al. (2022) and a 0.04 percent decline in real wages in Guo et al. (2018) under Trump 1.0. The US import shares from China are projected to decline even further – dropping to

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[19] During the 2018–2019 US–China trade conflict, the simple average additional tariff imposed by the US on Chinese goods reached about 19.95 percent as of December 2019.

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5.2 percent overall, 4.1 percent for intermediate goods, and 6.3 percent for consumer goods – versus declines from 22.1 percent to 12.6 percent and 31.6 percent to 21.2 percent, respectively, under Trump 1.0.

Third, Trump 2.0 tariffs adopt a flat, undifferentiated structure across sectors. This contrasts with the more selective approach of Trump 1.0. Li et al. (2022) estimated that optimal Nash tariffs vary by sector (8.7 percent to 18.5 percent). Uniform tariffs ignore product-specific sensitivities, resulting in higher distortionary costs and efficiency losses.

Finally, Trump 2.0 is characterized by heightened policy uncertainty. Following the "reciprocal tariff" announcement on April 2, 2025, the proposed rate on Chinese imports shifted rapidly – from 34 percent to 84 percent, then 125 percent – within days. Such volatility creates a highly uncertain environment, discouraging investment, disrupting supply chains, and dampening productivity growth.

It is important to note that the model used in this study captures only the direct, static welfare effects. The exclusion of dynamic channels – such as investment delays, firm exit, and anticipatory supply chain adjustments – implies that its estimates likely represent a lower bound of the full economic costs associated with prolonged trade tensions and policy uncertainty. Future research could incorporate these dynamic effects for a more comprehensive assessment.

VI. Conclusion

This study examined the trade and welfare consequences of the US–China tariff dispute, with particular emphasis on the impact of prospective future tariff escalations by the US against China and other countries. To quantify these effects, a multicountry, multisector Armington model was developed with IO linkages, and several counterfactual scenarios were simulated.

The results show that tariff escalation would substantially reshape global trade flows and generate significant welfare losses for both the US and China. A 30 percent tariff on Chinese imports would reduce China's welfare by 0.131 percent and the US welfare by 0.183 percent. Under a more severe 54 percent tariff scenario, welfare losses rise to 0.157 percent for China and 0.279 percent for the US. China's exports to the US contract sharply, by 59.1 percent for intermediate goods and 52.7 percent for final goods, but are partially redirected to alternative markets such as Mexico, Canada, and India. US imports, in turn, shift toward ASEAN, Chinese Taiwan province, and South Korea.

While trade diversion yields moderate welfare gains for third countries such as Mexico and ASEAN, these gains are reversed under broader tariff regimes. In the "Liberation Day" scenario, where the US imposes additional tariffs on all trading

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partners – including 30 percent on China, 25 percent on North American Free Trade Agreement countries, and 10 percent on others – China's indirect export channels through third countries are significantly constrained. Consequently, all major economies incur welfare losses, with the largest impacts observed in Mexico, Canada, and Chinese Taiwan province. These findings underscore the complex and far-reaching global implications of US tariff policy.

The analysis yields several policy implications for China, which can be grouped into four broad strategic areas: targeted countermeasures, trade cooperation, structural upgrading, and domestic resilience.

First, China could strengthen its capacity to respond with targeted countermeasures. Reciprocal tariffs impose costs on the US, the results of this study suggest that they also exacerbate welfare losses for China and are unlikely to alter US strategic intentions. A more effective approach involves "precision retaliation" against politically sensitive but economically marginal sectors in the US, combined with efforts to expand alternative export markets. This strategy could be complemented by the use of export controls and legal challenges in multilateral trade fora.

Second, China should deepen trade cooperation with the EU, BRI, and RCEP partners. The simulations in this study indicated that stronger regional integration and diversified trade relationships can help offset losses from US-centered trade disruptions. Policy priorities include expanding trade cooperation with the EU, pursuing breakthroughs in the China–EU investment agreement, and leveraging the institutional frameworks of the BRI and RCEP to reduce market concentration risks.

Third, China should optimize its export structure by prioritizing intermediate goods and trade in services. Increasing exports of high-value-added, high-tech intermediates would improve China's position in global value chains. This requires ramping up research and development, targeted subsidies to strategic sectors (e.g., semiconductors, advanced materials, precision equipment), and creating stronger linkages along supply chains to enhance productivity. At the same time, expanding trade in services and in particular digital trade infrastructure and reducing reliance on physical goods can help insulate the economy from traditional tariff shocks.

Fourth, domestic market development is critical to bolstering long-term economic resilience. Investments in infrastructure, health care, and education can support household consumption and employment. Improving logistics and trade facilitation mechanisms will further promote the digital and green transformation of manufacturing. Finally, fostering an attractive environment for foreign investment, particularly in high-end manufacturing and innovation-intensive sectors, can help maintain China's competitiveness in the face of external pressures.

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Appendices

Appendix A. Model part

1. Model setup

(1) Household demand function

Given the prices $\{p^j_{in}\}N_{i=1}$ and income I_n, consumers aim to maximize their utility:

$$\max_{q^j_{in}} Q^{j,F}_n = \left(\sum_{i=1}^{N}\left(q^j_{in}\right)^{\frac{\sigma^j-1}{\sigma^j}}\right)^{\frac{\sigma^j}{\sigma^j-1}} \tag{10}$$

$$\text{s.t. } \sum_i p^j_{in}q^j_{in} \leqslant \alpha^j_n I_n, \tag{11}$$

where α^j_n is the expenditure share of country n in sector j, satisfying $\Sigma^J_{j=1}\alpha^j_n = 1$. Solving the utility maximization problem yields the demand function for product q^j_{in} as:

$$p^j_{in}q^j_{in} = \left(\frac{p^j_{in}}{p^{j,F}_n}\right)^{1-\sigma^j} \sigma^j_n I_n, \tag{12}$$

where $P^{j,F}_n$ denotes the price index of the composite final goods.

$$p^{j,F}_{in} = \left(\sum_{i=1}^{N}\left(p^j_{in}\right)^{1-\sigma^j}\right)^{\frac{1}{1-\sigma^j}} \tag{13}$$

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(2) Firm's production functions

Firms in country *i* sector *j* produce a distinct variety. Consider a double nested CES production function, with an outer nest between labor and materials and an inner CES aggregator of composite intermediate goods from all sectors. The production function is given by

$$q_i^j = A_i^j\left[\left(\psi_i^j\right)^{\frac{1}{\mu}}\left(l_i^j\right)^{\frac{\eta-1}{\eta}} + \sum\nolimits_{k=1}^{J}\left(\psi_i^{kj}\right)^{\frac{1}{\eta}}\left(Q_i^{kj,I}\right)^{\frac{\eta-1}{\eta}}\right]^{\frac{\eta-1}{\eta}}, \tag{14}$$

where A_i^j represents the constant productivity in country *i* sector *j*, l_t^j is labor, and $Q_i^{kj,\,I}$ denotes the composite intermediate goods from sector *k* used for the production of variety in country *i* sector *j*. Labor and composite intermediate goods are combined with a CES function with elasticity of substitution equal to η. ψ_i^j and ψ_i^{kj} are the labor weights and material weights varying by sector and country.

The composite intermediate goods in sector *j* country *i* are aggregated across varieties of sector *j* from all countries, with a CES aggregation form given by

$$Q_i^{j,I} = \left(\sum\nolimits_{n=1}^{N}\left(q_{ni}^j\right)^{\frac{\theta^j-1}{\theta^j}}\right)^{\frac{\theta^j}{\theta^j-1}}, \tag{15}$$

where θ represents the elasticity of substitution across varieties in sector *j* from all countries. The unit price of the composite intermediate good is therefore given by

$$P_i^{j,I} = \left(\sum\nolimits_{n=1}^{N}\left(p_{ni}^j\right)^{1-\theta^j}\right)^{\frac{1}{1-\theta^j}}. \tag{16}$$

2. Solving the model

Exact hat algebra (Dekle et al., 2008) is used to solve the equilibrium in relative changes. The notation $\hat{x} = x'/x$ denotes the relative change in variable *x* between the new and initial equilibrium states, where x' represents the value in the new equilibrium and *x* the initial value, and the equilibrium conditions as shown in Equations (2), (4)–(9) can be written as follows:

$$\hat{P}_n^{j,F} = \left(\sum_{i=1}^{N}\pi_{in}^{j,F}\left(k_{in}^j\hat{c}_i^j\right)^{1-\sigma^j}\right)^{\frac{1}{1-\sigma^j}}, \hat{p}_n^{j,I} = \left(\sum\nolimits_{i=1}^{N}\pi_{in}^{j,I}\left(k_{in}^j\hat{c}_i^j\right)^{1-\theta^j}\right)^{\frac{1}{1-\theta^j}}, \tag{17}$$

$$\hat{c}_i^j = \left[\gamma_i^j\hat{w}_i^{1-\eta} + \sum\nolimits_k\gamma_i^{kj}\left(\hat{P}_i^{k,I}\right)^{1-\eta}\right]^{\frac{1}{1-\eta}}, \tag{18}$$

$$\hat{\pi}_{i,n}^{j,F} = \frac{\left(\hat{\kappa}_{in}^j\ \hat{c}_i^j\right)^{1-\sigma^j}}{\sum\nolimits_{m=1}^{N}\pi_{mn}^{j,F}\left(k_{mn}^j\hat{c}_m^j\right)^{1-\sigma^j}}, \hat{\pi}_{in}^{j,I} = \frac{\left(\hat{\kappa}_{in}^j\ \hat{c}_i^j\right)^{1-\sigma^j}}{\sum\nolimits_{m=1}^{N}\pi_{mn}^{j,I}\left(k_{mn}^j\hat{c}_m^j\right)^{1-\sigma^j}}, \tag{19}$$

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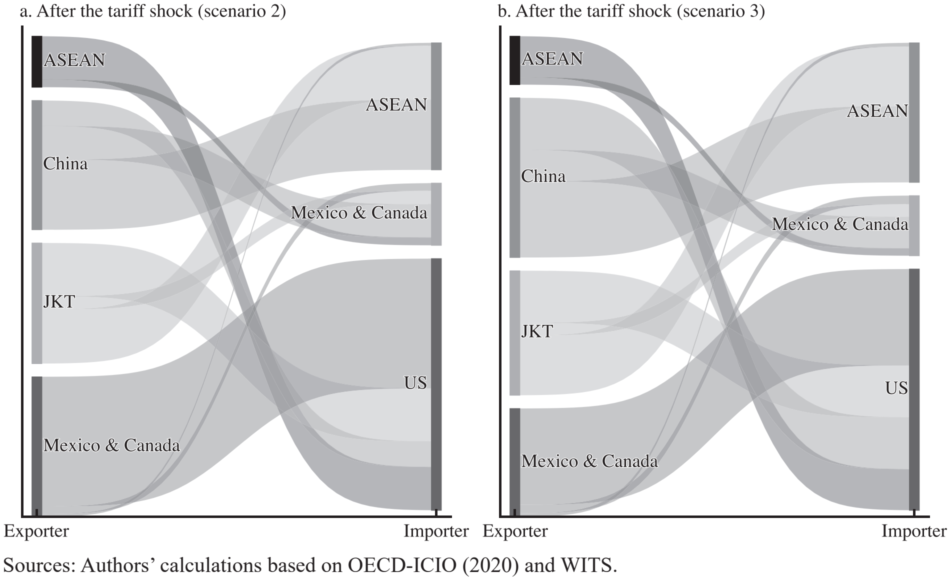
$$X_n^{j,I'} = \sum_{k=1}^{J} \gamma_n^{jk'} \sum_{i=1}^{N} \frac{X_{ni}^{k'}}{1+\tau_{ni}^{k'}}, X_n^{j,F'} = \alpha_n^j I_n', \tag{20}$$

$$W_i' L_i = \sum\nolimits_{j=1}^{J} \gamma_i^{j'} \sum\nolimits_{n=1}^{N} \frac{X_{in}^{j'}}{1+\tau_{in}^{j'}}, \tag{21}$$

where $X_{ni}^{k'} = X_{ni}^{k,F'} + X_{ni}^{k,I'} = \pi_{ni}^{k,F'} X_i^{k,F'} + \pi_{ni}^{k,I'} X_i^{k,I'}, I_n' = w_n' L_n + \sum\nolimits_{j=1}^{J} \sum\nolimits_{i=1}^{N} \frac{\tau_{in}^{j'} x_{in}^{j'}}{1+\tau_{in}^{j'}}$, $\hat{\kappa}_{in}^{j} = \frac{1+\tau_{in}^{j'}}{1+\tau_{in}^{j}}$, and $\hat{\gamma}_i^j = \frac{\hat{w}_i^{1-\eta}}{\left(\hat{c}_i^j\right)^{1-\eta}}$; $\hat{\gamma}_i^{kj} = \frac{\left(\hat{p}_i^I\right)^{1-\eta}}{\left(\hat{c}_i^j\right)^{1-\mu}}$. Equation (17) represents the relative change in price index for composite intermediate goods and final goods. Equation (18) captures the relative change of unit input cost. Equation (19) is the relative change in expenditure share. Equation (20) shows the market clearing condition under the new equilibrium, and Equation (21) represents the labor market clearing condition. Given the tariff changes, using the above system of equations, it is possible to calculate the changes in each country's wage levels, the price index of composite intermediate and final goods, output, and the bilateral intermediate trade values of intermediate and final goods.

Appendix B. Figures and tables

Figure B1. The changes in trade flows (scenarios 2 and 3)



a. After the tariff shock (scenario 2)

b. After the tariff shock (scenario 3)

Sources: Authors' calculations based on OECD-ICIO (2020) and WITS.

Notes: This figure illustrates the bilateral trade flows before and after the tariff shock in scenarios 2 and 3. To highlight the trade pattern changes among major countries, Japan, South Korea, and Chinese Taiwan province have been grouped together (abbreviated as JKT). Only the trade flows of selected major economies are presented.

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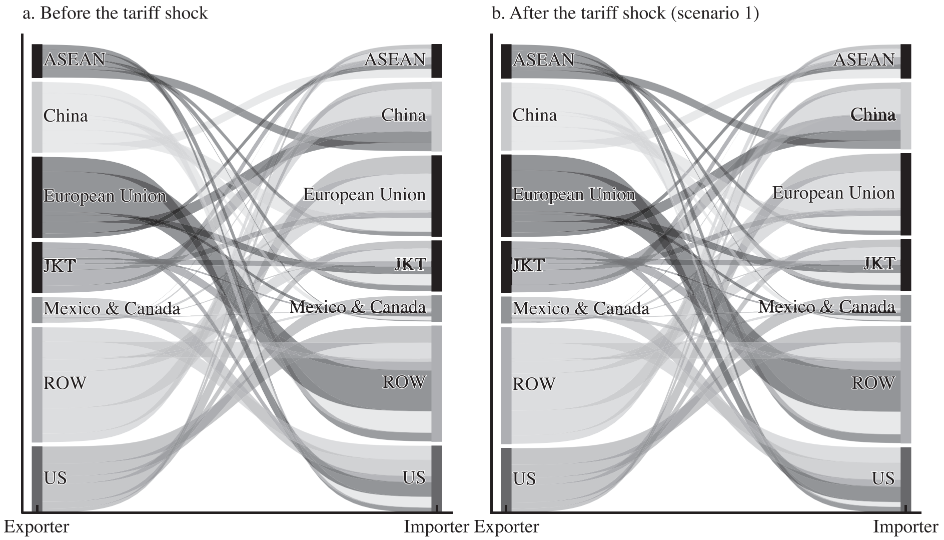
Figure B2. The changes in trade flows (scenario 1, all economies)


a. Before the tariff shock

b. After the tariff shock (scenario 1)

Sources: Authors' calculations based on OECD-ICIO (2020) and WITS.

Notes: Japan, South Korea, and Chinese Taiwan province have been combined and abbreviated as JKT. Australia, Brazil, and India have been merged into the ROW category.

Table B1. The elasticity of substitution for each sector

Sector	σ^j	θ^j
Agriculture	10.28	9.04
Mining	5.87	8.56
Food and tobacco	10.60	8.79
Textiles and leather	8.51	7.16
Wood	5.56	7.19
Paper and printing	3.71	5.86
Coke and refined petroleum	5.87	6.04
Chemical	5.42	6.36
Pharmaceuticals	14.20	10.45
Rubber and plastics	4.71	3.82
Other nonmetallic mineral	7.71	4.45
Basic metals	5.87	9.71
Fabricated metal	5.21	7.17
Electronic and optical	4.46	7.06
Electrical equipment	4.88	13.08
Machinery not elsewhere classified	6.18	11.02
Motor vehicles	5.29	9.17
Other transport equipment	7.18	9.96
Other manufacturing	7.61	9.97
Services	5.87	8.56

Sources: Authors'calculations and Broda and Weinstein (2006).

Note: This table reports the elasticity of substitution across industries for final goods and intermediate goods.

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Table B2. The changes in China's total output and total exports by manufacturing sectors (%)

Sector	Total output			Total exports		
	Scenario 1	Scenario 2	Scenario 3	Scenario 1	Scenario 2	Scenario 3
Agriculture	–0.70	–0.83	–0.24	–0.10	0.31	–1.42
Mining	1.49	1.71	1.33	2.85	3.43	2.22
Food and tobacco	–0.60	–0.71	–0.28	–1.85	–1.61	–2.92
Textiles and leather	–3.90	–4.76	–3.35	–11.22	–14.06	–9.69
Wood	–2.85	–3.38	–2.54	–17.14	–21.29	–16.09
Paper and printing	–0.95	–1.19	–0.54	–7.41	–10.02	–6.79
Coke and refined petroleum	–0.09	–0.16	0.22	2.72	3.23	2.55
Chemical	–0.81	–1.07	–0.52	–2.05	–2.85	–2.30
Pharmaceuticals	–1.04	–1.08	–0.45	–20.13	–20.09	–20.10
Rubber and plastics	–2.40	–3.22	–2.03	–7.55	–11.08	–6.79
Other nonmetallic mineral	–1.18	–1.48	–0.88	–5.44	–7.79	–5.18
Basic metals	–0.52	–0.64	–0.40	3.15	3.91	1.21
Fabricated metal	–1.55	–1.91	–1.34	–6.44	–8.17	–7.05
Electronic and optical	–3.73	–4.94	–3.65	–8.27	–11.09	–8.14
Electrical equipment	–2.05	–2.47	–1.92	–6.80	–8.10	–7.11
Machinery not elsewhere classified	–1.06	–1.27	–0.72	–5.29	–6.26	–5.00
Motor vehicles	–0.90	–1.13	–0.42	–10.20	–13.07	–9.19
Other transport equipment	0.30	0.38	1.46	1.59	2.05	3.77
Other manufacturing	–5.95	–7.08	–5.54	–16.04	–19.07	–15.41

Sources: Authors' calculations based on OECD-ICIO (2020) and WITS.

Note: This table shows the change in China's total output and total exports across different manufacturing sectors.

Table B3. The changes in US total output and total exports by manufacturing sectors (%)

Sector	Total output			Total exports		
	Scenario 1	Scenario 2	Scenario 3	Scenario 1	Scenario 2	Scenario 3
Agriculture	–0.70	–0.87	5.07	–5.83	–6.91	–27.30
Mining	–1.03	–1.25	15.81	–3.01	–3.63	–26.06
Food and tobacco	0.15	0.11	5.88	–4.62	–5.51	–29.16
Textiles and leather	22.84	28.55	50.81	–6.11	–7.34	–26.85
Wood	2.35	2.89	12.66	–4.15	–4.92	–22.68
Paper and printing	1.01	1.31	5.67	–2.54	–3.05	–15.87
Coke and refined petroleum	–0.10	–0.13	1.93	–1.42	–1.71	–21.31
Chemical	1.23	1.67	6.33	–3.20	–3.85	–17.85
Pharmaceuticals	–1.17	–1.55	15.07	–5.95	–7.02	–30.13
Rubber and plastics	3.50	4.99	10.26	–1.88	–2.27	–14.28
Other nonmetallic mineral	2.68	3.62	9.13	–2.54	–3.07	–15.66
Basic metals	0.10	0.18	16.97	–4.44	–5.28	–33.85
Fabricated metal	2.84	3.54	10.87	–3.08	–3.65	–23.47

(Continued on the next page)

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(Table B3 continued)

Sector	Total output			Total exports		
	Scenario 1	Scenario 2	Scenario 3	Scenario 1	Scenario 2	Scenario 3
Electronic and optical	8.94	11.91	18.68	–4.74	–5.62	–16.90
Electrical equipment	10.70	12.80	26.53	–7.66	–9.01	–31.89
Machinery not elsewhere classified	1.56	1.86	10.32	–5.30	–6.27	–24.76
Motor vehicles	–0.18	–0.20	15.43	–3.20	–3.85	–25.46
Other transport equipment	–1.47	–1.79	–1.01	–4.04	–4.82	–19.59
Other manufacturing	7.07	8.36	18.79	–5.42	–6.48	–24.40

Sources: Authors' calculations based on OECD-ICIO (2020) and WITS.

Note: This table shows the change in the US total output and total exports across different manufacturing sectors.

Table B4. US–China bilateral tariff levels (as of May 14, 2025, %)

Sector	US import tariffs on China	China's import tariffs on US
Agriculture	50.60	33.69
Mining	29.69	34.16
Food and tobacco	49.17	44.57
Textiles and leather	52.36	23.61
Wood	45.31	30.40
Paper and printing	45.52	19.24
Coke and refined petroleum	41.78	38.12
Chemical	44.95	28.50
Pharmaceuticals	22.51	14.22
Rubber and plastics	47.52	30.63
Other nonmetallic mineral	48.45	30.26
Basic metals	59.78	35.20
Fabricated metal	54.61	17.96
Electronic and optical	36.32	21.32
Electrical equipment	53.33	20.50
Machinery not elsewhere classified	42.95	21.89
Motor vehicles	61.87	27.03
Other transport equipment	46.39	15.13
Other manufacturing	44.90	21.98

Sources: Author's calculations based on Tariff Policy Commission of the State Council of China, USITC, and WITS.

Note: This table shows the weighted average tariff rates that the US and China imposed on each other's goods as of May 14, 2025.

Table B5. The welfare effects of tit-for-tat retaliation in scenarios 2 and 3 (change in welfare, %)

Region	Scenario 2 (1)	Scenario 3 (2)
Australia	–0.007	–0.018
ASEAN	0.046	–0.092
Brazil	–0.003	–0.068
Canada	0.023	–0.966
China	–0.269	–0.204
Chinese Taiwan province	–0.022	–0.158
EU	0.006	–0.044
India	0.035	–0.064
Japan	0.005	–0.048
Mexico	0.122	–1.253
South Korea	0.005	–0.099
US	–0.312	–0.328
ROW	0.011	–0.054

Sources: Authors' calculations based on OECD-ICIO (2020) and WITS.

Note: This table presents the welfare changes of tit-for-tat retaliation across scenarios 2 and 3; welfare is defined as real income, I_n/P_n.

(Edited by Lin Zhang)

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