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Geopolitics along the value chains☆

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ABSTRACT

This paper examines the intricate interplay between geopolitics and global value chains (GVCs) in shaping international trade dynamics. By developing indices of voting similarity from United Nations General Assembly data, we quantify the influence of geopolitical relationships on trade flows and economic welfare. Utilizing a structural approach grounded in the World Input–Output Database, we estimate the elasticity of geopolitics across various sectors, distinguishing between intermediate goods and final consumption. Our findings reveal significant trade and welfare implications of geopolitical relationships, highlighting how political alignment or discord influences economic outcomes across countries. Through counterfactual analyses, we explore scenarios such as the Israeli–Palestinian Conflict, the Russo–Ukrainian War, and the China–United States Trade Disputes, providing insights into how geopolitical shifts could reshape GVCs and economic performance globally. The results underscore the importance of considering geopolitical factors in trade policy and economic strategy formulation.

1. Introduction

During this post-pandemic period, the lingering effects of COVID-19, tensions and competition between great powers, and ongoing military conflicts are intertwined. As protectionism has resurged, globalization appears to be on a downward trend after reaching its peak. Economists are questioning whether global value chains (GVCs) are unwinding, shortening, reshoring, friend-shoring, or near-shoring (Baldwin, 2022). Indeed, trade patterns have shifted due to political relations (Alfaro & Chor, 2023; Antràs et al., 2023; Goldberg & Reed, 2023). However, there is a scarcity of literature exploring the political effects on trade and GVCs in a structural manner. Thus, this paper aims to fill this gap by quantifying the effects of geopolitical factors on value chains across countries from the perspective of political relationships.

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In this paper, we first develop voting similarity indices to quantify the geopolitical relationships between countries, utilizing data from United Nations General Assembly (UNGA) voting data. We then employ these indices to estimate geopolitics elasticity in the context of international trade and GVCs. In our estimation of geopolitics elasticity, we provide a homogeneous elasticity applicable to all sectors, as well as heterogeneous elasticities for intermediate goods and final consumption, and for various specific sectors, based on a theoretical framework of Antràs and Chor (2018). Subsequently, we apply these elasticities to conduct counterfactual analyses, simulating the impacts of geopolitical events on welfare, trade flows, gross output, and the positions of countries within the GVCs. The geopolitical events examined include the Israeli–Palestinian Conflict, the Russo–Ukrainian War, and China–US Trade Disputes.

In the estimation of geopolitics elasticity, we find that the voting similarity effectively reduces trade barriers between countries and stimulates trade. The geopolitics elasticity, specifically the coefficient of geopolitical approximation on international trade flows, is estimated to be 0.0762. This estimate is statistically significant and economically meaningful, implying that a ten percent increase in voting similarity is, ceteris paribus, associated with a 0.762% increase in trade flows. The elasticity is found to be larger for final consumption (0.183) than for intermediate goods (0.0214). For the heterogeneous elasticities across sectors, variations are more pronounced. By applying the estimated elasticity in the counterfactual analysis, we observe that geopolitics have substantial impacts on trade, welfare, and GVC positions.

This paper contributes to two strands of literature. Firstly, it addresses the discussion of geopolitics in the field of trade. The relationship between geopolitics and economics is typically viewed from two perspectives. The first perspective explores the impact of trade on geopolitical relationships. For example, Polachek (1980) and Jackson and Nei (2015) illustrate the positive effects of trade on peace. Kleinman et al. (2024) argue that better economic friendship fosters better political relationships, while Martin et al. (2008) present a contrasting viewpoint, suggesting that countries engaged in multilateral trade relationships are more likely to engage in conflict due to the relatively lower cost of bilateral conflicts. The second perspective examines the impact of geopolitics on trade. For instance, Blomberg and Hess (2006) and Hoekman et al. (2023) document the adverse effects of violence on trade, or conversely, the positive effects of cooperative international relationships. More specifically, Cosar and Thomas (2021) focus on the potential closure of waterways due to conflicts between countries. Glick and Taylor (2010) emphasize the long-lasting effects of wars, an extreme form of geopolitical conflicts, on economic activities, particularly trade. Our paper enriches this body of literature by quantifying the trade and welfare effects and the implied positions within GVCs through the input–output linkage. Although Campos et al. (2023) studies the impact of geopolitical fragmentation and trade by using the general equilibrium framework, they mainly measure the fragmentation or trade restrictiveness by using information from tariffs, non-tariff barriers, and restrictions on requiring, obtaining, and using foreign exchange for current transactions, whereas our measure following Kleinman et al. (2024) provides more specific information about the political alignment across countries and over time.

Second, the paper also enriches the studies on global value chains. Existing literature examines the impact of shocks, such as supply chain shocks (Baldwin & Freeman, 2022) or changes in trade costs (Alfaro & Chor, 2023), empirical analyses of firm performance along the value chain (Chor et al., 2021), and the theoretical role of GVCs in trade gains (Sposi et al., 2020). Quantitative analysis in this field is also prevalent. Studies such as Antràs and Chor (2018), Antràs and De Gortari (2020), Bonadio et al. (2021), and Grossman et al. (2024) develop structural models and conduct quantitative analyses within the framework of GVCs, focusing primarily on the effects of shocks on welfare through GVC linkages. Our paper enhances this body of literature by introducing a non-traditional factor—geopolitics—into GVC analyses and estimating the elasticity of geopolitics. This approach is particularly relevant in the current global context, where geopolitical dynamics significantly influence trade patterns and the operation of GVCs.

The rest of the paper proceeds as follows: Section 2 introduces the model. Section 3 presents the estimation of geopolitics elasticity. Section 4 provides conceptual counterfactual framework. Section 5 shows the counterfactual results for effects of geopolitical events that we are interested in. Section 6 concludes the paper.

2. Model setup

The model and notation follow Antràs and Chor (2018). The economy comprises J countries indexed by i or j and S sectors indexed by r or s. We use a dyad (i, j) to denote a shipment from country i to j, and a dyad (r, s) to denote a shipment from sector r to s. We use F to represent final-use goods. We assume a two-tier utility function for a representative consumer in country j, where the upper level is characterized by a Cobb–Douglas utility function: $u\left(C_j\right) = \prod_{s=1}^{S}\left(C_j^s\right)^{\alpha_j^s}$, with the shares satisfying $\sum_{s=1}^{S}\alpha_j^s = 1$ and C_j^s representing the composite final consumption of sector s. Each sector s comprises a continuum of varieties $\omega^s \in [0,1]$. The production function for an intermediate variety ω^s, which requires labor $l_j^s(\omega^s)$ and materials from other sectors $\mathcal{M}_j^{rs}(\omega^s)$, is given by the following Cobb–Douglas formula: $y_j^s(\omega^s) = z_j^s(\omega^s)\left(l_j^s(\omega^s)\right)^{1-\sum_{r=1}^{S}\gamma_j^{rs}}\prod_{r=1}^{S}\left(\mathcal{M}_j^{rs}(\omega^s)\right)^{\gamma_j^{rs}}$, where γ_j^{rs} represents the share of input from sector r used in the production of sector s, and $(1-\sum_{r=1}^{S}\gamma_j^{rs})$ is the labor share. The productivity $z_j^s(\omega)$ follows an i.i.d. Fréchet distribution with the cumulative distribution function: $F_j^s(z) = e^{-T_j^s z^{-\theta_s}}$, where $T_j^s > 0$ indicates country j's overall state of technology in sector s, and $\theta_s > 1$ measures (inversely) the efficiency dispersion across goods in sector s. The composite intermediate goods of sector s in country j can be used as materials for the production of sector r ($\mathcal{M}_j^{sr}$) and for final consumption (C_j^s). The composite is a Constant Elasticity of Substitution (CES) quantity aggregator over a set of varieties purchased from the lowest cost supplier: $Q_j^s = \left(\int q_j^s(\omega^s)^{1-1/\sigma^s}\,d\omega^s\right)^{\sigma^s/(\sigma^s-1)}$, where $q_j^s(\omega^s)$ is the demanded quantity of an intermediate variety ω^s with σ^s being the elasticity of substitution across varieties in sector s.

This research aims to examine the impacts of geopolitics on GVCs, with a particular focus on China. The relationship between geopolitics and international trade has been a long-standing topic in trade literature (Jackson & Nei, 2015; Martin et al., 2008). Geopolitics is often considered a distinct, non-traditional trade cost factor—separate from conventional trade costs such as tariffs, free trade agreements, and transportation expenses—and its direct impact on international trade has been widely examined within the framework of gravity models (Du et al., 2017; Guiso et al., 2009). Meanwhile, the use of exact hat algebra from international trade literature to quantitatively examine the general equilibrium relationship between geopolitics and welfare has gained popularity in recent years (Campos et al., 2023; Cosar & Thomas, 2021; Kleinman et al., 2024). However, there is a notable gap in the literature when it comes to quantitatively analyzing the impact of geopolitics on GVCs within a structural quantitative framework. In practice, the influence of geopolitics on GVCs has garnered increasing attention, particularly in light of developments such as the China–US trade war (Alfaro & Chor, 2023; Goldberg & Reed, 2023). Building on separate strands of research in geopolitics, structural trade models, and GVCs, this paper bridges these areas by integrating geopolitics into the structural analysis of global value chains. Specifically, we incorporate geopolitical factors into the quantitative trade model developed by Caliendo and Parro (2015). Building upon the work of Antràs and Chor (2018), we differentiate between the trade costs of goods intended for intermediate production and those for final consumption. This distinction allows for a structural interpretation of all the cells in a World Input–Output Table (WIOT), enabling us to isolate the influence of geopolitics on intermediate production from that on final consumption. This is particularly relevant in light of the United States' sanctions on the Chinese semiconductor industry in trade wars with China.[1] Specifically, we introduce a new component to trade costs: geopolitical risk, alongside ad-valorem tariffs and iceberg international trade costs.[2] The total cost of shipping one unit of a variety from sector r in country i to sector s in country j is defined as follows: $\kappa_{ij}^{rs} \equiv g_{ij} d_{ij}^{rs}$. Here, d_{ij}^{rs} denotes the iceberg international trade cost, and g_{ij} is the measure of (inverse) geopolitical proximity. Similarly, the cost of shipping to final consumers is: $\kappa_{ij}^{rF} \equiv g_{ij} d_{ij}^{rF}$, where F indicates final consumption.

Following the Ricardian structure of Eaton and Kortum (2002), as carried forward by Caliendo and Parro (2015) and Antràs and Chor (2018), country j's expenditure share of sector s spent on materials of sector r from country i is given by:

$$\pi_{ij}^{rs} = \frac{T_i^r \left(c_i^r d_{ij}^{rs} g_{ij} \right)^{-\theta^r}}{\sum_{k=1}^{J} T_k^r \left(c_k^r d_{kj}^{rs} g_{kj} \right)^{-\theta^r}}, \tag{1}$$

where c_i^r, the unit cost of production, under the assumption of constant returns to scale and perfect competition, is given by:

$$c_j^s = Y_j^s w_j^{1-\sum_{r=1}^{S} \gamma_j^{rs}} \prod_{r=1}^{S} \left(P_j^{rs} \right)^{\gamma_j^{rs}}, \tag{2}$$

where Y_j^s is a constant depending on γ_j^{rs}, w_j is the wage rate, and P_j^{rs} is the ideal price index of sector-r intermediate composite used as input for sector s in country j. The CES price index now is given by:

$$P_j^{rs} = A^r \left[\sum_{k=1}^{J} T_k^r \left(c_k^r d_{kj}^{rs} g_{kj} \right)^{-\theta^r} \right]^{-1/\theta^r}, \tag{3}$$

where A^r is a constant depending on σ^r and θ^r, with assumed relation $\theta^r > \sigma^r - 1$ to guarantee the well-defined CES price index.

As introduced above, we allow for differentiated trade costs for intermediate production and final consumption. Similar to the trade share for intermediate goods, country j's expenditure share of final consumption spent on sector-r composite from country i is given by:

$$\pi_{ij}^{rF} = \frac{T_i^r \left(c_i^r d_{ij}^{rF} g_{ij} \right)^{-\theta^r}}{\sum_{k=1}^{J} T_k^r \left(c_k^r d_{kj}^{rF} g_{kj} \right)^{-\theta^r}}. \tag{4}$$

And the CES price index of sector-r composite for final consumption in country j is given by:

$$P_j^{rF} = A^r \left[\sum_{k=1}^{J} T_k^r \left(c_k^r d_{kj}^{rF} g_{kj} \right)^{-\theta^r} \right]^{-1/\theta^r}. \tag{5}$$

To close the model, we first impose the good-market clearing condition:

$$Y_j^s = \sum_{k=1}^{J} \pi_{jk}^{sF} \alpha_k^s (w_k L_k + D_k) + \sum_{r=1}^{S} \sum_{k=1}^{J} \pi_{jk}^{sr} \gamma_k^{sr} Y_k^r. \tag{6}$$

This condition implies that the gross output of sector s in country j has two uses: for final consumption in all countries and as materials for production in all sectors across all countries. Here, L_k and D_k denote country k's labor endowment and trade deficit, respectively.

[1] We note that similar to our approach, Brandt et al. (2021) consider varying tariffs and shipping costs for ordinary and processing trade in China.

[2] In the benchmark, for simplicity, we omit tariffs and tariff revenues for several reasons. First, we delve into the impacts of geopolitics on GVCs, international trade flows, and welfare. Neglecting tariffs allows us to focus on such investigation without worrying about the measurement difficulty and inaccuracy of tariffs. Second, tariffs are neither a sufficient nor a necessary measure of trade policy as non-tariff barriers and sanctions are surging in numbers recently. Third, the motivation for tariff revenue has been reduced to minimal given its negligible contribution to national output.

At last, trade balances:

$$\sum_{i=1}^{J}\sum_{r=1}^{S}\sum_{s=1}^{S}\pi_{ij}^{sr}\gamma_j^{sr}Y_j^r + w_jL_j = \sum_{i=1}^{J}\sum_{r=1}^{S}\sum_{s=1}^{S}\pi_{ji}^{sr}\gamma_i^{sr}Y_i^r + \sum_{s=1}^{S}\sum_{i=1}^{J}\pi_{ji}^{sF}\alpha_i^s(w_iL_i + D_i). \tag{7}$$

Also, note that the total expenditure of country j on sector s is given by:

$$X_j^s = \sum_{r=1}^{S}\gamma_j^{sr}Y_j^r + \alpha_j^s(w_jL_j + D_j). \tag{8}$$

And the overall price index in country i becomes:

$$P_j^F = \prod_{s=1}^{S}\left(P_j^{sF}/\alpha_j^s\right)^{\alpha_j^s}. \tag{9}$$

3. Estimating geopolitics elasticity

Following Figure 1 of Antràs and Chor (2018), we can recover the intermediate input shares and final expenditure shares from the World Input–Output Database (WIOD) entries with tildes:

$$\gamma_j^{rs} = \frac{\sum_{i=1}^{J}\tilde{Z}_{ij}^{rs}}{\tilde{Y}_j^s}, \tag{10}$$

$$\alpha_j^s = \frac{\sum_{i=1}^{J}\tilde{F}_{ij}^s}{\sum_{r=1}^{S}\widetilde{VA}_j^r + \tilde{D}_j}, \tag{11}$$

where $\tilde{Z}_{ij}^{rs}$ denotes intermediate trade flows across country-pairs and sector-pairs, with $\tilde{Y}_j^s$ representing gross output, $\tilde{F}_{ij}^s$ final-use trade flows, $\widetilde{VA}_j^r$ value added, and $\tilde{D}_j$ trade deficit. Meanwhile, we also have the country-pair-specific trade shares for intermediate goods and final consumption:

$$\pi_{ij}^{rs} = \frac{\tilde{Z}_{ij}^{rs}}{\sum_{k=1}^{J}\tilde{Z}_{kj}^{rs}} = \frac{\tilde{Z}_{ij}^{rs}}{\gamma_j^{rs}\tilde{Y}_j^s}, \tag{12}$$

$$\pi_{ij}^{rF} = \frac{\tilde{F}_{ij}^r}{\sum_{k=1}^{J}\tilde{F}_{kj}^r} = \frac{\tilde{F}_{ij}^r}{\alpha_j^s\left(\sum_{r=1}^{S}\widetilde{VA}_j^r + \tilde{D}_j\right)}. \tag{13}$$

To simplify the notations, final consumption F could be considered a special output sector. Henceforth, without further explanations, final consumption is regarded as a trade flow from sector r and exporter i to importer j and the final consumption sector F. Additional instructions will be provided when we need to consider intermediate output and final consumption separately. We then construct the weighted trade flow from the input sector r of exporter i to the output sector s of importer j (including the final consumption F) by using the weight $Y_{iw}/(Y_iY_j)$. Next, we regress the weighted trade flow on the (logarithm of) voting similarity index by using the Poisson pseudo-maximum likelihood (PPML) estimator. The PPML estimator can handle zero trade flows and heteroskedasticity in a systematic way, which has become a standard setting in trade literature (Chang et al., 2022; Head & Mayer, 2014; Silva & Tenreyro, 2006). The benchmark regression equation is as follows:

$$tradeflow_{ijt}^{rs} = e^{(\chi\Delta Vote_{ijt} + \zeta Vote_{ij,t-1} + \beta^T\text{Controls}_{ijt} + \text{FE}_{irt} + \text{FE}_{jst} + \text{FE}_{rs} + \text{FE}_{ij})} + \varepsilon_{ijtrs} \tag{14}$$

where $tradeflow_{ijt}^{rs}$ refers to the weighted trade flow from the input sector r of exporter i to the output sector s of importer j (including the final consumption F in the benchmark scenario), $Vote_{ijt}$ is the (logarithm of) voting similarity index, and $\Delta Vote_{ijt}$ is the change in the voting similarity from the last period to the current period. Controls_{ijt} includes a set of asymmetric trade cost proxies typically used in trade literature, including a trade agreement indicator rta_{ijt}, a GSP treatment indicator gsp_{ijt}, and a common currency indicator $comcur_{ijt}$. FE_{irt}, FE_{jst}, FE_{rs}, and FE_{ij} are sets of fixed effects, and χ is the elasticity of geopolitics that we are interested in. The two fixed effects FE_{irt} and FE_{jst} accommodate the multilateral resistance terms in the structural gravity equation (Anderson & van Wincoop, 2003; Anderson & Yotov, 2010; Head & Mayer, 2014). The fixed effects FE_{ij} capture various long-term economic, military, and political factors that are invariant over time and deeply rooted in the bilateral relationship (Baier & Bergstrand, 2007). The fixed effects FE_{rs} describe the input–output linkages that are embedded in the production network. The data sources are described in Appendix. The description of variables and summary statistics are shown in Tables A.1 and A.2.[3]

We utilize the WIOD 2013 Release, covering 36 sectors, 40 countries, and a Rest of World (RoW) for the period from 1995 to 2011. To align with this dataset, we construct the voting similarity measure using the United Nations General Assembly (UNGA) data from the same period. We choose the voting similarity of UNGA data to measure the geopolitics at the country-pair level for two reasons. First, these voting data capture country-level alliances and the similarity of economic and geopolitical interests, making it a comprehensive and representative measure of geopolitical relationships (Alesina & Dollar, 2000; Kleinman et al., 2024). Second, compared to other studies that are based on specific events, the voting similarity covers a broad range of countries over a

[3] We only include time-variant trade cost controls, since the time-invariant variables will be absorbed by the importer–exporter fixed effects in the estimation.

Table 1
Geopolitics Elasticity.

	(1)	(2)	(3)	(4)
	Dependent variable: $tradeflow_{ijt}^{rs}$			
$\Delta Vote_{ijt}$	0.0762*		0.0520	
	(0.0451)		(0.0346)	
$\Delta Vote\_inter_{ijt}$		0.0214		0.0179
		(0.0455)		(0.0361)
$\Delta Vote\_final_{ijt}$		0.183***		0.101**
		(0.0538)		(0.0427)
$Vote_{ij,t-1}$	0.195**		0.123**	
	(0.0839)		(0.0610)	
$Vote\_inter_{ij,t-1}$		0.0951		0.113*
		(0.0858)		(0.0614)
$Vote\_final_{ij,t-1}$		0.387***		0.139*
		(0.0968)		(0.0746)
$\ln(tariff_{ijt}^{r}/100+1)$			−1.308***	−1.308***
			(0.253)	(0.253)
Controls	✓	✓	✓	✓
FE_{irt}	✓	✓	✓	✓
FE_{jst}	✓	✓	✓	✓
FE_{rs}	✓	✓	✓	✓
FE_{ij}	✓	✓	✓	✓
Observations	29,189,608	29,189,608	7,637,782	7,637,782

Notes: This table presents the benchmark estimates of geopolitics elasticity using the PPML estimator. Columns (1) and (3) analyze trade flows of both intermediates and final-use consumption goods. Columns (2) and (4) explore the heterogeneous effects of geopolitics on GVCs by including interaction terms $\Delta Vote\_inter_{ijt}$ and $Vote\_inter_{ij,t-1}$ for intermediate goods, and $\Delta Vote\_final_{ijt}$ and $Vote\_final_{ij,t-1}$ for final consumption simultaneously. In Columns (3) and (4), tariffs are controlled for. Fixed effects for exporter–input sector–year, importer–output sector–year, input sector–output, and exporter–importer are consistently included. Standard errors, clustered at the exporter–importer level, are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

long historical period, which is highly suitable for panel studies like ours (Mityakov et al., 2013). We consider the lagged voting similarity index and its relative change from the previous period simultaneously in the baseline setting. The lagged geopolitics term $Vote_{ij,t-1}$, which reflects the events up to the start of the previous year, is likely to capture the effects of geopolitics up to the recent past. The contemporary component $\Delta Vote_{ijt}$, which reflects revisions to geopolitics due to recent events that occurred in the past year, can be interpreted as capturing the genuine effect of changes in geopolitics on trade (Chang et al., 2022).

The benchmark results are shown in Table 1. In Columns (1) and (3), we analyze the trade flows of both intermediates and final-use consumption goods. In Columns (2) and (4), we examine the heterogeneous effects of geopolitics on GVCs by including interaction terms: $\Delta Vote\_inter_{ijt}$ and $Vote\_inter_{ij,t-1}$ for intermediate goods, and $\Delta Vote\_final_{ijt}$ and $Vote\_final_{ij,t-1}$ for final consumption F simultaneously.[4] In Columns (3) and (4), we control for tariffs. Fixed effects including exporter–input sector–year, importer–output sector–year, input sector–output sector, and exporter–importer are consistently included. As illustrated in Column (1), the elasticity of geopolitics, i.e., the coefficient of $\Delta Vote_{ijt}$, is estimated at approximately 0.0762, indicating that an improvement in political relations relative to the previous year can significantly and positively promote international trade flows. Holding all else constant, a ten percent increase in voting similarity is associated with an approximately 0.8% increase in bilateral trade flows, which is economically meaningful. The lagged political affinity, estimated at 0.195, suggests a lasting effect of geopolitics on trade, emphasizing the importance of controlling for country-pair fixed effects. The results for heterogeneity in Column (2) indicate that the elasticity of geopolitics is greater for final consumption (0.183) than for intermediate goods (0.0214), suggesting that high-level political attitudes are reflected in bottom-level consumer behavior. Including trade policy controls, such as tariffs, does not alter the significant coefficient for final consumption. However, we interpret the results with tariffs with particular caution due to the less reliable quality of tariff data and the relatively limited number of observations. We use the coefficient of $\Delta Vote_{ijt}$ (0.0762) from Column (1) and the coefficients of $\Delta Vote\_inter$ (0.0214) and $\Delta Vote\_final$ (0.183) from Column (2) as the geopolitical elasticity of interest for our counterfactual analyses.

Additionally, we conduct several robustness checks by (1) using an alternative measure of voting similarity; (2) repeating the estimation sector by sector; (3) estimating the heterogeneous effects of voting similarity. In Table 2, Columns (1) and (2) utilize $Vote_{ijt}$ in the current period as the voting similarity index, while Columns (3) and (4) use the previous period measure $Vote_{ij,t-1}$ as the control. In Columns (1) and (3), we investigate the homogeneous effects of geopolitics on trade, whereas in Columns (2) and (4), we estimate the heterogeneous effects for intermediate goods and for final consumption simultaneously. The patterns of the results are consistent with those in the benchmark. Given our focus on the contemporary revision effects of geopolitics, the

[4] $\Delta Vote\_inter_{ijt}$ is the interaction term of $\Delta Vote_{ijt}$ with the intermediate production dummy, and $Vote\_inter_{ij,t-1}$ is the interaction term of $Vote_{ij,t-1}$ with the intermediate production dummy. $\Delta Vote\_final_{ijt}$ is the interaction term of $\Delta Vote_{ijt}$ with the final consumption dummy, and $Vote\_final_{ij,t-1}$ is the interaction term of $Vote_{ij,t-1}$ with the final consumption dummy.

Table 2
Geopolitics Elasticity: Alternative Measures.

	(1)	(2)	(3)	(4)
	Dependent variable: $tradeflow_{ijt}^{rs}$			
$Vote_{ijt}$	0.0987*			
	(0.0516)			
$Vote\_inter_{ijt}$		0.0167		
		(0.0528)		
$Vote\_final_{ijt}$		0.256***		
		(0.0652)		
$Vote_{ij,t-1}$			0.133**	
			(0.0518)	
$Vote\_inter_{ij,t-1}$				0.0510
				(0.0549)
$Vote\_final_{ij,t-1}$				0.283***
				(0.0639)
Controls	✓	✓	✓	✓
FE_{irt}	✓	✓	✓	✓
FE_{jst}	✓	✓	✓	✓
FE_{rs}	✓	✓	✓	✓
FE_{ij}	✓	✓	✓	✓
Observations	29,214,668	29,214,668	29,223,743	29,223,743

Notes: This table presents the estimates of geopolitics elasticity using the PPML estimator, based on alternative measures. Columns (1) and (3) analyze trade flows of both intermediates and final-use consumption goods. Columns (2) and (4) explore the heterogeneous effects of geopolitics on GVCs by including interaction term $Vote\_inter_{ijt}$ for intermediate goods, and $Vote\_final_{ijt}$ for final consumption simultaneously. Fixed effects for exporter–input sector–year, importer–output sector–year, input sector–output, and exporter–importer are consistently included. Standard errors, clustered at the exporter–importer level, are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 3
Geopolitics Elasticity with GVC Positions.

	(1)	(2)	(3)	(4)
	Dependent variable: $tradeflow_{ijt}^{rs}$			
$Vote_{ij,t-1}$	0.194**	0.193**		
	(0.0841)	(0.0840)		
$\Delta Vote_{ijt}$	−0.114	−0.176		
	(0.187)	(0.193)		
$\Delta Vote_{ijt} \times U_{it}$	0.0330	−0.0722		
	(0.0544)	(0.107)		
$\Delta Vote_{ijt} \times D_{jt}$	0.0588	0.190*		
	(0.0700)	(0.105)		
$\Delta Vote_{ijt} \times D_{it}$		0.135		
		(0.105)		
$\Delta Vote_{ijt} \times U_{jt}$		−0.131*		
		(0.0779)		
$Vote_{ijt}$			0.0436	0.0198
			(0.465)	(0.441)
$Vote_{ijt} \times U_{it}$			0.0246	−0.0782
			(0.145)	(0.289)
$Vote_{ijt} \times D_{jt}$			0.00132	0.528*
			(0.155)	(0.276)
$Vote_{ijt} \times D_{it}$				0.134
				(0.270)
$Vote_{ijt} \times U_{jt}$				−0.541**
				(0.248)
Controls	✓	✓	✓	✓
FE_{irt}	✓	✓	✓	✓
FE_{jst}	✓	✓	✓	✓
FE_{rs}	✓	✓	✓	✓
FE_{ij}	✓	✓	✓	✓
Observations	29,189,608	29,189,608	29,214,668	29,214,668

Notes: This table presents the estimates of geopolitics elasticity with GVC positions. We consider two GVC positions: Upstreamness U and Downstreamness D, following Antràs and Chor (2018). Fixed effects for exporter–input sector–year, importer–output sector–year, input sector–output, and exporter–importer are consistently included. Standard errors, clustered at the exporter–importer level, are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

estimates in Table 1 are regarded as the benchmark. Subsequently, in Table A.3, we repeat the estimation for each input sector. The sector-level elasticity is reported from Columns (1) to (35). In Table A.4, we include interaction terms of $\Delta Vote_{ijt}$ and sector dummies for each sector simultaneously, obtaining the heterogeneous effects for each input sector. The elasticity of geopolitics shows significant heterogeneity across sectors, reflecting the sector-specific sensitivity to political shocks.

To explore the role of GVCs in geopolitics elasticity, we further investigate the impacts of geopolitical affinity and different GVC positions on international trade flows. We consider two crucial GVC positions: Upstreamness U and Downstreamness D, following Antràs and Chor (2018). Specifically, Column (1) of Table 3 examines the interactions of $\Delta Vote_{ijt}$ with the exporter's Upstreamness U_{it} and the importer's Downstreamness D_{jt}, while Column (2) considers the interactions of $\Delta Vote_{ijt}$ with both the exporter's and importer's Upstreamness and Downstreamness (U_{it}, U_{jt}, D_{it}, D_{jt}) simultaneously. From Column (2), we observe that the effects of geopolitics predominantly arise from the demand side, or the importing country, and show divergent impacts with importer's Upstreamness and Downstreamness. Recall that Upstreamness U is higher if usage occurs more stages upstream from final demand, and Downstreamness D is higher if usage occurs more stages downstream from primary factors. The positive and significant coefficient of $\Delta Vote_{ijt} \times D_{jt}$ suggests that a more favorable political relationship becomes even more influential if the importer's GVCs incorporate more stages downstream from primary factors. This is consistent with the definition of Downstreamness and the economics of geopolitics, as consumers in the importing country tend to purchase more from politically friendly trading partners if the importer needs more materials for multi-stage production chains. Conversely, a negative impact appears if the importing country is relatively far from final demand, implying a competitive effect with its trading partners in upstream input material sectors, despite their favorable geopolitical relations. Columns (3) and (4) serve as counterparts to Columns (1) and (2), with $\Delta Vote_{ijt}$ replaced by $Vote_{ijt}$. The results of Columns (3) and (4) are qualitatively similar to those of Columns (1) and (2). We find that the divergent effects of current period geopolitical proximity with the importer's Upstreamness and Downstreamness in Column (4) are more pronounced relative to the change effects in geopolitics observed in Column (2). This distinction is quite straightforward as these interaction terms of current period geopolitics capture some lagged effects of $Vote_{ij,t-1}$ previously shown in Column (2) but are absent in Column (4) now.

The geopolitics measure of voting similarity is considered highly reliable as it encapsulates historical, contemporary, and forward-looking aspects of a country's economic, political, and security considerations with respect to another. Its comprehensive nature ensures a likely orthogonality to potential shocks in bilateral trade flows.[5] Nonetheless, we recognize the potential endogeneity concern and address it through an Instrumental Variables (IV) estimation. We acknowledge that identifying a feasible IV varying over time and across country pairs is a significant challenge. To address this, we leverage the six sub-categories of voting issues identified in Bailey et al. (2017): Palestinian conflict, nuclear weapons and nuclear material, arms control and disarmament, colonialism, human rights, and (economic) development.

Focusing on the "human rights" category, which accounts for 17% of all UNGA voting issues, we construct a new voting similarity index specifically based on human rights-related issues. We then use the lagged indices from one and two years prior ($Vote\_hr_{ij,t-1}$ and $Vote\_hr_{ij,t-2}$) as instrumental variables. These lagged indices are likely to be correlated with the original voting similarity measure, satisfying the relevance requirement. On the other hand, UNGA issues related to human rights are generally disconnected from bilateral trade between voting pairs, as countries typically do not consider economic or trade interests when voting on human rights issues. Moreover, the lagged human rights-related measures—relative to the current year's measure—are even less likely to correlate with residual shocks to current trade flows. This is particularly true after accounting for comprehensive fixed effects, including FE_{irt}, FE_{jst}, FE_{rs}, and FE_{ij}. Thus, these instrumental variables are likely to satisfy the exclusion restriction.

The IV regression results are presented in Table 4. Columns (2), (4), and (6) show the 2nd stage results with $Vote\_hr_{ij,t-1}$, $Vote\_hr_{ij,t-2}$, and both $Vote\_hr_{ij,t-1}$ and $Vote\_hr_{ij,t-2}$ used as IVs, respectively. The results confirm that our estimate of geopolitics elasticity remains statistically significant and economically robust. The Hansen J-statistic clears any potential concern of over-identification. The 1st stage results further affirm the validity of the chosen IVs, as evidenced by the F-statistics and the coefficients.[6] Overall, the voting similarity indices based on UNGA data provide effective measures of geopolitical relationships. The estimates of geopolitics elasticity derived from these indices remain trustworthy, even under alternative IV strategies. We believe our approach sufficiently addresses potential endogeneity concerns, ensuring the robustness of our findings.

4. Counterfactual framework

We are interested in the impacts of changes in geopolitical proximity (g_{ij}), trade costs (d_{ij}^{rs}, d_{ij}^{rF}), and technology level (T_j^s) on trade flows, GVC positions, and welfare. We utilize the exact hat algebra to rewrite all the structural Eqs. (1)–(7) in terms of changes (Antràs & Chor, 2018; Caliendo & Parro, 2015; Dekle et al., 2007; Galle & Lorentzen, 2024). Specifically, we denote a variable of interest in its factual state as x and its counterfactual value as x'. The relative change is then expressed with a hat, $\hat{x} \equiv x'/x$. For all the equilibrium equations mentioned above, we transform them into their "hat" versions for counterfactual analyses,

[5] While we recognize the historical evolution of geopolitical conflicts, we argue that it constitutes only a minimal share of the overall variation in geopolitics. To support this, we regress our geopolitics measure on three sets of fixed effects commonly employed in our reduced-form regressions: exporter-year, importer-year, and exporter-importer fixed effects. The sequential R-squared is 0.969, indicating that the residual variation in geopolitics over time—after purging the fixed effects—is negligible.

[6] As an alternative, we also use the voting similarity indices lagged by two and three years ($Vote_{ij,t-2}$ and $Vote_{ij,t-3}$) as instrumental variables. The corresponding IV results are presented in Table A.5. Columns (2), (4), and (6) show the 2nd stage results with $Vote_{ij,t-2}$, $Vote_{ij,t-3}$, and both $Vote_{ij,t-2}$ and $Vote_{ij,t-3}$ used as IVs, respectively. These results are closely aligned with those in Table 4, further supporting the robustness of our approach.

Table 4
IV Estimation Results.

	$Vote\_hr_{ij,t-1}$		$Vote\_hr_{ij,t-2}$		$Vote\_hr_{ij,t-1}$&$Vote\_hr_{ij,t-2}$	
	1st stage	IV/2SLS	1st stage	IV/2SLS	1st stage	IV/2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
$comcur_{ijt}$	0.00686	−0.0799**	−0.000620	−0.0744*	−0.00365	−0.0839**
	(0.00431)	(0.0391)	(0.00318)	(0.0389)	(0.00302)	(0.0389)
rta_{ijt}	0.0224***	0.0622	0.0221***	0.0629	0.0168***	0.0661
	(0.00789)	(0.0412)	(0.00614)	(0.0420)	(0.00469)	(0.0418)
gsp_{ijt}	−0.0215***	0.0158	−0.00480	0.0139	−0.0127**	0.0148
	(0.00832)	(0.0416)	(0.00712)	(0.0397)	(0.00603)	(0.0431)
$Vote_{ijt}$		0.330*		0.426*		0.459*
		(0.171)		(0.249)		(0.277)
$Vote\_hr_{ij,t-1}$	0.266***				0.160***	
	(0.0232)				(0.0159)	
$Vote\_hr_{ij,t-2}$			0.204***		0.0896***	
			(0.0196)		(0.0193)	
FE_{irt}	✓	✓	✓	✓	✓	✓
FE_{jst}	✓	✓	✓	✓	✓	✓
FE_{rs}	✓	✓	✓	✓	✓	✓
FE_{ij}	✓	✓	✓	✓	✓	✓
Observations	24,755,933	24,755,933	24,663,569	24,663,569	23,594,086	23,594,086
1st stage F-statistic	130.55		108.64		76.38	
Hansen$J$-statistic						0.009
χ^2 p-value						0.9261

Notes: This table presents the IV regression results. Columns (2), (4), and (6) show the 2nd stage results with $Vote\_hr_{ij,t-1}$, $Vote\_hr_{ij,t-2}$, and both $Vote\_hr_{ij,t-1}$ and $Vote\_hr_{ij,t-2}$ used as IVs, respectively. Fixed effects for exporter–input sector–year, importer–output sector–year, input sector–output, and exporter–importer are consistently included. Standard errors, clustered at the exporter–importer level, are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

allowing us to systematically study the effects of theoretical adjustments on the model's variables.

$$\hat{\pi}_{ij}^{rs} = \frac{\hat{T}_i^r \left(\hat{c}_i^r \hat{d}_{ij}^{rs} \hat{g}_{ij}\right)^{-\theta^r}}{\left(\hat{P}_j^{rs}\right)^{-\theta^r}}, \tag{15}$$

$$\hat{\pi}_{ij}^{rF} = \frac{\hat{T}_i^r \left(\hat{c}_i^r \hat{d}_{ij}^{rF} \hat{g}_{ij}\right)^{-\theta^r}}{\left(\hat{P}_j^{rF}\right)^{-\theta^r}}, \tag{16}$$

$$\hat{c}_j^s = (\hat{w}_j)^{1-\sum_{r=1}^S \gamma_j^{rs}} \prod_{r=1}^S \left(\hat{P}_j^{rs}\right)^{\gamma_j^{rs}}, \tag{17}$$

$$\hat{P}_j^{rs} = \left[\sum_{i=1}^J \pi_{ij}^{rs} \hat{T}_i^r \left(\hat{c}_i^r \hat{d}_{ij}^{rs} \hat{g}_{ij}\right)^{-\theta^r}\right]^{-1/\theta^r}, \tag{18}$$

$$\hat{P}_j^{rF} = \left[\sum_{i=1}^J \pi_{ij}^{rF} \hat{T}_i^r \left(\hat{c}_i^r \hat{d}_{ij}^{rF} \hat{g}_{ij}\right)^{-\theta^r}\right]^{-1/\theta^r}, \tag{19}$$

$$(Y_j^s)' = \sum_{k=1}^J (\pi_{jk}^{sF})' (\alpha_k^s)' (\hat{w}_k w_k L_k + D_k') + \sum_{r=1}^S \sum_{k=1}^J (\pi_{jk}^{sr})' \gamma_k^{sr} (Y_k^r)', \tag{20}$$

$$\sum_{i=1}^J \sum_{r=1}^S \sum_{s=1}^S (\pi_{ij}^{sr})' \gamma_j^{sr} (Y_j^r)' + \hat{w}_j w_j L_j = \sum_{i=1}^J \sum_{r=1}^S \sum_{s=1}^S (\pi_{ji}^{sr})' \gamma_i^{sr} (Y_i^r)' + \sum_{s=1}^S \sum_{i=1}^J (\pi_{ji}^{sF})' (\alpha_i^s)' (\hat{w}_i w_i L_i + D_i'). \tag{21}$$

Note that wage income in country j is also equivalent to the value added across all sectors, expressed as $w_j L_j = \sum_{r=1}^S \left(1 - \sum_{s=1}^S \gamma_j^{sr}\right) Y_j^r = \sum_{r=1}^S VA_j^r$. Given the Cobb–Douglas cost function, we derive the following relationship: $(VA_j^r)' = \widehat{VA}_j^r \cdot VA_j^r = \hat{Y}_j^r \cdot VA_j^r$ once $\hat{Y}_j^r$ is determined. The welfare effect is then calculated using:

$$\hat{W}_j = \hat{w}_j / \hat{P}_j^F = \hat{w}_j / \prod_{s=1}^S \left(\hat{P}_j^{sF}\right)^{\alpha_j^s}. \tag{22}$$

Table 5
Israeli–Palestinian Conflict.

Countries or Regions	Δ Welfare	U'	U	D'	D	Δ Intermediate Import	Δ Intermediate Export	Δ Final-use Import	Δ Final-use Export	Δ Gross Output
Panel A1. Modest political disparity; Geopolitics elasticity (0.0762)										
Pro-Palestinian Camp	−0.34%	2.2922	2.2883	2.2195	2.2167	0.86%	−7.65%	−7.39%	−9.66%	−0.03%
Pro-Israel Camp	−0.01%	2.0702	2.0730	2.0647	2.0667	0.56%	0.30%	0.44%	0.56%	−0.03%
CHN	−0.32%	2.8347	2.8237	2.9115	2.9046	0.43%	−5.90%	−8.60%	−5.06%	0.22%
USA	−0.06%	1.7883	1.7880	1.8096	1.8096	0.89%	1.62%	1.28%	1.75%	−0.23%
EU	0.00%	2.0673	2.0694	2.0692	2.0710	0.50%	0.69%	0.83%	0.66%	−0.02%
NATO	−0.04%	2.0507	2.0528	2.0526	2.0545	0.62%	0.22%	0.56%	0.18%	−0.04%
Panel A2. Large political disparity; Geopolitics elasticity (0.0762)										
Pro-Palestinian Camp	−0.62%	2.2953	2.2883	2.2222	2.2167	1.41%	−12.30%	−12.39%	−15.44%	−0.06%
Pro-Israel Camp	−0.26%	2.0683	2.0730	2.0629	2.0667	1.14%	−0.62%	−0.25%	−0.10%	−0.05%
CHN	−0.65%	2.8445	2.8237	2.9177	2.9046	1.05%	−10.58%	−15.70%	−9.37%	0.40%
USA	−0.20%	1.7881	1.7880	1.8097	1.8096	1.06%	1.69%	1.39%	2.05%	−0.53%
EU	−0.27%	2.0660	2.0694	2.0672	2.0710	1.10%	−0.01%	0.40%	0.02%	−0.04%
NATO	−0.31%	2.0494	2.0528	2.0508	2.0545	1.24%	−0.65%	0.04%	−0.63%	−0.07%
Panel A3. Modest political disparity; Geopolitics elasticity for intermediate goods (0.0214) and final consumption (0.183)										
Pro-Palestinian Camp	−0.70%	2.2927	2.2883	2.2178	2.2167	1.73%	−1.61%	−12.91%	−22.34%	−0.09%
Pro-Israel Camp	0.14%	2.0701	2.0730	2.0666	2.0667	0.65%	−0.03%	1.08%	1.69%	−0.04%
CHN	−0.27%	2.8355	2.8237	2.9077	2.9046	0.04%	−0.57%	−18.89%	−10.53%	0.11%
USA	0.05%	1.7876	1.7880	1.8095	1.8096	0.31%	0.39%	2.70%	4.47%	−0.28%
EU	0.20%	2.0666	2.0694	2.0710	2.0710	0.66%	0.12%	1.70%	2.10%	−0.04%
NATO	0.13%	2.0503	2.0528	2.0544	2.0545	0.84%	0.02%	1.20%	1.13%	−0.05%

Notes: The table reports the average changes (in %) in welfare, trade for intermediate goods or final consumption, gross output, and the average factual and counterfactual GVC positions for the two camps and several representative countries or regions. Panels A1, A2, and A3 correspond to the Scenarios 1, 2 and 3 in Section 5.1, respectively.

By using the framework described above, we are equipped to conduct counterfactual analyses. Suppose in a counterfactual scenario, due to geopolitical conflicts, countries around the world are divided into different camps, leading to updates in the voting similarity matrix. The change in the voting similarity matrix is reflected in $(\hat{g}_{ijt})^{-\theta^r}$ via the elasticity we estimated previously, according to the equation:

$$(\hat{g}_{ijt})^{-\theta^r} = \exp\left[\chi\left(Vote'_{ijt} - Vote_{ijt}\right)\right].$$

Thus, we can input $(\hat{g}_{ijt})^{-\theta^r}$ into the counterfactual equations to calculate changes in variables of interest, such as trade flows—for instance, the total intermediate trade flows of sector r from the US to China $\sum_{s=1}^{S}(Z^{rs}_{US,CN})'$, the total final-use trade flows of sector r from the US to China $(F^{r}_{US,CN})'$, the total intermediate trade flows of sector r from China to the US $\sum_{s=1}^{S}(Z^{rs}_{CN,US})'$, and the total final-use trade flows of sector r from China to the US $(F^{r}_{CN,US})'$, etc. Moreover, we can evaluate changes in welfare, gross output, and GVC positions characterized by Upstreamness U and Downstreamness D.

5. Counterfactual results

In this section, we conduct several counterfactual analyses to explore the effects of significant geopolitical events on welfare, positions within GVCs, and trade flows encompassing both intermediate goods and final consumption, as well as on overall gross output. The geopolitical events of interest—the Israeli–Palestinian Conflict, the Russo–Ukrainian War, and the China–United States Trade Disputes—are steeped in historical grievances that continue to evolve, involving multiple countries and profoundly affecting the global economic, political, and military landscapes. For example, the Israeli–Palestinian conflict has led to severe humanitarian disasters, including hunger, displacement, and extensive casualties. In this conflict, certain non-regional powers have engaged both covertly and overtly, influencing regional tensions through economic, military, or diplomatic support to advance their geopolitical and economic agendas. Moreover, the Russo–Ukrainian War has wreaked catastrophic local damage and, as a confrontation between major producers and exporters of agricultural products, minerals, and energy, has exacerbated pressures on already vulnerable GVCs. Another pressing geopolitical concern is the China–United States Trade Disputes, which significantly impede the economic progress of the two largest global economies and cast a shadow over the post-COVID-19 global economic recovery and globalization efforts. Analyzing these impactful geopolitical events within a quantitative trade model to assess their effects on economic outcomes, trade flows, GVCs, and welfare is not only theoretically significant but also crucial for practical policy implications.

5.1. Israeli–Palestinian conflict

The Israeli–Palestinian conflict has its roots in the late nineteenth century and has seen a recent escalation in hostilities. According to a report from the Global Conflict Tracker,[7] the conflict intensified on October 7, 2023, when hostilities broke out between Israel and Hamas. In response, President Joe Biden publicly affirmed his support for Israel. Concurrently, Israel declared war on Hamas, prompting the US to escalate its military support by sending additional arms shipments and repositioning warships in the Mediterranean Sea closer to Israel. Despite the situation's urgency, an emergency United Nations Security Council meeting convened to discuss the renewed violence but failed to reach a consensus statement.

In this paper, we simulate the effects of conflict-induced alignments on key variables of interest. Specifically, we categorize countries into two camps: the Pro-Palestine Camp and the Pro-Israel Camp. The Pro-Palestine Camp includes China, Russia, Indonesia, and Turkey, while the Pro-Israel Camp comprises countries from the European Union (EU), the North Atlantic Treaty Organization (NATO), the US, Japan, Korea, Australia, and Canada. We investigate several scenarios in which the voting similarity matrix shifts towards a more adversarial stance between the camps and reflects increased unity within each camp.[8] For each scenario, we simulate changes in the relevant variables and present the percentage changes and GVC positions in Table 5.

Scenario 1. *Voting similarity indices within each camp shift to 1, while the indices shift to 0.01 between countries in different camps. The geopolitics elasticity (0.0762) from Column (1) in Table 1 is applied.*

Scenario 2. *Voting similarity indices within each camp shift to 1, while the indices shift to 0.001 between countries in different camps. The geopolitics elasticity (0.0762) from Column (1) in Table 1 is applied.*

Scenario 3. *Voting similarity indices within each camp shift to 1, while the indices shift to 0.01 between countries in different camps. The geopolitics elasticities for intermediate goods (0.0214) and final consumption (0.183) from Column (2) in Table 1 are applied.*

Panels A1 and A2 of Table 5 show the counterfactual results for Scenarios 1 and 2, respectively. In Scenario 1, the effect on the Pro-Israel Camp is relatively trivial, while the Pro-Palestine Camp experiences a significant welfare loss, with China contributing the majority of this decline. Due to heightened political risks, China's international trade decreases significantly. As it becomes more challenging to export goods to the Pro-Israel Camp, China may enhance its domestic market development, leading to an increase in gross output. However, this is offset by rising material costs, resulting in a net decrease in China's welfare. Both the Upstreamness and Downstreamness measures increase, suggesting an extension of GVCs. This outcome is somewhat perplexing and may indicate that China is engaging in trade through third countries, thereby lengthening its value chains. In both scenarios, both camps experience an average welfare loss. Additionally, we observe that a larger disparity in the voting similarity index between the two camps correlates with a greater welfare loss for both. Comparing Panels A1 and A2 of Table 5, the economic outcomes are qualitatively similar across scenarios, but the magnitudes are amplified. For instance, China's welfare loss intensifies from −0.32% to −0.65%, and the Upstreamness measure increases slightly from 2.83% to 2.84%.

In Scenarios 1 and 2, we apply a homogeneous geopolitics elasticity. Panel A3 of Table 5 presents the counterfactual results for Scenario 3, where we differentiate the elasticity for intermediate goods and final consumption. The analysis reveals that the impacts on welfare, Upstreamness, Downstreamness, and gross output for China are reduced. This underscores the significant role of intermediate trade for China. With a higher elasticity for final consumption, China experiences a substantial reduction in final-use trade, but the lesser impacts on intermediate goods ultimately temper the overall negative effects. Consequently, the reduction in China's welfare loss is less pronounced.

Regarding the positions along the GVCs, the Pro-Palestine Camp exhibits higher levels of Upstreamness and Downstreamness, while the Pro-Israel Camp shows reductions in both. The degree of change in these metrics intensifies as the differences in voting similarity between the camps increase. Notably, heterogeneous elasticity does not significantly influence the magnitude of Upstreamness or Downstreamness. This observation underscores the substantial potential benefits of economic cooperation and GVCs restructuring among developing countries such as China and Russia. China boasts one of the largest consumer markets and most extensive manufacturing capacities globally, whereas Russia possesses rich resources in upstream manufacturing materials like agricultural products, crude oil, and minerals but lacks the capacity to further process these materials. In the scenario of divided camps arising from the Israeli–Palestinian Conflict, China and Russia leverage their comparative advantages and factor endowments to enhance their GVC positions.

5.2. Russo-Ukrainian war

The Russo–Ukrainian War, an ongoing conflict that began in February 2014, saw escalating military engagements by 2021 at the Russia–Ukraine border, with both sides deploying over 100,000 troops. Towards the end of that year, the Ministry of Foreign Affairs of the Russian Federation proposed a draft treaty offering security assurances to the US and NATO in an attempt to peacefully resolve the conflict. However, despite three rounds of dialogue in January 2022 involving Russia, the US, NATO, and the Organization for Security and Cooperation in Europe, significant progress towards peace remained elusive. Subsequently, the US supplied Ukraine with arms and soldiers, while NATO and the Republic of Belarus conducted live fire drills in February, actions that further exacerbated tensions. On February 24, 2022, President Vladimir Putin initiated a "special military operation" aimed at

[7] https://www.cfr.org/global-conflict-tracker/conflict/israeli-palestinian-conflict

[8] We acknowledge that the assignment of voting similarity values (e.g., 1 for within-camp and 0.1 or 0.01 for between-camp relationships) may appear arbitrary. However, these values are chosen to simulate polarized geopolitical scenarios and to assess their economic impacts. Importantly, the methodology allows for flexibility in setting alternative values, which can be explored in future extensions of the study.

"demilitarizing and denazifying" Ukraine, claiming that Russia had no intentions of occupying the country. This phase of the Russo–Ukrainian War attracted widespread international scrutiny, leading to heightened sanctions against Russia by numerous countries. In late September 2022, Russia declared the annexation of four partially-occupied regions, an action that received widespread condemnation internationally. The conflict has led to a severe humanitarian crisis, resulting in a significant influx of refugees and tens of thousands of casualties.

For this analysis, countries are categorized into two groups: the Eastern Camp and the Western Camp. The Eastern Camp includes China and Russia, while the Western Camp comprises countries in the EU, NATO, the US, Canada, Japan, Korea, and Australia. We then examine several scenarios in which the voting similarity matrix shifts towards a relatively more adversarial stance between the two camps, as well as scenarios reflecting a more unified alignment within each camp. For each scenario, we simulate changes in the relevant variables and present the percentage changes and GVC positions in Table 6.

Scenario 1. *Voting similarity indices within each camp shift to 1, while the indices shift to 0.01 between countries in different camps. The geopolitics elasticity (0.0762) from Column (1) in Table 1 is applied.*

Scenario 2. *Voting similarity indices within each camp shift to 1, while the indices shift to 0.001 between countries in different camps. The geopolitics elasticity (0.0762) from Column (1) in Table 1 is applied.*

Scenario 3. *Voting similarity indices within each camp shift to 1, while the indices shift to 0.01 between countries in different camps. The geopolitics elasticities for intermediate goods (0.0214) and final consumption (0.183) from Column (2) in Table 1 are applied.*

For the Russo–Ukrainian War, Table 6 indicates that both camps experience relatively moderate and stable average welfare changes. The Eastern Camp sees a net welfare loss, whereas the Western Camp generally gains in welfare. Applying homogeneous elasticity in Scenarios 1 and 2, both Russia and China, along with the US, incur welfare losses. Notably, Russia experiences a larger relative loss compared to China. Generally, the economic outcomes for China and Russia align closely, with their GVC positions lengthening—likely a result of trade being diverted to third countries. For instance, while Russian crude could be sold directly to the EU, US-imposed sanctions now necessitate routing Russian oil through third countries before it reaches the EU. Conversely, the Western Camp enjoys an overall increase in welfare, although the distribution is uneven. The EU benefits significantly, acting as a conduit between the US and Eastern Camp, whereas the US experiences a slight welfare reduction.

As the political divide between the two camps widens from Scenario 1 to Scenario 2, the EU begins to face welfare losses comparable to those of the US, as evidenced in Panel B2 of Table 6. This shift indicates the diminishing intermediary role of the EU between the US and Eastern Camp, with the EU ultimately bearing the costs of an adversarial stance towards the Eastern Camp.

In Scenario 3, where we distinguish between the elasticities for intermediate goods and final consumption, we observe from Panel B3 of Table 6 that Russia incurs a greater loss, while China experiences a lesser loss, and the Western Camp realizes some welfare gains. This outcome can be attributed to the distinct roles each plays within GVCs. The EU, the US, and China possess a comparative advantage in industrial production, whereas Russia is predominantly reliant on exporting upstream production materials, such as wood and crude oil. Consequently, China and the Western Camp are able to mitigate negative impacts through their engagement in intermediate trade, a capacity that Russia does not equally share.

5.3. China–United States trade disputes

China–United States trade saw significant growth in the two decades following China's accession to the World Trade Organization (WTO) in 2001. However, economic conflicts, known as the China–United States Trade Disputes, have been ongoing since January 2018. These began when U.S. President Donald Trump implemented tariffs and other trade barriers on Chinese goods. In retaliation, China increased tariffs on American products. These trade disputes have had substantial impacts on both countries and the global economy (Dang et al., 2023; Fajgelbaum et al., 2020; Goldberg & Reed, 2023; Jiao et al., 2024).

In this paper, we examine the effects of China–United States trade disputes using a novel approach by leveraging the voting similarity index. Tariff data from the World Integrated Trade Solution (WITS) indicate that the average tariff imposed by the US on Chinese goods in 2011 was only 1.6738%. However, Ju et al. (2021) report that tariffs on Chinese imports peaked at 21% during the height of the trade war. Thus, in this section, we model changes in tariff rates as equivalent variations in the voting similarity index across several scenarios to evaluate their effects. Scenario 1 represents the ongoing China–United States Trade Disputes, while Scenario 4 portrays a more extreme scenario—the trade decoupling between China and the US. The counterfactual results for the trade war and decoupling scenarios are displayed in Panels C1 and C4 of Table 7, respectively.

Scenario 1. *Voting similarity indices between China and US in all sectors decrease by 19.655% (=1-(1%-21%)/(1-1.6738%)). The geopolitics elasticity (0.0762) from Column (1) in Table 1 is applied.*

Scenario 2. *Voting similarity indices between China and US in the intermediate sectors decrease by 19.655% (=1-(1%-21%)/(1-1.6738%)). The geopolitics elasticity (0.0214) from Column (2) in Table 1 is applied.*

Scenario 3. *Voting similarity indices between China and US for the final consumption decrease by 19.655% (=1-(1%-21%)/(1-1.6738%)). The geopolitics elasticity (0.183) from Column (2) in Table 1 is applied.*

Scenario 4. *Voting similarity indices between China and US in all sectors decrease by 99.999999% (=1-0.00000001/(1-1.6738%)). The geopolitics elasticity (0.0762) from Column (1) in Table 1 is applied.*

We initially adjust the political affinity matrix between the US and China to correspond with their tariff changes from 1.6738% to a peak of 21%. In Scenario 1, we assume political changes affect all sectors, as shown in Panel C1. Scenarios 2 and 3 isolate the effects to intermediate goods and final consumption, respectively, as detailed in Panels C2 and C3. The economic impacts across all countries appear modest. The welfare losses in the US predominantly stem from final consumption, mirroring the situation in China. This underscores the US's substantial reliance on Chinese final goods. The absence of affordable Chinese imports significantly raises

Table 6
Russo–Ukrainian War.

Countries or Regions	Δ Welfare	U'	U	D'	D	Δ Intermediate Import	Δ Intermediate Export	Δ Final-use Import	Δ Final-use Export	Δ Gross Output
Panel B1. Modest political disparity; Geopolitics elasticity (0.0762)										
Eastern Camp	−0.33%	2.5880	2.5816	2.4483	2.4414	0.12%	−5.85%	−7.67%	−7.13%	0.16%
Western Camp	0.05%	2.0700	2.0730	2.0647	2.0667	0.58%	0.57%	0.67%	0.90%	−0.02%
RUS	−0.36%	2.3408	2.3395	1.9852	1.9783	−0.18%	−5.60%	−6.55%	−8.91%	0.04%
CHN	−0.29%	2.8352	2.8237	2.9115	2.9046	0.41%	−6.10%	−8.80%	−5.36%	0.29%
USA	−0.02%	1.7883	1.7880	1.8096	1.8096	0.88%	1.73%	1.36%	1.86%	−0.17%
EU	0.07%	2.0671	2.0694	2.0691	2.0710	0.50%	0.95%	1.06%	1.00%	−0.02%
NATO	0.06%	2.0506	2.0528	2.0528	2.0545	0.59%	0.92%	1.01%	0.99%	−0.03%
Panel B2. Large political disparity; Geopolitics elasticity (0.0762)										
Eastern Camp	−0.61%	2.5931	2.5816	2.4543	2.4414	0.36%	−10.28%	−13.67%	−12.12%	0.26%
Western Camp	−0.16%	2.0680	2.0730	2.0628	2.0667	1.17%	−0.22%	0.09%	0.39%	−0.05%
RUS	−0.63%	2.3411	2.3395	1.9909	1.9783	−0.31%	−9.75%	−11.41%	−14.49%	0.01%
CHN	−0.60%	2.8451	2.8237	2.9176	2.9046	1.03%	−10.82%	−15.93%	−9.76%	0.50%
USA	−0.14%	1.7882	1.7880	1.8097	1.8096	1.04%	1.86%	1.51%	2.22%	−0.44%
EU	−0.15%	2.0657	2.0694	2.0672	2.0710	1.09%	0.37%	0.73%	0.51%	−0.04%
NATO	−0.16%	2.0493	2.0528	2.0510	2.0545	1.18%	0.39%	0.71%	0.57%	−0.06%
Panel B3. Modest political disparity; Geopolitics elasticity for intermediate goods (0.0214) and final consumption (0.183)										
Eastern Camp	−0.77%	2.5828	2.5816	2.4466	2.4414	0.01%	−1.71%	−14.57%	−18.72%	0.11%
Western Camp	0.20%	2.0698	2.0730	2.0666	2.0667	0.65%	0.03%	1.53%	2.34%	−0.04%
RUS	−1.28%	2.3287	2.3395	1.9854	1.9783	0.01%	−3.01%	−9.95%	−26.20%	0.05%
CHN	−0.25%	2.8369	2.8237	2.9077	2.9046	0.01%	−0.41%	−19.19%	−11.24%	0.17%
USA	0.08%	1.7877	1.7880	1.8095	1.8096	0.36%	0.44%	2.90%	4.74%	−0.23%
EU	0.27%	2.0663	2.0694	2.0711	2.0710	0.64%	0.18%	2.14%	2.73%	−0.04%
NATO	0.24%	2.0499	2.0528	2.0546	2.0545	0.77%	0.17%	2.04%	2.68%	−0.05%

Notes: The table reports the average changes (in %) in welfare, trade for intermediate goods or final consumption, gross output, and the average factual and counterfactual GVC positions for the two camps and several representative countries or regions. Panels B1, B2, and B3 correspond to the Scenarios 1, 2 and 3 in Section 5.2, respectively.

the US price level, adversely affecting American welfare. Conversely, China experiences a welfare loss due to a contracted export market. Overall, the US incurs greater relative losses, illustrating that the economic burdens of the trade war predominantly affect US consumers (Amiti et al., 2019).

In Scenario 4, we examine the scenario of trade decoupling between China and the US, where the voting distance approaches a prohibitive level. As indicated in Panel C4 of Table 7, the US experiences a substantial welfare loss of approximately 1%, highlighting its dependence on affordably priced Chinese products. Conversely, China appears to gain significantly in welfare, a result that initially seems perplexing.

To investigate this, we analyze the welfare effects for China and the US relative to their geopolitical distance, illustrated in Fig. 1. The US welfare loss shows a consistent decline, while China's welfare exhibits a U-shaped curve. The significant welfare loss for the US stems from the absence of lower-cost Chinese goods. For China, difficulties in trading with the US prompt it to seek new trade partners and to enhance its domestic market, thus potentially reversing the negative impacts of trade decoupling. However, an intermediate tariff level around 70% diminishes China's resolve to completely shift away from established trade patterns, leading to minimal welfare at this point. Interestingly, when China's welfare is most adversely affected, the geopolitical distance—or equivalently, the tariff level—is around 70%. This coincides with historical high tariffs such as those during the Smoot–Hawley Tariff Act, which was set at 67%, and aligns with theoretical optimal US tariffs estimated at around 60% (Ossa, 2014), validating our simulation outcomes. Panel C7 of Table 7 elaborates on the economic outcomes, welfare, and GVC positions of some representative countries and regions when China experiences the greatest adversity. It is revealed that the US actually suffers greater losses than China, which reinforces the call for renewed trade negotiations between the two nations, as suggested by numerous studies.

To further investigate the role of GVCs in geopolitical events, we conducted two additional counterfactual analyses. Departing from Scenario 1, where we adjusted voting similarity indices between China and the US across all sectors, we separately analyze the effects of political changes on intermediate goods (Scenario 5) and final consumption (Scenario 6), both applying the same geopolitics elasticity of 0.0762. This welfare decomposition aims to underscore the significance of GVCs in quantitative policy evaluations. The outcomes of Scenarios 5 and 6 are presented in Panels C5 and C6 of Table 7, respectively.

The findings indicate that the US continues to suffer welfare losses predominantly from final consumption, highlighting its significant dependence on affordable Chinese consumer goods. In contrast, the impacts on China are more balanced between intermediate goods and final consumption, demonstrating a relatively more crucial role for intermediate trade. Specifically, the widened political distance leads to a notable welfare reduction for China due to obstructed intermediate exports to the US, with a larger decline in gross output of approximately −0.0054%, compared to −0.0051% in Scenario 1 and a marginal 0.0003% in Scenario 6. This effect is also reflected in GVC positions: the Downstreamness measure in Scenario 5 (2.9048) closely matches that in Scenario 1 (2.9048), but the Upstreamness measure in Scenario 5 (2.8238) is slightly shorter than in Scenario 1 (2.8242).

Table 7
China–United States Trade Disputes.

Countries or Regions	Δ Welfare	U'	U	D'	D	Δ Intermediate Import	Δ Intermediate Export	Δ Final-use Import	Δ Final-use Export	Δ Gross Output
Panel C1. China–United States Trade Disputes: Geopolitics elasticity (0.0762) for all sectors										
CHN	−0.0046%	2.8242	2.8237	2.9048	2.9046	0.0008%	−0.1677%	−0.2535%	−0.2349%	−0.0051%
USA	−0.0158%	1.7878	1.7880	1.8094	1.8096	0.0038%	−0.1805%	−0.1429%	−0.1401%	0.0039%
EU	−0.0014%	2.0694	2.0694	2.0710	2.0710	0.0031%	0.0046%	0.0052%	0.0076%	−0.0020%
JPN	−0.0013%	1.9422	1.9422	1.9375	1.9375	−0.0048%	0.0023%	0.0138%	0.0250%	−0.0143%
KOR	0.0000%	2.5473	2.5474	2.5394	2.5393	−0.0158%	−0.0022%	0.0143%	0.0292%	0.0038%
CAN	−0.0041%	2.0056	2.0057	1.9298	1.9298	0.0009%	0.0056%	0.0140%	0.0629%	0.0014%
Panel C2. China–United States Trade Disputes: Geopolitics elasticity (0.0214) for intermediate goods										
CHN	−0.0008%	2.8237	2.8237	2.9046	2.9046	0.0005%	−0.0635%	−0.0077%	0.0049%	−0.0016%
USA	−0.0009%	1.7879	1.7880	1.8095	1.8096	0.0007%	−0.0442%	0.0021%	−0.0033%	0.0009%
EU	−0.0003%	2.0694	2.0694	2.0710	2.0710	0.0009%	0.0018%	0.0009%	0.0004%	0.0000%
JPN	−0.0004%	1.9422	1.9422	1.9375	1.9375	−0.0001%	0.0034%	0.0018%	0.0005%	−0.0011%
KOR	−0.0003%	2.5474	2.5474	2.5393	2.5393	−0.0012%	0.0033%	0.0031%	−0.0005%	0.0003%
CAN	−0.0006%	2.0057	2.0057	1.9298	1.9298	0.0004%	0.0035%	0.0013%	0.0007%	0.0018%
Panel C3. China–United States Trade Disputes: Geopolitics elasticity (0.183) final consumption										
CHN	−0.0052%	2.8245	2.8237	2.9046	2.9046	−0.0023%	0.1344%	−0.5338%	−0.6052%	0.0007%
USA	−0.0308%	1.7878	1.7880	1.8096	1.8096	0.0029%	−0.0603%	−0.3570%	−0.3078%	0.0018%
EU	−0.0008%	2.0694	2.0694	2.0710	2.0710	−0.0004%	−0.0030%	0.0042%	0.0153%	−0.0051%
JPN	0.0008%	1.9421	1.9422	1.9375	1.9375	−0.0103%	−0.0197%	0.0147%	0.0591%	−0.0240%
KOR	0.0020%	2.5472	2.5474	2.5394	2.5393	−0.0271%	−0.0332%	0.0079%	0.0730%	0.0064%
CAN	−0.0048%	2.0055	2.0057	1.9299	1.9298	−0.0014%	−0.0172%	0.0230%	0.1445%	−0.0115%
Panel C4. China–United States Trade Decoupling: Geopolitics elasticity (0.0762) for all sectors										
CHN	0.2713%	2.8498	2.8237	2.9132	2.9046	0.0920%	−7.7854%	−12.4898%	−12.3683%	−0.1285%
USA	−1.0293%	1.7765	1.7880	1.7998	1.8096	0.1302%	−8.7838%	−7.3135%	−7.0730%	0.1665%
EU	−0.1142%	2.0681	2.0694	2.0719	2.0710	0.1659%	0.1830%	0.2408%	0.3623%	−0.1122%
JPN	−0.0580%	1.9406	1.9422	1.9383	1.9375	−0.2366%	0.0509%	0.7835%	1.5088%	−0.6866%
KOR	−0.0012%	2.5414	2.5474	2.5418	2.5393	−0.8806%	−0.2524%	0.7457%	1.7383%	0.1778%
CAN	−0.3623%	2.0015	2.0057	1.9324	1.9298	0.0621%	0.2342%	0.7924%	3.4423%	0.1137%
Panel C5. China–United States Trade Disputes: Geopolitics elasticity (0.0762) for intermediate goods										
CHN	−0.0025%	2.8238	2.8237	2.9048	2.9046	0.0018%	−0.2241%	−0.0285%	0.0185%	−0.0054%
USA	−0.0030%	1.7879	1.7880	1.8094	1.8096	0.0026%	−0.1558%	0.0072%	−0.0110%	0.0032%
EU	−0.0010%	2.0695	2.0694	2.0710	2.0710	0.0033%	0.0060%	0.0033%	0.0013%	0.0002%
JPN	−0.0015%	1.9422	1.9422	1.9375	1.9375	−0.0005%	0.0111%	0.0070%	0.0008%	−0.0041%
KOR	−0.0009%	2.5474	2.5474	2.5393	2.5393	−0.0044%	0.0117%	0.0110%	−0.0015%	0.0011%
CAN	−0.0021%	2.0057	2.0057	1.9298	1.9298	0.0014%	0.0126%	0.0045%	0.0023%	0.0063%
Panel C6. China–United States Trade Disputes: Geopolitics elasticity (0.0762) for final consumption										
CHN	−0.0023%	2.8241	2.8237	2.9046	2.9046	−0.0010%	0.0559%	−0.2243%	−0.2540%	0.0003%
USA	−0.0128%	1.7879	1.7880	1.8096	1.8096	0.0012%	−0.0247%	−0.1501%	−0.1292%	0.0007%
EU	−0.0003%	2.0694	2.0694	2.0710	2.0710	−0.0002%	−0.0012%	0.0018%	0.0064%	−0.0021%
JPN	0.0003%	1.9421	1.9422	1.9375	1.9375	−0.0043%	−0.0085%	0.0064%	0.0245%	−0.0100%
KOR	0.0008%	2.5473	2.5474	2.5393	2.5393	−0.0114%	−0.0139%	0.0034%	0.0305%	0.0027%
CAN	−0.0020%	2.0056	2.0057	1.9298	1.9298	−0.0006%	−0.0070%	0.0095%	0.0606%	−0.0048%
Panel C7. China–United States Trade Disputes: When China suffers the most with political distance 0.7087										
CHN	−0.0341%	2.8261	2.8237	2.9056	2.9046	0.0045%	−0.9430%	−1.3151%	−1.3164%	−0.0317%
USA	−0.0811%	1.7868	1.7880	1.8086	1.8096	0.0203%	−0.9466%	−0.7898%	−0.7348%	0.0212%
EU	−0.0061%	2.0694	2.0694	2.0710	2.0710	0.0157%	0.0309%	0.0255%	0.0457%	−0.0108%
JPN	−0.0064%	1.9421	1.9422	1.9375	1.9375	−0.0248%	0.0187%	0.0681%	0.1403%	−0.0676%
KOR	−0.0035%	2.5469	2.5474	2.5395	2.5393	−0.0843%	−0.0163%	0.0834%	0.1507%	0.0192%
CAN	−0.0184%	2.0054	2.0057	1.9300	1.9298	0.0047%	0.0418%	0.0692%	0.3458%	0.0078%

Notes: The table reports the average changes (in %) in welfare, trade for intermediate goods or final consumption, gross output, and the average factual and counterfactual GVC positions for several representative countries or regions. Panels C1, C2, C3, C4, C5, and C6 correspond to the Scenarios 1, 2, 3, 4, 5, and 6 in Section 5.3, respectively. Panel C7 corresponds to the scenario when China suffers the most, with a political distance of 0.7087 to the US, in the China–United States Trade Disputes.

Scenario 5. *Voting similarity indices between China and US in the intermediate sectors decrease by 19.655% (=1-(1%-21%)/(1-1.6738%)). The geopolitics elasticity (0.0762) from Column (2) in Table 1 is applied.*

Scenario 6. *Voting similarity indices between China and US for the final consumption decrease by 19.655% (=1-(1%-21%)/(1-1.6738%)). The geopolitics elasticity (0.0762) from Column (2) in Table 1 is applied.*

When China faces significant adverse impacts, what strategies should be employed to mitigate such shocks? To counter the escalating trade barriers imposed by the US, we propose two major strategies for China to alleviate or reverse the detrimental

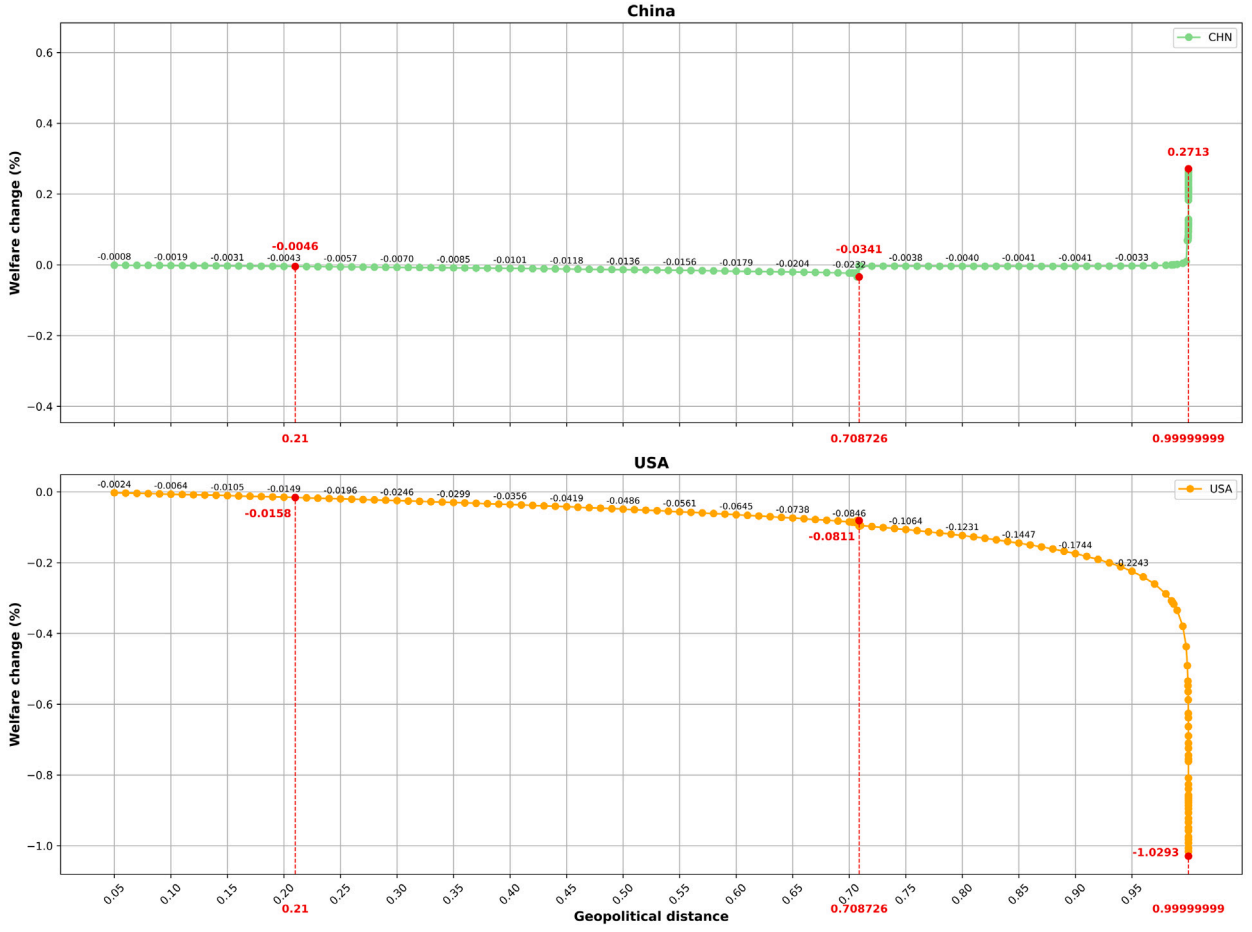

Fig. 1. China and the US Welfare with Geopolitical Distance.
Notes: This figure displays the welfare effects for China and the US relative to their geopolitical distance. See Section 5.3 for details.

effects of trade disputes: (1) promoting the dual circulation strategy by reducing domestic trade costs, denoted as $d^{rs}_{CN,CN}$, and (2) enhancing productivity through technological advancements, represented as T^{r}_{CN}. Panels D1–D3 of Table 8 demonstrate the impact of reducing China's domestic trade costs by 10%, 20%, and 50% in scenarios where China experiences the most significant welfare loss, with a political distance to the US around 0.7087. Remarkably, even a modest reduction of 10% in internal trade costs can enhance China's welfare by 45% and significantly extend its GVC positions. More substantial reductions of 20% and 50% in internal costs lead to welfare increases of 125% and an impressive 15-fold, respectively. These figures, while seemingly extraordinary, align with findings from Tombe and Zhu (2019), who documented a 45.6% welfare boost when China's internal trade costs match those of the US. Additionally, Li et al. (2024) found a threefold increase in welfare upon the elimination of all firm-level frictions in China. Our results corroborate these findings, illustrating that lowering internal trade costs in China not only benefits its own economy but also has a positive spillover effect, enhancing welfare in almost every other country.

Solution 1. *Reduce China's internal trade costs by 10%, 20%, and 50%, assuming* $\hat{d}^{rs}_{CN,CN}$ *to be 0.9, 0.8, and 0.5, respectively.*

Solution 2. *Enhance China's productivity by 10%, 20%, and 50%, assuming* $\hat{T}^{r}_{CN}$ *to be 1.1, 1.2, and 1.5, respectively.*

The second strategy for China to mitigate the adverse effects of China–US trade disputes involves enhancing its productivity. Panels D4–D6 of Table 8 demonstrate the effects of improving China's productivity by 10%, 20%, and 50% in scenarios where China experiences the greatest welfare loss, with a political distance to the US around 0.7087. We find that improvements in productivity yield relatively smaller effects compared to reductions in internal trade costs. This observation supports the efficacy of China's dual circulation strategy. Unlike the productivity enhancements, the dual circulation strategy not only generates significant positive effects for China but also benefits other countries, and is comparatively easier to implement.

We also explored the impact of both reducing domestic trade costs and enhancing productivity in the context of a hypothetical China–US trade decoupling scenario. The results, presented in Table 9, show that the effects on welfare, economic outcomes, and GVC positions are qualitatively and quantitatively similar to those observed in Table 8 when China is most adversely affected. The primary policy implication is that promoting internal circulation by lowering China's domestic trade costs is a more effective strategy to counteract the negative impacts of trade frictions compared to strategies focused on improving productivity.

Table 8
China's Solutions to China–United States Trade Disputes When Suffering the Most.

Countries or Regions	Δ Welfare	U'	U	D'	D	Δ Intermediate Import	Export	Δ Final-use Import	Export	Δ Gross Output
Panel C7. China–United States Trade Disputes: When China suffers the most with political distance 0.7087										
CHN	−0.0341%	2.8261	2.8237	2.9056	2.9046	0.0045%	−0.9430%	−1.3151%	−1.3164%	−0.0317%
USA	−0.0811%	1.7868	1.7880	1.8086	1.8096	0.0203%	−0.9466%	−0.7898%	−0.7348%	0.0212%
EU	−0.0061%	2.0694	2.0694	2.0710	2.0710	0.0157%	0.0309%	0.0255%	0.0457%	−0.0108%
JPN	−0.0064%	1.9421	1.9422	1.9375	1.9375	−0.0248%	0.0187%	0.0681%	0.1403%	−0.0676%
KOR	−0.0035%	2.5469	2.5474	2.5395	2.5393	−0.0843%	−0.0163%	0.0834%	0.1507%	0.0192%
CAN	−0.0184%	2.0054	2.0057	1.9300	1.9298	0.0047%	0.0418%	0.0692%	0.3458%	0.0078%
Panel D1. China's Solutions to Trade Disputes: Reducing China's domestic trade costs by 10%										
CHN	45.6488%	2.8899	2.8237	2.9612	2.9046	−2.8490%	−8.6268%	−17.4561%	−2.7373%	6.0730%
USA	2.8816%	1.7864	1.7880	1.8082	1.8096	−3.0384%	−4.6195%	−2.8923%	−5.2905%	−3.4891%
EU	2.9868%	2.0690	2.0694	2.0686	2.0710	−3.5968%	−3.6358%	−3.2181%	−3.4662%	0.9351%
JPN	3.5627%	1.9361	1.9422	1.9341	1.9375	−0.8756%	−6.6816%	−5.1957%	−3.6502%	11.4027%
KOR	3.1925%	2.5279	2.5474	2.5297	2.5393	3.7220%	−7.8592%	−8.5860%	−3.4704%	−2.8864%
CAN	2.8862%	2.0059	2.0057	1.9270	1.9298	−3.3144%	−3.0398%	−2.8590%	−3.6479%	6.4443%
Panel D2. China's Solutions to Trade Disputes: Reducing China's domestic trade costs by 20%										
CHN	125.8644%	2.9352	2.8237	2.9988	2.9046	−7.0813%	−13.4261%	−31.3294%	−2.0414%	14.8003%
USA	7.4979%	1.7867	1.7880	1.8082	1.8096	−7.2452%	−9.0376%	−5.7075%	−10.9266%	−8.0758%
EU	7.6251%	2.0691	2.0694	2.0663	2.0710	−8.4571%	−8.4151%	−7.5534%	−8.1127%	2.2413%
JPN	8.9700%	1.9292	1.9422	1.9308	1.9375	−3.2138%	−14.2115%	−11.0543%	−8.1519%	27.4436%
KOR	8.3942%	2.5072	2.5474	2.5217	2.5393	5.1404%	−16.3572%	−17.0564%	−7.4279%	−6.9525%
CAN	7.4489%	2.0082	2.0057	1.9237	1.9298	−7.8105%	−6.8114%	−6.6343%	−8.8570%	15.5212%
Panel D3. China's Solutions to Trade Disputes: Reducing China's domestic trade costs by 50%										
CHN	1521.42%	2.9940	2.8237	3.0388	2.9046	−32.4468%	−7.1110%	−37.8864%	22.2523%	78.36%
USA	45.5788%	1.7952	1.7880	1.8127	1.8096	−32.0992%	−29.0320%	−19.4490%	−39.3564%	−33.27%
EU	46.5702%	2.0843	2.0694	2.0601	2.0710	−34.7156%	−33.2478%	−31.0342%	−33.9890%	9.59%
JPN	53.5381%	1.9087	1.9422	1.9229	1.9375	−24.2613%	−41.7196%	−32.4598%	−28.2776%	119.9%
KOR	53.2273%	2.4554	2.5474	2.4986	2.5393	−15.4376%	−45.3327%	−44.4660%	−27.7742%	−30.45%
CAN	46.3241%	2.0288	2.0057	1.9172	1.9298	−32.9913%	−27.6164%	−27.4892%	−35.1906%	68.22%
Panel D4. China's Solutions to Trade Disputes: Improving China's productivity by 10%										
CHN	6.2611%	2.8327	2.8237	2.9140	2.9046	−0.7506%	1.5255%	0.2006%	2.1895%	0.8113%
USA	0.5515%	1.7873	1.7880	1.8090	1.8096	−0.7143%	−1.3521%	−0.8269%	−1.5700%	−0.6545%
EU	0.6200%	2.0701	2.0694	2.0710	2.0710	−0.8837%	−0.6502%	−0.5733%	−0.7387%	0.2040%
JPN	0.7240%	1.9426	1.9422	1.9376	1.9375	−0.2386%	−0.4219%	0.0154%	−0.1946%	2.2612%
KOR	0.6726%	2.5475	2.5474	2.5392	2.5393	−0.8385%	−0.4285%	−0.7072%	−0.4522%	−0.5863%
CAN	0.6095%	2.0064	2.0057	1.9298	1.9298	−0.7843%	−0.3452%	−0.3204%	−0.5901%	1.2885%
Panel D5. China's Solutions to Trade Disputes: Improving China's productivity by 20%										
CHN	12.4051%	2.8382	2.8237	2.9214	2.9046	−1.4958%	3.8189%	1.7193%	5.4259%	1.6060%
USA	1.2159%	1.7881	1.7880	1.8095	1.8096	−1.4055%	−1.6596%	−0.9180%	−2.2900%	−1.2976%
EU	1.2617%	2.0709	2.0694	2.0709	2.0710	−1.7561%	−1.2851%	−1.1439%	−1.4717%	0.4095%
JPN	1.4554%	1.9430	1.9422	1.9377	1.9375	−0.4633%	−0.8564%	−0.0511%	−0.5247%	4.4983%
KOR	1.3629%	2.5481	2.5474	2.5391	2.5393	−1.6164%	−0.8316%	−1.4042%	−1.0181%	−1.1661%
CAN	1.2658%	2.0076	2.0057	1.9295	1.9298	−1.5576%	−0.6789%	−0.7039%	−1.4632%	2.4871%
Panel D6. China's Solutions to Trade Disputes: Improving China's productivity by 50%										
CHN	30.1706%	2.8516	2.8237	2.9388	2.9046	−3.5736%	10.2328%	5.8004%	14.2936%	3.7922%
USA	3.1072%	1.7901	1.7880	1.8107	1.8096	−3.3090%	−2.5040%	−1.1733%	−4.2817%	−3.0740%
EU	3.0966%	2.0730	2.0694	2.0707	2.0710	−4.1215%	−3.0352%	−2.7051%	−3.4788%	0.9791%
JPN	3.5524%	1.9440	1.9422	1.9379	1.9375	−1.1230%	−2.1326%	−0.3137%	−1.4311%	10.6687%
KOR	3.3848%	2.5493	2.5474	2.5389	2.5393	−3.8964%	−1.9774%	−3.2257%	−2.4512%	−2.7675%
CAN	3.1392%	2.0111	2.0057	1.9288	1.9298	−3.7028%	−1.5714%	−1.7384%	−3.8571%	5.7059%

Notes: The table reports the average changes (in %) in welfare, trade for intermediate goods or final consumption, gross output, and the average factual and counterfactual GVC positions for several representative countries or regions. Panel C7 corresponds to the scenario when China suffers the most, with a political distance of 0.7087 to the US, in the China–United States Trade Disputes. Panels D1, D2, and D3 demonstrate the impact of reducing China's domestic trade costs by 10%, 20%, and 50% in scenario when China suffers the most, respectively. Panels D4, D5, and D6 demonstrate the effects of improving China's productivity by 10%, 20%, and 50%, respectively.

5.4. Discussions

Regionalism of GVCs. The past few decades have seen GVCs expand rapidly as a part of the globalization process. However, recent years have sparked public debates on deglobalization, influenced by factors such as the COVID-19 pandemic and a resurgence in trade protectionism. These developments have adversely affected trade, prompting shifts in the selection of trade partners (Antràs

Table 9
China's Solutions to China–United States Trade Decoupling.

Countries or Regions	Δ Welfare	U'	U	D'	D	Δ Intermediate Import	Export	Δ Final-use Import	Export	Δ Gross Output
Panel C4. China–United States Trade Decoupling: Geopolitics elasticity (0.0762) for all sectors										
CHN	0.2713%	2.8498	2.8237	2.9132	2.9046	0.0920%	−7.7854%	−12.4898%	−12.3683%	−0.1285%
USA	−1.0293%	1.7765	1.7880	1.7998	1.8096	0.1302%	−8.7838%	−7.3135%	−7.0730%	0.1665%
EU	−0.1142%	2.0681	2.0694	2.0719	2.0710	0.1659%	0.1830%	0.2408%	0.3623%	−0.1122%
JPN	−0.0580%	1.9406	1.9422	1.9383	1.9375	−0.2366%	0.0509%	0.7835%	1.5088%	−0.6866%
KOR	−0.0012%	2.5414	2.5474	2.5418	2.5393	−0.8806%	−0.2524%	0.7457%	1.7383%	0.1778%
CAN	−0.3623%	2.0015	2.0057	1.9324	1.9298	0.0621%	0.2342%	0.7924%	3.4423%	0.1137%
Panel E1. China's Solutions to Trade Decoupling: Reducing China's domestic trade costs by 10%										
CHN	46.2872%	2.9084	2.8237	2.9662	2.9046	−2.7216%	−15.0358%	−27.5467%	−13.8138%	5.7937%
USA	1.8974%	1.7759	1.7880	1.7995	1.8096	−2.8970%	−11.8629%	−9.3393%	−10.7659%	−3.3337%
EU	2.8485%	2.0676	2.0694	2.0694	2.0710	−3.4543%	−3.4562%	−2.9921%	−3.1404%	0.8119%
JPN	3.4573%	1.9343	1.9422	1.9347	1.9375	−1.0112%	−6.5633%	−4.3660%	−2.3647%	10.7238%
KOR	3.1301%	2.5211	2.5474	2.5315	2.5393	3.2265%	−8.0079%	−7.9495%	−2.0087%	−2.7090%
CAN	2.5180%	2.0019	2.0057	1.9295	1.9298	−3.2138%	−2.7883%	−2.1703%	−0.5361%	6.6620%
Panel E2. China's Solutions to Trade Decoupling: Reducing China's domestic trade costs by 20%										
CHN	126.9974%	2.9485	2.8237	3.0009	2.9046	−6.8873%	−19.4023%	−40.2849%	−13.2213%	14.2148%
USA	6.3897%	1.7753	1.7880	1.7993	1.8096	−7.0479%	−16.0566%	−12.1241%	−15.7397%	−7.8754%
EU	7.4331%	2.0676	2.0694	2.0672	2.0710	−8.2847%	−8.1863%	−7.2972%	−7.7559%	2.0928%
JPN	8.7823%	1.9275	1.9422	1.9315	1.9375	−3.2897%	−13.8805%	−10.0740%	−6.8186%	26.6525%
KOR	8.2418%	2.4998	2.5474	2.5233	2.5393	5.0541%	−16.2780%	−16.2994%	−5.9969%	−6.7460%
CAN	7.0136%	2.0038	2.0057	1.9266	1.9298	−7.6436%	−6.5444%	−5.9621%	−5.6679%	15.9574%
Panel E3. China's Solutions to Trade Decoupling: Reducing China's domestic trade costs by 50%										
CHN	1522.7823%	2.9971	2.8237	3.0356	2.9046	−32.1209%	−13.2492%	−46.4060%	9.1797%	75.3564%
USA	43.5708%	1.7736	1.7880	1.8010	1.8096	−31.7566%	−38.1144%	−26.9032%	−43.2632%	−32.9458%
EU	46.0375%	2.0825	2.0694	2.0614	2.0710	−34.4434%	−32.8628%	−30.7000%	−33.4824%	9.4590%
JPN	52.6814%	1.9080	1.9422	1.9243	1.9375	−24.1715%	−40.7883%	−31.2022%	−26.8026%	119.2074%
KOR	52.4047%	2.4495	2.5474	2.5011	2.5393	−14.6798%	−44.3702%	−43.1758%	−26.2939%	−30.2891%
CAN	45.5490%	2.0221	2.0057	1.9220	1.9298	−32.6822%	−27.2209%	−26.9610%	−31.8248%	70.3366%
Panel E4. China's Solutions to Trade Decoupling: Improving China's productivity by 10%										
CHN	6.5517%	2.8556	2.8237	2.9214	2.9046	−0.6641%	−5.6146%	−11.1692%	−9.3631%	0.6625%
USA	−0.4076%	1.7768	1.7880	1.7999	1.8096	−0.5982%	−9.3484%	−7.6438%	−7.9250%	−0.5095%
EU	0.5097%	2.0688	2.0694	2.0718	2.0710	−0.7430%	−0.4822%	−0.3541%	−0.4026%	0.0969%
JPN	0.6588%	1.9410	1.9422	1.9383	1.9375	−0.4480%	−0.3967%	0.7671%	1.1764%	1.6387%
KOR	0.6580%	2.5416	2.5474	2.5414	2.5393	−1.6029%	−0.6786%	−0.0320%	1.1350%	−0.4245%
CAN	0.2703%	2.0026	2.0057	1.9322	1.9298	−0.7277%	−0.1095%	0.4022%	2.6116%	1.4295%
Panel E5. China's Solutions to Trade Decoupling: Improving China's productivity by 20%										
CHN	12.7266%	2.8607	2.8237	2.9285	2.9046	−1.3995%	−3.5094%	−9.9115%	−6.4972%	1.4141%
USA	0.2192%	1.7770	1.7880	1.8000	1.8096	−1.2849%	−9.8851%	−7.9550%	−8.7390%	−1.1502%
EU	1.1429%	2.0695	2.0694	2.0717	2.0710	−1.6115%	−1.1148%	−0.9189%	−1.1288%	0.2982%
JPN	1.3783%	1.9413	1.9422	1.9384	1.9375	−0.6626%	−0.8330%	0.7359%	0.8651%	3.8668%
KOR	1.3404%	2.5418	2.5474	2.5412	2.5393	−2.3233%	−1.0760%	−0.7313%	0.6026%	−1.0015%
CAN	0.9123%	2.0036	2.0057	1.9321	1.9298	−1.4930%	−0.4345%	0.0280%	1.8256%	2.6772%
Panel E6. China's Solutions to Trade Decoupling: Improving China's productivity by 50%										
CHN	30.5288%	2.8727	2.8237	2.9452	2.9046	−3.4507%	2.3737%	−6.4778%	1.3452%	3.4555%
USA	2.0084%	1.7778	1.7880	1.8005	1.8096	−3.1702%	−11.3574%	−8.7965%	−10.9591%	−2.9140%
EU	2.9555%	2.0715	2.0694	2.0716	2.0710	−3.9645%	−2.8492%	−2.4625%	−3.1085%	0.8553%
JPN	3.4442%	1.9421	1.9422	1.9386	1.9375	−1.3002%	−2.0829%	0.5477%	0.0327%	10.0086%
KOR	3.3349%	2.5423	2.5474	2.5409	2.5393	−4.4603%	−2.1988%	−2.5362%	−0.7462%	−2.5942%
CAN	2.7496%	2.0066	2.0057	1.9317	1.9298	−3.6161%	−1.3011%	−0.9851%	−0.3263%	6.0421%

Notes: The table reports the average changes (in %) in welfare, trade for intermediate goods or final consumption, gross output, and the average factual and counterfactual GVC positions for several representative countries or regions. Panel C4 corresponds to the Scenario 4 of trade decoupling between China and the US in Section 5.3, where the voting distance approaches a prohibitive level. Panels E1, E2, and E3 demonstrate the impact of reducing China's domestic trade costs by 10%, 20%, and 50% in scenario of trade decoupling, respectively. Panels E4, E5, and E6 demonstrate the effects of improving China's productivity by 10%, 20%, and 50%, respectively.

et al., 2023; Dang et al., 2023; Fajgelbaum et al., 2020; Handley et al., 2020; Jiao et al., 2024). Amidst numerous geopolitical events and a growing anti-globalization sentiment, concerns have arisen about the shortening of GVCs, re-shoring, friend-shoring, and near-shoring (Alfaro & Chor, 2023; Baldwin, 2022; Baldwin & Freeman, 2022). In this context, we explore the regional GVC position measures for three major clusters—EU, NAFTA, and East Asia—under three scenarios of China–US Trade Disputes: a peak tariff of 21%, a near-prohibitive tariff scenario representing trade decoupling, and a tariff level of 70.87% when China is most adversely affected.

Table 10
China–United States Trade Disputes: Shortening of GVCs or Near-shoring?

Countries	U	U'	U''	U'''	D	D'	D''	D'''
CHN	3.015743	3.014411	3.013847	3.014085	3.046101	3.044645	3.037597	3.043905
IDN	2.003259	2.001777	1.998628	2.001517	1.941758	1.942865	1.950066	1.94333
JPN	1.909871	1.910142	1.907762	1.909985	1.890085	1.890084	1.893407	1.890293
KOR	2.657869	2.653218	2.647004	2.652681	2.530543	2.526831	2.544845	2.527931
Average	2.396685	2.394887	2.39181	2.394567	2.352122	2.351106	2.356479	2.351365
CAN	1.88385	1.914141	1.914117	1.914191	1.876862	1.85775	1.853831	1.857556
MEX	1.623003	1.679921	1.681234	1.68013	1.602715	1.633579	1.630004	1.633426
USA	1.883672	1.713585	1.714487	1.713766	1.886515	1.723587	1.725331	1.723825
Average	1.796842	1.769216	1.769946	1.769362	1.788697	1.738305	1.736389	1.738269
AUT	2.039667	2.04389	2.043935	2.043911	2.050503	2.06204	2.061841	2.062049
BEL	2.115085	2.115086	2.114957	2.115104	2.098378	2.101751	2.100942	2.101716
BGR	2.255217	2.271687	2.271941	2.271738	2.280022	2.295865	2.294967	2.295835
CYP	1.50091	1.515465	1.515677	1.515501	1.618339	1.649819	1.649361	1.64981
CZE	2.346631	2.354129	2.35402	2.354148	2.32818	2.334811	2.33364	2.334777
DEU	1.982209	1.984597	1.984271	1.984584	1.973552	1.976318	1.975934	1.976321
DNK	1.895488	1.898668	1.898283	1.898655	1.993104	1.991768	1.991576	1.991794
ESP	1.914786	1.915006	1.914947	1.915061	1.929637	1.934518	1.934607	1.934554
EST	2.061142	2.086533	2.086246	2.086547	1.971883	2.00783	2.007498	2.007841
FIN	2.106157	2.108158	2.108511	2.108199	2.083283	2.089032	2.088881	2.089057
FRA	1.847336	1.847625	1.847661	1.847682	1.884292	1.886106	1.886222	1.886161
GBR	1.908874	1.908559	1.908493	1.908579	1.856443	1.858524	1.858926	1.858566
GRC	1.435787	1.436847	1.437065	1.436878	1.54205	1.539298	1.539273	1.539311
HUN	2.14048	2.155783	2.155858	2.155806	2.127179	2.149667	2.149532	2.149701
IRL	2.051878	2.056381	2.056957	2.056462	2.222894	2.223539	2.228345	2.223899
ITA	1.942951	1.944331	1.94441	1.944371	1.955001	1.956849	1.956974	1.95689
LTU	1.752688	1.769681	1.770011	1.769723	1.709471	1.735171	1.73442	1.735138
LUX	2.36723	2.374331	2.373752	2.374305	3.282791	3.224126	3.225124	3.224362
LVA	2.020605	2.039539	2.039687	2.039577	2.081436	2.110408	2.109827	2.110385
MLT	1.904926	1.94415	1.944263	1.944182	2.126889	2.150382	2.149532	2.150406
NLD	2.023882	2.026417	2.026493	2.026442	1.838844	1.841769	1.840985	1.841727
POL	2.050509	2.058147	2.058274	2.058188	2.02757	2.036716	2.036047	2.036698
PRT	1.864783	1.869315	1.869563	1.869381	1.925089	1.929915	1.930181	1.929965
ROU	1.883133	1.884804	1.885054	1.884852	1.988606	1.994906	1.994771	1.994918
SVK	1.996339	2.187805	2.187966	2.187844	2.014193	2.067532	2.066265	2.067487
SVN	2.046626	2.011486	2.011462	2.011511	2.052635	2.029139	2.028544	2.029125
SWE	1.874418	2.0488	2.048689	2.048804	1.888341	2.056989	2.057299	2.057033
Average	1.975175	1.994712	1.994757	1.994742	2.031504	2.045733	2.045612	2.04576

Notes: This table illustrates the factual and counterfactual GVC positions of countries within three major regional clusters—EU, NAFTA, and East Asia—under three scenarios of China–US Trade Disputes: a peak tariff of 21% (with superscript $'$), a near-prohibitive tariff scenario representing trade decoupling (with superscript $''$), and a tariff level of 70.87% when China is most adversely affected (with superscript $'''$). We consider two GVC positions: Upstreamness U and Downstreamness D, following Antràs and Chor (2018).

Table 10 illustrates the counterfactual GVC positions of countries within three major regional clusters. For EU members, the GVC length increases, with the average Upstreamness measure rising from 1.975175 to (1.994712, 1.994757, 1.994742) and Downstreamness from 2.031504 to (2.045733, 2.045612, 2.04576), suggesting some tendencies towards friend-shoring and near-shoring. In contrast, for NAFTA, the average GVC length shortens, with no apparent signs of friend-shoring or near-shoring. The distribution of GVC positions within NAFTA is notably varied; the US GVCs become significantly shorter, whereas Canada and Mexico see lengthening in their GVCs. For East Asian countries, the GVC length remains relatively unchanged, with no indications of friend-shoring or near-shoring emerging. Despite the various geopolitical risks, the analysis remains optimistic about the functionality of GVCs. Overall, there is no significant evidence suggesting major shifts towards friend-shoring, near-shoring, or shortening of value chains.

An Event Study of China–United States Trade Disputes. To support and validate our quantitative simulation results, we conduct several reduced-form regressions and a simple event study focusing on the China–US Trade Disputes.[9]

Table 11 presents the regression results when we specifically focus on the China–United States Trade Disputes. Noteworthy points include: the regression sample encompasses trade flows from China to the US and vice versa from 1995 to 2019 at the exporter–importer-year-HS6 level. As the importance classification of UNGA voting data by the US State Department ceases in 2017, we utilize an alternative measure, $Vote2_{ijt}$, from the same source, which accounts for all votes in contrast to only important votes in

[9] The Israeli–Palestinian Conflict intensified in 2023, and the Russo–Ukrainian War formally broke out in 2022. However, systematic and reliable trade flow data are not yet available. Therefore, we focus on the geopolitical event of China–United States Trade Disputes using empirical techniques of reduced-form regressions and event studies in this section.

Table 11
The Impacts of Geopolitics on China–US Trade.

	Dependent variable: $tradeflow_{ijt}^{rs}$							
	CN ⇒ US & US ⇒ CN				CN ⇒ US		US ⇒ CN	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta Vote2_{ijt}$	0.455***	0.423***	0.446***	0.442***	0.430***	0.444***	0.527***	0.510***
	(0.076)	(0.076)	(0.049)	(0.049)	(0.090)	(0.048)	(0.119)	(0.060)
$Vote2_{ij,t-1}$	0.723***	0.698***	0.717***	0.715***	0.677***	0.695***	0.883***	0.867***
	(0.068)	(0.067)	(0.045)	(0.045)	(0.082)	(0.046)	(0.098)	(0.050)
$\ln(tariff_{ijt}^{r}/100+1)$		−8.453***		−0.850*				
		(0.574)		(0.509)				
Controls	✓	✓	✓	✓	✓	✓	✓	✓
FE_i			✓	✓		✓		✓
FE_r			✓	✓		✓		✓
Observations	210,131	210,131	210,107	210,107	103,180	103,108	106,951	106,900

Notes: This table presents the regression results when we specifically focus on the China–United States Trade Disputes using the PPML estimator. Columns (1)–(4) address trade flows between China and the US. Columns (5)–(6) detail the results for trade flows from China to the US, while Columns (7)–(8) focus on the results for trade flows from the US to China. In Columns (2) and (4), tariffs are controlled for. The dynamic trade cost proxies such as rta_{ijt}, gsp_{ijt}, and $comcur_{ijt}$ are consistently included. FE_i and FE_r stand for exporter and sector fixed effects, respectively Standard errors, clustered at the exporter–importer level, are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 12
China–United States Trade Disputes: An Event Study.

	(1)	(2)
	Dependent variable: $\ln tradeflow_{ijt}^{rs}$	
$Post1_{ijt}$	−0.234**	−0.249**
	(0.00416)	(0.0106)
$\ln(tariff_{ijt}^{r}/100+1)$		−1.604*
		(0.127)
Controls	✓	✓
FE_i	✓	✓
FE_r	✓	✓
Observations	210,107	210,107

Notes: This table presents the event study results when we specifically focus on the China–United States Trade Disputes before and after the onset of trade disputes in 2018. The coefficients of $Post1_{ijt}$ indicate the effect post-2018. In Column (1), the tariff rate is not controlled, while in Column (2), tariffs are controlled at the exporter–importer-sector-year level. Both columns incorporate time-variant trade cost proxies, country fixed effects, and sector fixed effects. FE_i and FE_r stand for exporter and sector fixed effects, respectively. Standard errors, clustered at the exporter–importer level, are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

the $Vote_{ijt}$ measure. Moreover, disaggregated trade flow data are sourced from the Center for Prospective Studies and International Information (CEPII), and tariff data from the WITS.

We regress the trade flows between China and the US on changes in voting similarity and its lagged value, including tariffs and dynamic trade cost proxies such as rta_{ijt}, gsp_{ijt}, and $comcur_{ijt}$. Due to multicollinearity concerns and a limited number of observations specific to this study, only exporter and year fixed effects are considered. Columns (1)–(4) of Table 11 address trade flows between China and the US. Columns (5)–(6) detail the results for trade flows from China to the US, while Columns (7)–(8) focus on the results for trade flows from the US to China.

The results clearly indicate that increases in voting similarity consistently correlate positively with trade flows, regardless of whether tariff controls are included, or whether exporter and year fixed effects are utilized. This is true whether analyzing two-way trade flows between China and the US or focusing solely on one-way flows. Notably, the magnitude of 0.446 in Column (3) of Table 11 is substantially higher than the baseline geopolitics elasticity of 0.0762 from Column (1) in Table 1, underscoring the significant impact of China–United States Trade Disputes on international trade. This emphasizes the relevance and necessity of our focused investigation into such geopolitical events within a quantitative framework.

Additionally, we conduct an event study to examine the trend in China–US trade before and after the onset of trade disputes in 2018. The event study method is a robust tool for identifying dynamic treatment effects (Miller, 2023), which we use to assess the adverse impacts of the China–US trade disputes, following the nonparametric event study approach outlined in Dobkin et al. (2018). We exclude the year 2018, marking the beginning of the trade disputes, and avoid including years post-2019 to circumvent the confounding effects of the COVID-19 pandemic, which significantly influenced both trade dispute policies and trade flows. Although this exclusion considerably narrows the event window, it still allows us to observe a significant and discernible trend following the onset of the trade disputes.

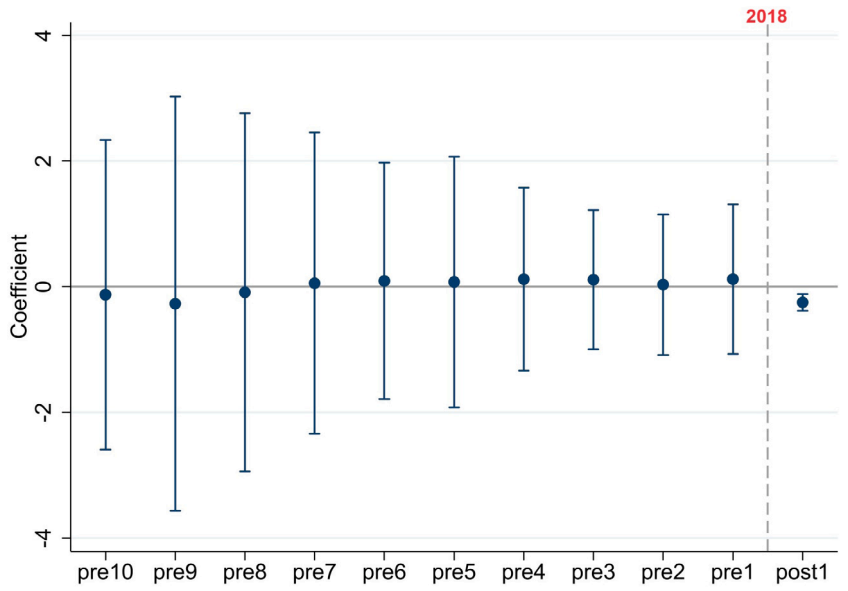

Fig. 2. China–United States Trade Disputes: An Event Study.
Notes: This figure displays the coefficients and the 95% confidence intervals for the event study of China–United States Trade Disputes, as shown in Column (2) of Table 12.

Table 12 reveals that the coefficients for the year following 2018 are consistently and significantly negative. In Column (1), the tariff rate is not controlled, while in Column (2), tariffs are controlled at the exporter–importer-sector-year level. Both columns incorporate time-variant trade cost proxies, country fixed effects, and sector fixed effects. The results successfully pass the joint test for the years prior to 2018, with p-values of 0.1684 when tariffs are not controlled and 0.1996 when tariffs are controlled, suggesting no distinct trends prior to the trade disputes. Additionally, we illustrate the trends in Fig. 2, which displays the coefficients and the 95% confidence intervals during the period when tariffs are factored in. It is evident that the coefficients of time indicators are not significantly different from zero before 2018, but post-2018, they become significantly negative, reflecting a substantial decline in trade flows between China and the US due to the trade disputes.

6. Conclusion

In this study, we have explored the complex relationships between geopolitics and GVCs and their collective impact on international trade flows and economic welfare. Utilizing a novel dataset comprising voting similarities from the United Nations General Assembly, we quantitatively assessed the influence of geopolitical alignments on trade dynamics across different sectors, incorporating both intermediate goods and final consumption. Our analysis leveraged the World Input–Output Database to establish a robust structural framework, through which we derived estimates of geopolitics elasticity that highlight the differential impacts on trade and welfare.

Our findings indicate that geopolitical alignment significantly influences trade barriers, with closer political relationships facilitating enhanced trade flows and economic integration, while political discord tends to restrict these flows, thereby exacerbating the economic isolation of nations. Through a series of counterfactual scenarios, including the Israeli–Palestinian Conflict, the Russo–Ukrainian War, and the China–US Trade Disputes, we illustrated how shifts in geopolitical landscapes could potentially reshape GVCs, affecting both the structure and economic output of involved countries.

This research contributes to the literature on international economics by quantifying the impact of geopolitics on trade, an area that has often been overlooked in economic discourse. By integrating political variables into the analysis of GVCs, we provide a more comprehensive understanding of the factors that influence global trade patterns beyond traditional economic metrics.

The policy implications of our study are significant, especially for policymakers and international trade negotiators. Our results suggest that fostering political alliances, or at least mitigating geopolitical tensions, can lead to economic benefits through more robust trade relationships. As such, trade policies should consider not only economic and technical factors but also the geopolitical contexts that can profoundly influence economic outcomes. Furthermore, countries might need to reevaluate their strategic positions within GVCs in light of evolving geopolitical realities to enhance their economic resilience and welfare.

In conclusion, by bridging the gap between geopolitics and economic analysis, our study provides critical insights into the nexus of international relations and global economic dynamics. This understanding is crucial for formulating strategies that not only capitalize on economic opportunities but also navigate the complexities of international political relationships.

CRediT authorship contribution statement

Chenxin Jin: Data collection. **Wei Jin:** Empirical estimation. **Bin Sheng:** Counterfactual analysis.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.chieco.2024.102341.

Data availability

Data will be made available on request.

References

Alesina, Alberto, & Dollar, David (2000). Who gives foreign aid to whom and why? *Journal of Economic Growth*, *5*, 33–63.

Alfaro, Laura, & Chor, Davin (2023). Global supply chains: The looming "great reallocation". NBER Working Paper 31661.

Amiti, Mary, Redding, Stephen J., & Weinstein, David E. (2019). The impact of the 2018 tariffs on prices and welfare. *Journal of Economic Perspectives*, *33*(4), 187–210.

Anderson, James E., & van Wincoop, Eric (2003). Gravity with gravitas: A solution to the border puzzle. *American Economic Review*, *93*(1), 170–192.

Anderson, James E., & Yotov, Yoto V. (2010). The changing incidence of geography. *American Economic Review*, *100*(5), 2157–2186.

Antràs, Pol, & Chor, Davin (2018). On the measurement of upstreamness and downstreamness in global value chains. In *World Trade Evolution: Growth, Productivity and Employment*: *vol. 5*, (pp. 126–194). Taylor & Francis Group New York.

Antràs, Pol, & De Gortari, Alonso (2020). On the geography of global value chains. *Econometrica*, *88*(4), 1553–1598.

Antràs, Pol, Redding, Stephen J., & Rossi-Hansberg, Esteban (2023). Globalization and pandemics. *American Economic Review*, *113*(4), 939–981.

Baier, Scott L., & Bergstrand, Jeffrey H. (2007). Do free trade agreements actually increase members' international trade? *Journal of International Economics*, *71*(1), 72–95.

Bailey, Michael A., Strezhnev, Anton, & Voeten, Erik (2017). Estimating dynamic state preferences from United Nations voting data. *Journal of Conflict Resolution*, *61*(2), 430–456.

Baldwin, Richard (2022). The peak globalisation myth: Part 3–How global supply chains are unwinding. *Vox EU Columns. Centre for Economic Policy Research*, *2*.

Baldwin, Richard, & Freeman, Rebecca (2022). Risks and global supply chains: What we know and what we need to know. *Annual Review of Economics*, *14*, 153–180.

Blomberg, S. Brock, & Hess, Gregory D. (2006). How much does violence tax trade? *The Review of Economics and Statistics*, *88*(4), 599–612.

Bonadio, Barthélémy, Huo, Zhen, Levchenko, Andrei A., & Pandalai-Nayar, Nitya (2021). Global supply chains in the pandemic. *Journal of International Economics*, *133*, Article 103534.

Brandt, Loren, Li, Bingjing, & Morrow, Peter M. (2021). Processing trade and costs of incomplete liberalization: The case of China. *Journal of International Economics*, *131*, Article 103453.

Caliendo, Lorenzo, & Parro, Fernando (2015). Estimates of the trade and welfare effects of NAFTA. *Review of Economic Studies*, *82*(1), 1–44.

Campos, Rodolfo G., Estefanía-Flores, Julia, Furceri, Davide, & Timini, Jacopo (2023). Geopolitical fragmentation and trade. *Journal of Comparative Economics*, *51*(4), 1289–1315.

Chang, Pao-Li, Fujii, Tomoki, & Jin, Wei (2022). Good names beget favors: The impact of country image on trade flows and welfare. *Management Science*, *68*(10), 7555–7596.

Chor, Davin, Manova, Kalina, & Yu, Zhihong (2021). Growing like China: Firm performance and global production line position. *Journal of International Economics*, *130*, Article 103445.

Cosar, Kerem, & Thomas, Benjamin (2021). The geopolitics of international trade in Southeast Asia. *Review of World Economics*, *157*(1), 207–219.

Dang, Alicia H., Krishna, Kala, & Zhao, Yingyan (2023). Winners and losers from the US-China trade war. NBER Working Paper 31922.

Dekle, Robert, Eaton, Jonathan, & Kortum, Samuel (2007). Unbalanced trade. *American Economic Review*, *97*(2), 351–355.

Dobkin, Carlos, Finkelstein, Amy, Kluender, Raymond, & Notowidigdo, Matthew J. (2018). The economic consequences of hospital admissions. *American Economic Review*, *108*(2), 308–352.

Du, Yingxin, Ju, Jiandong, Ramirez, Carlos D., & Yao, Xi (2017). Bilateral trade and shocks in political relations: Evidence from China and some of its major trading partners, 1990–2013. *Journal of International Economics*, *108*, 211–225.

Eaton, Jonathan, & Kortum, Samuel (2002). Technology, geography, and trade. *Econometrica*, *70*(5), 1741–1779.

Fajgelbaum, Pablo D., Goldberg, Pinelopi K., Kennedy, Patrick J., & Khandelwal, Amit K. (2020). The return to protectionism. *Quarterly Journal of Economics*, *135*(1), 1–55.

Galle, Simon, & Lorentzen, Linnea (2024). The unequal effects of trade and automation across local labor markets. *Journal of International Economics*, *150*, Article 103912.

Glick, Reuven, & Taylor, Alan M. (2010). Collateral damage: Trade disruption and the economic impact of war. *The Review of Economics and Statistics*, *92*(1), 102–127.

Goldberg, Pinelopi K., & Reed, Tristan (2023). Is the global economy deglobalizing? If so, why? And what is next? *Brookings Papers on Economic Activity*, *2023*(1), 347–423.

Grossman, Gene M., Helpman, Elhanan, & Redding, Stephen J. (2024). When tariffs disrupt global supply chains. *American Economic Review*, *114*(4), 988–1029.

Guiso, Luigi, Sapienza, Paola, & Zingales, Luigi (2009). Cultural biases in economic exchange? *Quarterly Journal of Economics*, *124*(3), 1095–1131.

Handley, Kyle, Kamal, Fariha, & Monarch, Ryan (2020). Rising import tariffs, falling export growth: When modern supply chains meet old-style protectionism. NBER Working Paper 26611.

Head, Keith, & Mayer, Thierry (2014). Gravity equations: Workhorse, toolkit, and cookbook. In *Handbook of International Economics*: *vol. 4*, (pp. 131–195). Elsevier.

Hoekman, Bernard M., Mavroidis, Petros C., & Nelson, Douglas R. (2023). Geopolitical competition, globalisation and WTO reform. *The World Economy*, *46*(5), 1163–1188.

Jackson, Matthew O., & Nei, Stephen (2015). Networks of military alliances, wars, and international trade. *Proceedings of the National Academy of Sciences*, *112*(50), 15277–15284.

Jiao, Yang, Liu, Zhikuo, Tian, Zhiwei, & Wang, Xiaxin (2024). The impacts of the US trade war on Chinese exporters. *The Review of Economics and Statistics*, *106*(6), 1576–1587.

Ju, Jiandong, Wang, Xiaoyan, Li, Xin, & Hou, Jianghuai (2021). Impact of Sino-US tariff dispute on trade balance, terms of trade, and trade structure. *International Economic Review (in Chinese)*, (2), 71–93.
Kleinman, Benny, Liu, Ernest, & Redding, Stephen J. (2024). International friends and enemies. *American Economic Journal: Macroeconomics*, *16*(4), 350–385.
Li, Xiaolu, Ma, Lin, & Tang, Yang (2024). Migration and resource misallocation in China. *Journal of Development Economics*, *167*, Article 103218.
Martin, Philippe, Mayer, Thierry, & Thoenig, Mathias (2008). Make trade not war? *Review of Economic Studies*, *75*(3), 865–900.
Miller, Douglas L. (2023). An introductory guide to event study models. *Journal of Economic Perspectives*, *37*(2), 203–230.
Mityakov, Sergey, Tang, Heiwai, & Tsui, Kevin K. (2013). International politics and import diversification. *Journal of Law and Economics*, *56*(4), 1091–1121.
Ossa, Ralph (2014). Trade wars and trade talks with data. *American Economic Review*, *104*(12), 4104–4146.
Polachek, Solomon William (1980). Conflict and trade. *Journal of Conflict Resolution*, *24*(1), 55–78.
Silva, J. M. C. Santos, & Tenreyro, Silvana (2006). The log of gravity. *The Review of Economics and Statistics*, *88*(4), 641–658.
Sposi, Michael, Yi, Kei-Mu, & Zhang, Jing (2020). Trade integration, global value chains, and capital accumulation. NBER Working Paper 28087.
Tombe, Trevor, & Zhu, Xiaodong (2019). Trade, migration, and productivity: A quantitative analysis of China. *American Economic Review*, *109*(5), 1843–1872.