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Political alliances and trade: Europe in a polarized world

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ABSTRACT

This study investigates how political alliances influence trade and welfare in Europe and major global economies amidst escalating geopolitical tensions. Utilizing a panel data approach, we assess the impact of military alliances on trade through structural gravity and staggered difference-in-difference methodologies. We further simulate the potential trade and welfare effects of the strengthening and disintegration of political alliances within blocs. Results reveal significant trade and welfare consequences stemming from the expansion or disintegration of the North Atlantic Treaty Organization (NATO) and the establishment of a military alliance under the Shanghai Cooperation Organization (SCO). From a European point of view, our results suggest that the accession of new NATO members will bring economic benefits, while the US leaving NATO, or the deepening of the SCO, will bring negative trade and welfare effects. If a US exit from NATO triggers a disintegration of the alliance and the SCO creates a military alliance, this would lead to severe negative consequences for the EU. Notably, the study finds that the benefits of collective security provided by NATO substantially outweigh the costs associated with its 2% defence spending requirement.

1. Introduction

Political relationships between nations have played a crucial role in shaping the global economic landscape. Nations with closer political ties tend to engage in higher levels of trade, whereas political disagreements often lead to reduced economic interactions. For example, Mansfield and Bronson (1997) highlight the positive impact of political alliances on trade volumes between countries. Conversely, Fuchs and Klann (2013) focus on the negative consequences of diverging political views, termed the ‘Dalai Lama effect’. On the other hand, trade regimes have important implications for political alliances and decisions to engage in conflicts (Polachek et al., 1999). Chang and Sellak (2023) develop a theoretical model that explains how trade regimes have political implications for armament and conflicts. Overall, since WWII, there have been a series of rapid geopolitical changes that require more careful evaluation in the context of the global trade environment.

The period from 1990 to 2010, following the dissolution of the Soviet Bloc, marked an era of significant global integration and ideological convergence, largely attributed to a consensus on the democratic political system and liberal economic institutions, controversially known as the “Washington Consensus” (Marangos, 2009). Scholars such as Fukuyama (1992) and Friedman (2005) have articulated visions of a new world where ideological conflicts give way to a universal embrace of democratic systems of government and market-based economies. Subsequently, countries such as China and Russia took on more assertive roles, contesting the current geopolitical balance. Initiatives such as China’s Belt and Road Initiative and the ‘Made in China 2025’ strategy demonstrate efforts to establish a new global economic framework. Russia’s military actions in Georgia, Syria, and Ukraine also

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posed a challenge to the dominance of the Western world in global affairs. This period was also characterized by the rise of populist leaders who exploited economic dissatisfaction, blaming it on international trade, immigration, and the liberal elite. More specifically, populism often rallies against the establishment and idealizes past national identity (Silva, 2024). This multifaceted concept is notoriously difficult to define; nevertheless, Celico et al. (2024) offer an insightful discussion. Examples include Boris Johnson's Brexit campaign in the UK and Donald Trump's MAGA movement in the US.

This trend has been evident in various democracies, with an increase in the popularity of the far-right parties throughout Europe and beyond, prompting a reassessment of the sustainability of the liberal order and the future of military and political alliances as the world shifts towards autocracy and a multi polar power structure. The re-evaluation of political alliances and their economic implications is crucial, as articulated by Ikenberry (2012), who examines the challenges facing the liberal international order. In this regard, the role of military alliances is central to reshaping the geopolitical and economic landscape. The strategic and economic calculus of alliances, especially in the context of the North Atlantic Treaty Organization (NATO) and its 2% GDP contribution mandate for defence spending, is a subject of contemporary debate. Therefore, this paper contributes to the literature by examining the trade-offs associated with military alliances in the current geopolitical context.

Geopolitical tensions have reinforced political divisions, notably between the China-Russia-backed Shanghai Cooperation Organization (SCO) and NATO. Recent research, such as the work by Crozet and Hinz (2020), has begun to assess how new conflicts affect trade, particularly through the lens of deteriorating political relations and the resultant increase in trade costs from sanctions and counter-sanctions. On the other hand, the work by Li et al. (2023) has explored the trade effects of NATO expansion. Furthermore, the research of Dimitriou et al. (2024) identifies a positive relationship between military expenditure and economic growth in the case of NATO members, but negative for non-members. Similarly, Callado-Muñoz et al. (2023) find that weapons trade between NATO members has a positive effect on output and productivity.

This paper broadens the scope to investigate the dynamics of strengthened political alliances within these blocs, as well as to examine the ramifications of a significant member, potentially the United States, withdrawing from NATO. This line of inquiry is especially pertinent in the context of the 2024 US Presidential elections and remains under-explored despite its growing political feasibility. Additionally, this paper evaluates the economic impact of new members, including Finland, Sweden, and Ukraine, joining NATO. Conversely, on the other side of the political and geographical spectrum, we analyse the formation of a formal defence alliance around the Shanghai Cooperation Organization (SCO) and its economic implications for its members, as well as for the EU and NATO members. Overall, our key contribution in this paper is the empirical assessment of how escalating geopolitical tensions influence European trade and welfare. Therefore, we address two critical questions: (i) How would European trade and welfare be affected by stronger alliances within blocks and the expansion of NATO? (ii) What are the potential trade and welfare consequences of the US withdrawing from NATO and its subsequent disintegration?

Using a structural gravity model estimated with trade data from 1960–2018, our approach is to compare the welfare effects of a range of scenarios using a general equilibrium analysis. We find a strong, positive, and significant impact of military alliances on trade, comparable to the effect of preferential trade agreements (PTAs) documented in the literature (Head and Mayer, 2014; Baier et al., 2019; Pamp et al., 2021). Specifically, being part of a military alliance increases bilateral trade by approximately 30% when considering only external trade data. This impact is even more significant, with up to 114% more exports, when internal trade is included in the analysis. These results underline the substantial role that political and military partnerships play in enhancing trade relationships between countries. Furthermore, the findings suggest that NATO membership facilitates a significant increase in exports, with effects over a typical military alliance ranging from 24% to 62.9% extra trade across different models. This result is particularly notable when compared to the impact of other military alliances, indicating that NATO's economic and military significance has a uniquely positive effect on trade between its members.

The strong positive effect of NATO on trade withstands robustness checks using various model specifications and a Staggered Difference-in-Differences (SDiD) analysis (Callaway and Sant'Anna, 2021). The SDiD results reveal that the treatment effects of NATO membership vary over time but consistently show a positive influence on trade. Moreover, the positive impacts of NATO on exports increase with NATO military activity and the duration of membership. However, it also indicates that the positive impact has significantly declined over the last decade, reflecting the geopolitical changes discussed previously. The SDiD analysis also reveals that the effect of a generic military alliance on trade is not robust, highlighting the uniqueness of the NATO alliance. In terms of European interests, the simulations suggest that NATO expansion brings trade and welfare benefits, while NATO disintegration or SCO deepening will bring negative economic consequences. Overall, the paper illustrates the important relationships between military alliances, preferential trade agreements, and trade flows. This study underscores the economic implications of political and military partnerships, with NATO and the EU memberships significantly boosting trade among their member countries.

The rest of the paper is structured as follows. Section 2 discusses the literature on trade and politics, Section 3 presents the model, Section 4 introduces the data, Section 5 explains the counterfactual scenarios, Section 6 presents the results, and Section 7 concludes.

2. Trade and politics

2.1. Virtuous circle of trade and politics

The links between international trade and political alliances are complex and multi-directional, reflecting an interplay of economic and political factors. Economic Interdependence Theory suggests that high levels of bilateral trade foster cooperative political relations and reduce the likelihood of political and military conflicts (Polachek, 1980; Mansfield and Pollins, 2001; Oneal and Russett, 2001). In such cases, the potential losses in trade, investment, and access to global markets can outweigh the gains from military actions, leading to a preference for maintaining peace and stability.

Another strand of literature examining the positive relationships between trade and political relations emphasizes the opposite direction of causality, stating that trade follows the flag. Historical examples show that colonial powers often used military force to open markets and secure trade routes, which supports the idea that trade follows the flag. Historically, empires across the world promoted trade between metropolises and their colonies (Bah et al., 2018); the ancient Greeks created cities splintered from the key metropolises of Athens and Sparta; Rome built an infrastructure of roads and unified the laws across its provinces. Similarly, the British Empire encouraged trade with its colonies. Conversely, the process of decolonization reduced trade between metropolises and their former colonies (Head et al., 2010). Further, Hegre et al. (2010) focus on deteriorating political relations and find that conflict reduces trade. Meanwhile, Martin et al. (2012) find that countries that have engaged in conflict with each other in the past are more likely to sign a trade agreement and experience trade gains. In contemporary times, relationships may be more closely related to diplomatic and strategic partnerships than to direct military intervention. Hence, good political ties may play a significant role in facilitating trade flows between countries. Political distances, measures by UN voting patterns have a negative impact on trade (Umana Dajud, 2013). Furthermore, economic diplomacy, where states use trade agreements, foreign aid, and investment as tools to strengthen their geopolitical influence, can be seen as a modern form of ''trade follows the flag''.

Research on the impact of politics on trade has confirmed that both politics and bilateral conflicts influence trade (Ouyang and Yuan, 2021; Pollins, 1989b,a; Martin et al., 2008; Glick and Taylor, 2010). Moreover, consumers may express goodwill and solidarity towards politically close nations while demonstrating negative attitudes and boycotting goods from political adversaries. For example, Michaels and Zhi (2010) estimated an 8% drop in bilateral trade between the US and France as a response to French opposition to the Iraq War in 2003. Similarly, Yazigi (2014) reported an increase in Syrian trade with its current allies, Russia and Iran, despite the civil war's negative impact on its economy; Syria also experienced a marked drop in exports and imports to/from European countries.

Trust plays an important role in preferences for trade and consumption, resulting in a positive relationship between political affinity and consumption of imports. Evidence shows that bilateral trade increases following diplomatic exchanges (Rose, 2007) and state visits between countries (Nitsch, 2007). Conversely, Fuchs and Klann (2013) find evidence of a 'Dalai Lama Effect', which reduces exports to China for approximately two years after hosting the Dalai Lama. More broadly, trust between nations serves as a crucial determinant of economic ties. Guiso et al. (2009) discovered that a standard deviation increase in trust between importers and exporters boosts exports by 10%. Disdier and Mayer (2007) used the same data to find that a 5 percentage point improvement in bilateral trust results in a 5% increase in imports. On the supply side, countries often sacrifice economic efficiency to achieve political objectives; for example, Russia offers price discounts on natural gas to secure the loyalty of specific governments (Stulberg, 2015). In other words, trade follows the flag; politically motivated concessions often yield benefits, as more loyal governments provide preferential treatment to their political allies.

Evidently, as the direction of causality may go both ways, it should be modelled accounting for both effects via simultaneous equation modelling or an instrumental variable approach. Keshk et al. (2004) apply a simultaneous equation model and find a uni-directional impact, namely, that politics influences bilateral trade. Similarly, Glick and Taylor (2010) demonstrate that the endogeneity issue in the gravity model framework can be controlled for by country-pair fixed effects in a fully specified gravity model. Therefore, the impact of political and military alignment on trade can be modelled as strengthening bilateral political links, which may facilitate trade with countries that are politically and institutionally aligned.

2.2. Vicious circle of trade and politics

While trade can act as a factor promoting peace, disputes over trade policies, tariffs, and market access can also become sources of tension. Such disputes may sometimes escalate into broader political or military conflicts, especially when intertwined with issues like sovereignty, territorial claims, or national security. The aggression of Russia against Ukraine was triggered by the Ukrainian strategy for Euro-integration, which conflicted with the Russian-led Eurasian Economic Integration (Emerson and Movchan, 2016; Wolczuk, 2019).

International trade is often influenced by the distribution of natural resources, which can be uneven across countries. Competition for scarce resources, such as oil, minerals, and water, can lead to trade tensions and potentially military conflicts, especially if countries attempt to secure these resources through force or coercion. Berman et al. (2017) provide evidence that an increase in the prices of mineral resources could account for up to a quarter of the average level of violence in African countries from 1997 to 2010. Caselli et al. (2015) develop a theoretical and empirical framework to examine how natural resources and their proximity to borders influence the likelihood of interstate conflicts. Their theory posits that conflicts are more likely when a country possesses natural resources, especially when these resources are located near its border or if two neighbouring countries have unevenly distributed resources along their border. These hypotheses were tested using a new dataset on the locations of oilfields relative to international borders, revealing that the existence and positioning of oil significantly predict interstate conflicts post-World War II.

Countries may use economic measures, such as sanctions and embargoes, as tools of foreign policy to exert pressure on other nations. While these measures are economic in nature, they can lead to military confrontations if they severely impact the targeted country's economy, leading to retaliation or escalation.

2.3. Globalization and conflict

Control over key trade routes, such as shipping lanes and choke points (e.g., the Strait of Hormuz and the Suez Canal), has historically been a significant factor in military conflicts. Countries may engage in military actions to secure these routes, protect their commercial interests, or challenge the dominance of rivals.

Globalization has increased the interconnectedness of countries' economies, potentially amplifying the impact of any conflict on global trade networks. However, it also creates a shared interest in stability and peace, as widespread disruption can have far-reaching economic repercussions. The empirical evidence suggests that during the recent wave of globalization, while strategically significant locations frequently become the focus of armed disputes, the surge in international trade heightens the motivation to safeguard trade routes, thereby reducing the likelihood of conflicts at these critical points (Gallea and Rohner, 2021). Reversely, deterioration in global trade could increase the motivation to challenge the control of strategically significant locations by emerging global powers.

2.4. Political alliances and trade costs

The interplay between trade costs and institutional frameworks forms a critical nexus within the domain of international economics. As established in the literature, robust institutions encompassing effective property rights protection, well-developed judicial systems, and comprehensive contract laws are fundamentally linked to reduced trade costs. Anderson and Marcouiller (2002) explore the significant impact of corruption, insecurity along trading routes, and imperfect contract enforcement on international trade and empirically demonstrate that inadequate institutional quality – manifested through poor contract enforcement and lack of transparency in government policies – constrains trade to a degree comparable to tariffs. Levchenko (2007) emphasizes the critical role of institutions in shaping international trade patterns, suggesting that the structures provided by political alliances could similarly influence trade flows. Antràs and Chor (2013) explore how global value chains are organized, shedding light on how military alliances might impact the structuring of supply chains for defence-related products. These studies delineate how institutions mitigate trade barriers through mechanisms addressing incomplete contracts, enhancing trust, ensuring information security, and reducing asymmetric information. There is also empirical evidence showing that institutions play a significant role in reducing trade costs. Yu (2010) links democracy and trade, indirectly supporting the notion that political structures, including alliances, can facilitate trade. Furthermore, Hou et al. (2021) discuss the impact of institutional quality on trade costs, providing a foundation for arguing that the institutional-like frameworks established by military alliances could similarly reduce trade costs.

Expanding upon the traditional understanding of institutional impacts on trade, we focus on the influence of political alliances, particularly military alliances, as interactions between institutions in trading partners, as a significant determinant in reducing trade costs and fostering international trade. The premise is that military alliances and political connections serve not only as instruments of defence and security policy but also as economic bridges that streamline trade between member states. This shared commitment among alliance members provides a credible guarantee for the enforcement of contracts, particularly those that remain incomplete due to the inherent complexities of international commerce. The resultant reduction in perceived risk among trading partners effectively lowers transaction costs.[1]

Lastly, a noteworthy barrier to international trade is the presence of information asymmetries between trading partners. Political alliances, through their structured frameworks for cooperation and communication, significantly mitigate these asymmetries. They foster an environment of enhanced trust and transparency, particularly critical in the trade of military and dual-purpose technologies where security concerns and the strategic nature of goods necessitate higher degrees of confidence and information sharing (Anderson and Marcouiller, 2002). Moreover, these alliances facilitate the development of sophisticated, integrated supply networks specialized in the production of military and dual-purpose technologies. This dynamic highlights the strategic dimension of trade cost reduction, where economic efficiency and security imperatives intersect within the framework of military alliances.

3. The model and identification

This paper uses a structural gravity model of global trade with exogenously given factor endowments and the Armington assumptions about trade (Armington, 1969), augmented by political factors in the bilateral costs and consumer utility. In what follows, we briefly present the theoretical foundations, formulate the econometric specification, and discuss the identification strategy.

3.1. The setup

There are N countries, each producing a unique variety, i. Country i is endowed with Q_i units of the product, sold at factory gate price p_i. A representative consumer in country j has a constant elasticity of substitution utility function

[1] To note that the concept of expressive behaviour by Hillman (2010) can be used to explain government policies introduced to promote trade with countries in the military alliance despite knowing this is not the lowest-cost supplier. There is empirical evidence to support this expressive behaviour hypothesis if we refer to the literature on friend-shoring. For example, Javorcik et al. (2022) estimate the welfare losses associated with friend-shoring. However, the current paper does not explore this point any further since we do not construct scenarios that analyse government policies aimed at friend-shoring.

$$U_j = \left[\sum_i \left(\frac{C_{ij}}{\mu_{ij}} \right)^{(\sigma-1)/\sigma} \right]^{\sigma/(\sigma-1)} \tag{1}$$

where σ is the elasticity of substitution and μ_{ij} is a preference parameter, which may depend on political relations between two countries.

The consumer maximizes (1) subject to the budget constraint

$$\sum_j P_{ij} C_{ij} = E_j \tag{2}$$

where E_j is expenditure in country j, P_{ij} is price of product i in country j and C is consumption of good produced in i by the country j representative consumer.

To deliver a variety produced in country i to country j incurs a trade cost: $\tau_{ij} \geq 1$ units of good i is required to ship one unit of this good, with $\tau_{ij} = 1$ only when $i = j$. In particular, we assume that trade cost is parametrically described as

$$\tau_{ij,t}^{1-\sigma} = \exp(\gamma_{MA} MA_{ij,t} + \gamma_{PTA} PTA_{ij,t} + Z_{ij,t}\gamma_Z + e_{ij,t}) \tag{3}$$

where $MA_{ij,t}$ is a binary variable that takes value of 1 if there is a military alliance between countries i and j at time t and 0 otherwise, PTA_{ij} is a binary variable indicator of preferential trade agreement between countries i and j at time t, and $Z_{ij,t}$ is the set of additional controls that capture bilateral trade costs which vary over time. We expect that more politically aligned countries to trade more due to a positive country image effect on demand (captured by the bilateral preference parameter μ_{ij}), more favourable/less stringent inspections by government officials, absence of embargoes and boycotts and the trade in politically sensitive goods (i.e. weapons, advanced technology products, nuclear products etc.). In terms of the additional controls, we use a full set of country-pair fixed effects, so all bilateral, time-invariant factors are controlled for. We also control for reporter-time and partner-time fixed effects.

3.2. Equilibrium

The equilibrium is a static concept, so we do not show a time dimension, as the economy starts in a steady state and reaches a new steady state after a shock.

Solving the model yields a structural gravity representation

$$X_{ij} = \frac{Y_i E_j}{Y_w} \left(\frac{\tau_{ij}}{\Omega_i P_j} \right)^{(1-\sigma)} \tag{4}$$

where X_{ij} is export from country i to country j, $Y_i = \sum_j X_{ij}$ is total income in country i, $Y_w = \sum Y_i$ is world output, and $E_j = \sum_i X_{ij}$ is total expenditure in country j. In addition, it has the following equilibrium relationships

$$\Omega_i^{(1-\sigma)} = \sum_j \frac{E_j}{Y_w} \left(\frac{\tau_{ij}}{P_j} \right)^{(1-\sigma)} \tag{5}$$

are the outward multilateral resistance and

$$P_j^{(1-\sigma)} = \sum_i \frac{Y_i}{Y_w} \left(\frac{\tau_{ij}}{\Omega_i} \right)^{(1-\sigma)} \tag{6}$$

inward multilateral resistance terms.

The factory gate price in country i in the equilibrium is characterized as follows

$$p_i = (Y_i/Y_W)^{1/(1-\sigma)}(1/\Omega_i) \tag{7}$$

3.3. Identifying the key model parameters

Combining (3) and (4) and exploiting the time dimension yields

$$X_{ij,t} = \exp(\gamma_{MA} MA_{ij,t} + \gamma_{PTA} PTA_{ij,t} + Z_{ij,t}\gamma_Z + D_{it} + D_{jt} + D_{ij} + \varepsilon_{ij,t}) \tag{8}$$

We estimate Eq. (8) using a long panel of trade data covering 1960–2018. As discussed in the previous section, we control for exporter-year, importer-year, and bilateral fixed effects, which leaves only time-varying bilateral variables, including military alliances, and regional trade agreements. By including bilateral fixed effects, we control for historical and long-run political factors that shape bilateral relationships. We assume that the remaining fluctuations are orthogonal to the error term.

3.4. Solving for equilibrium and computing counterfactual scenarios

Our simulation methodology follows Anderson et al. (2018). This approach has been used to estimate the effect of the Transatlantic Trade and Investment Partnership (TTIP) (Felbermayr et al., 2015) and Brexit (Jackson and Shepotylo, 2018). Given the estimated model parameters, quantity of output and existing political environment, we solve the structural gravity model (4)–(6) using the cross-section of the most up-to-date trade data in 2018. We compute the global trade equilibrium under the baseline and, after modifying policy variables, under the counterfactual scenarios. Finally, we calculate changes in trade flows and consumer welfare before and after counterfactual trade policy changes.

We show two sets of results – conditional general equilibrium and full general equilibrium results (see discussion in Head and Mayer (2014) and Anderson et al. (2018)) – in order to disentangle the direct effects due to changes in trade costs from the indirect effects due to further adjustments in the global distribution of income and expenditure. For the conditional general equilibrium (CGE) (Head and Mayer, 2014; Anderson et al., 2018), we keep production and expenditure constant. The changes in bilateral exports are computed as

$$E\hat{X}P_{ij} = 100\% \times \frac{\hat{X}'_{ij}}{\hat{X}_{ij}} \tag{9}$$

where $\hat{X}_{ij}$ and $\hat{X}'_{ij}$ are bilateral flows in the baseline and counterfactual scenarios respectively.

The welfare changes in the CGE are evaluated as follows:

$$\hat{W}_i = 100\% \times (\hat{P}_i/\hat{P}'_i - 1) \tag{10}$$

For the full general equilibrium (FGE) results, the welfare changes are computed as follows:

$$\hat{W}_i = 100\% \times \left(\frac{\frac{Y'_i}{P'_i}}{\frac{Y_i}{P_i}} - 1 \right) \tag{11}$$

4. Data

This paper uses trade data from the Directions of Trade Statistics (DOTs) by IMF, where the DOTS sample covers 160 countries for the period 1960–2018. DOTS does not include internal trade, which is required to compute the welfare effects. We calculate internal trade, X_{ii}, based on the World Bank data on national accounts and balance of payments, adjusting for the share of services in GDP and for the share of value added in export statistics based on the OECD estimates:

$$X_{ii,t} = GDP_{it}(1 - s_{it})/vas_{it} - EXP_{it} + IMP_{it}, \tag{12}$$

where GDP is gross domestic product, s is the share of services in GDP, EXP and IMP are values of gross exports and imports of goods, and vas is the share of value added in exports. The share of value added in exports is from the OECD Trade in Value Added (TiVA) dataset.[2] Data on GDP and the share of services in value added is from the World Bank Databank.[3]

Bilateral gravity data for the simulations are taken from the Centre D'Etudes Prospectives et D'Informations Internationales Gravity dataset (CEPII, see Head et al. (2010) for a detailed description of the data). Data on preferential trade agreements comes from Mario Larch's Regional Trade Agreements Database (Egger and Larch, 2008). To measure the impact of formal political alignment, we use data on formal defence alliances from the Correlates of War (COW) (Gibler, 2009).[4] Further discussion and justification of the political variables are provided in the following section. We also control for other bilateral costs that vary over time. In some model specifications, we include data on the applied tariffs taken from UNCTAD TRAINS database access via World Integrated Trade Solution (WITS) by the World Bank.

4.1. Summary statistics

Table 1 presents summary statistics for the PPML and linear model samples, which we use to estimate the key model parameters. The PPML sample is bigger due to the inclusion of zero trade flows, while the linear model is constrained by the use of only positive trade flows.

4.1.1. Sample with zero trade flows

We have almost 1 million observations for 160 countries in 1960–2018. The average export value is 1.054 billion USD, with a very high standard deviation of 36.543, indicating a wide dispersion of export values among the observations. PTA has a mean of 0.144, which implies that for approximately 14.4% of the observations, trade is between countries that are part of a preferential trade agreement. Military Alliance has a mean of 0.036, which suggests that military alliances are not very common among the observations (about 3.6% of cases).

[2] For countries not in the dataset, we assigned to the broader categories, available in TiVA, such as Africa, Europe, East and South-East Asia, etc. We impute the share of value added in exports for periods not present in the OECD sample based on their level of economic development, size and global time trend.

[3] For countries with no shares of services available, we imputed the missing value based on the level of economic development, size, local and global trends.

[4] Data on military alliances is available until 2012 only. We extend it until 2018, by assuming there were no changes in this variable between 2013 and 2018.

Table 1
Summary statistics.

Variable	Obs	Mean	Std. dev.	Min	Max
A: Sample with zero trade flows					
Export, bln USD	967,342	1.054	36.543	0	7334.465
PTA	967,342	0.144	0.351	0	1
Military alliance	967,342	0.036	0.186	0	1
B: Sample with positive trade					
Log of Export	580,808	−5.692	3.881	−20.723	8.900
PTA	580,808	0.208	0.406	0	1
Military alliance	580,808	0.047	0.212	0	1

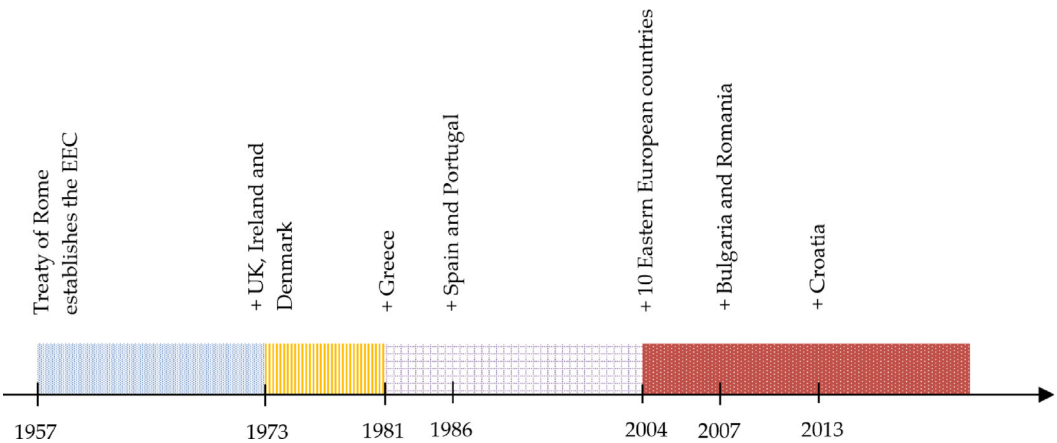


Fig. 1. EU enlargement timeline.

4.1.2. Sample with positive trade

There are 580,808 observations with positive bilateral trade flows, which is 60% of the overall sample. It indicates that even at the highest degree of aggregation of bilateral trade flows, a substantial share of the sample involves no trade. The mean of the natural logarithm of exports is −5.692 with a standard deviation of 3.881. For this sample, the mean of PTA is slightly higher at 0.208, indicating a higher proportion of observations with PTA compared to Sample A. For Military Alliance, the mean is 0.047, slightly higher than in Sample A, suggesting a marginally greater prevalence of military alliances in this sample.

5. Constructing the scenarios

This paper considers the impact of changes in the political environment measured by military alliances on bilateral trade costs (equation (3)). We construct the scenarios indicated in Table 2, which in turn will permit us to compare the trade and welfare changes across each of these dimensions. We are, in particular, focusing on NATO, as European security strongly relies on it, and the EU countries are the main beneficiaries of the current security arrangements. EU and NATO enlargements represent two parallel timelines of integration and security, with distinct membership criteria and geopolitical implications. Figs. 1 and 2 provide an overview, which highlight the key enlargement phases in the development of each institution. For an in-depth discussion, see Smith and Timmins (2018).

A stronger form of political alignment is a formal alliance. The Correlates of War Project tracks these arrangements over the period 1816–2012 (Gibler, 2009). There are four types of alliance identified: (1) defense pact (2) neutrality treaty (3) non-aggression treaty (4) entente agreement. These different types may signal different intentions: war or peace. In scenario 1 we will model Sweden and Finland's NATO accession. This is a major well-documented policy shift away from neutrality for both countries (Spohr, 2023); however, the trade and welfare impacts are not well understood. Scenario 2 considers only Ukraine joining NATO (not Sweden and Finland), as well as the EU. The third scenario assumes that Ukraine joins NATO but not the EU. It allows us to disentangle the effects stemming from military and economic co-operation. While scenario 4 assumes all three (Finland, Sweden and Ukraine) join NATO and Ukraine joins the EU. In the case of scenario 5, we assume that Donald Trump wins the next US election in 2024 and withdraws the US from NATO. Our additional scenarios consider the extreme benchmark of NATO disintegrating (scenario 6) and the deepening of the SCO to become a military alliance (scenarios 7–9). Expanding SCO membership from the core members to observers to dialogue partners, we demonstrate how the benefits of joining a military alliance change with the alliance size. Finally, scenario 10 considers a 25-member SCO military alliance and the complete disintegration of NATO. Overall, these scenarios provide an illustration of the trade and welfare impacts of some actual policy changes, in the case of the NATO accession of Finland and Sweden, as well as other potential changes and benchmark cases such as the NATO collapse.

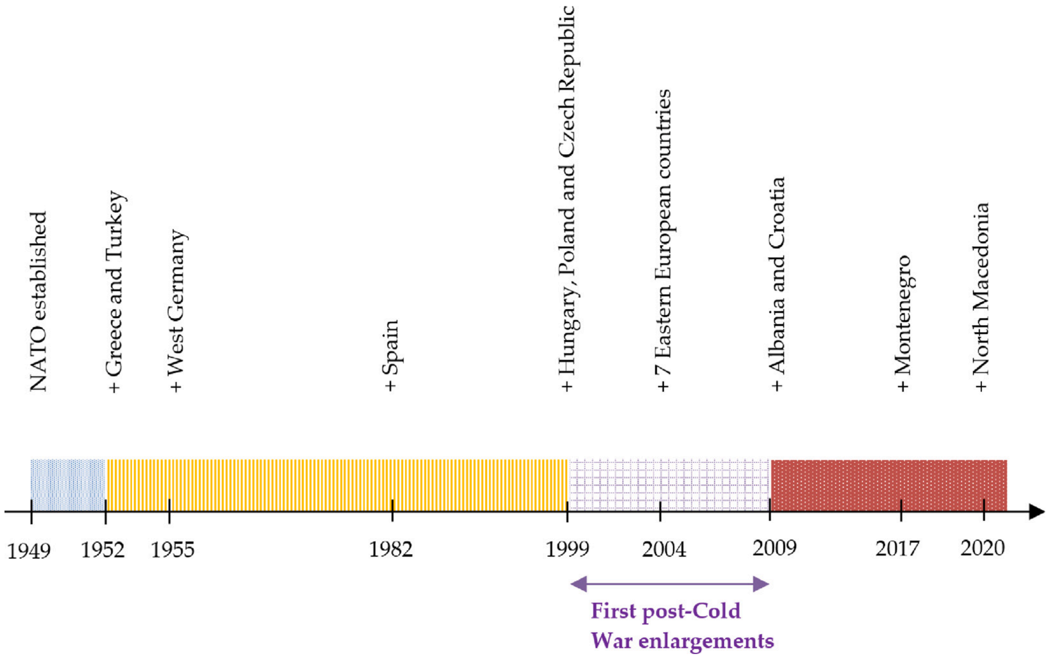


Fig. 2. NATO enlargement timeline.

Table 2
Scenarios.

Scenario	Brief description	Long description
1	FIN/SWE	Finland and Sweden join NATO
2	Ukraine Full	Ukraine joins NATO and EU
3	Ukraine Partial	Ukraine joins NATO but not EU
4	FIN/SWE/UKR Full	Finland, Sweden, and Ukraine join NATO
5	US out	US formally exits NATO
6	NATO disint.	Disintegration of NATO
7	SCO 9	Shanghai 9 members form military alliance (MA)
8	SCO 11	Shanghai 9 members and 2 observers form MA
9	SCO 25	Shanghai 9 members 2 observers and 14 dialogue partners form MA
10	Nato disint. and SCO 25	Scenario 6 and 9 combined

6. Results

6.1. Trade and military alliances

We estimate the impact of political relationships on trade, as specified in Eq. (8), using military alliances as proxies for formal political alliances. Our sample of bilateral exports spans from 1960 to 2018 and includes internal trade, as discussed in the data section. Using bilateral, time-varying characteristics of political ties – namely, military alliances – allows us to estimate their impact on trade within the structural gravity model with a full set of fixed effects. These effects control for all bilateral, time-invariant characteristics (such as distance and common borders) and time-varying, economy-wide, and global developments (represented by inward and outward multilateral resistance terms). This approach also addresses endogeneity concerns, as discussed in Glick and Taylor (2010). Furthermore, we control for the impact of trade policy by including preferential trade agreements, which are bilateral and vary over time. The impacts of MFN (Most Favored Nation) tariffs and macroeconomic shocks are also captured by the multilateral resistance terms.

The results are presented in Table 3. Models (1)–(6) were estimated using Poisson Pseudo Maximum Likelihood (PPML), as developed by Silva and Tenreyro (2006), and optimized for handling a large number of fixed effects according to Correia et al. (2020). PPML accounts for zero trade flows in the estimation process and is robust to heteroskedasticity, making it particularly suitable for trade data, which often exhibits significant variation in the scale of trade flows between country pairs. Models (7)–(10) were estimated using linear regression, with the log of exports serving as the dependent variable. We utilized samples that exclude internal trade for models (1)–(3) and (7)–(8), and include internal trade for models (4)–(6) and (9)–(10). In models (3) and (6), we report on PPML analyses conducted exclusively on positive trade flows to determine whether differences in results between PPML and linear regression are attributable to the inclusion of zero trade or to heterogeneity in trade flows. All standard errors

Table 3
Export and military alliance.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Military alliance,	.262**	.258**	.263**	.761**	.706**	.747**	.436**	.360**	.418**	.340**
Yes = 1	(.077)	(.075)	(.075)	(.095)	(.096)	(.091)	(.084)	(.083)	(.084)	(.083)
% change	30.0	29.4	30.1	114.0	102.6	111.1	54.7	43.3	51.9	40.5
PTA, Yes = 1		.171**	.176**		.425**	.449**		.305**		.309**
		(.024)	(.024)		(.051)	(.050)		(.022)		(.022)
% change		18.6	19.2		53.0	56.7		35.7		36.2
Method	PPML	PPML	PPML	PPML	PPML	PPML	Log	Log	Log	Log
Internal trade	No	No	No	Yes	Yes	Yes	No	No	Yes	Yes
Observations	967 207	967 207	576 767	974 736	974 736	583 774	576 767	576 767	583 774	583 774
R^2	.895	.895	.881	.975	.975	.973	0.87	0.87	0.87	0.87

$^+$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$ Robust standard errors in parentheses.
Data is Directions of Trade (DOT) in 1960–2018. The dependent variable is the value of total export in USD (Models (1)–(6)) or the log of value of total export (Models (7)–(10)) from reporting country i to partner country j at time t. Models (1)–(6) are estimated by PPML. Models (7)–(10) are estimated by linear regression. Models (4)–(6) and (9)–(10) include observations on internal trade. In models (3) and (6), the sample is restricted to only positive trade flows. In all models, we control for exporter-year, importer-year, and pair fixed effect. Standard errors in parentheses are cluster at country-pair. The percentage changes are calculated to compare the impact of joining alliance as $100\% \times (e^{\beta_{MA}} - 1)$ or signing PTA as $100\% \times (e^{\beta_{PTA}} - 1)$.

are clustered at the country-pair level. The potential endogeneity of military alliances is addressed through pair-fixed effects, which account for historical and bilateral factors, as well as reporter-time and partner-time fixed effects, capturing macroeconomic factors and multilateral resistance in a general equilibrium framework. Given that military alliances are typically established based on security concerns over economic considerations and form over longer periods, bilateral fixed effects are expected to capture most of the slowly evolving, time-invariant factors. Concurrently, more transient, country-specific factors are accounted for by reporter-time and partner-time fixed effects.

Military alliances are statistically significant in promoting trade among nations — having an alliance is associated with a 30% higher trade when considering only external trade samples. However, the impact is much more substantial, up to 114% more exports, if internal trade is taken into account. Excluding zero trade flows from the PPML estimation does not significantly impact the estimated coefficients. This result extends beyond the benefits of preferential trade and friendly trade policies, as we control for preferential trade agreements, which also significantly promote trade among nations — resulting in 17% higher trade for the sample without internal trade and up to 57% more trade when internal trade is included. The standard log-linear specification, presented in columns (7)–(10), also indicates a strong positive and significant effect of military alliances on trade, with magnitudes ranging from 41%–55% more trade. This is in between the results for PPML without and with internal trade flows.

6.2. NATO effect

Among the active defence alliances, NATO is the largest in terms of the economic and military power of its members. Since the focus of the paper is on the NATO effect on the EU members' trade and welfare, we further investigate whether NATO has a stronger effect on trade relative to other defence alliances. We add the NATO indicator variable, which is equal to 1 if both trading countries are NATO members and 0 otherwise. To account for the fact that a large number of countries who joined NATO during the investigation period also became members of the EU, we control for EU membership by introducing the EU indicator, which takes the value of 1 if both trading partners are EU members and 0 otherwise. We also control for the defense military alliances and preferential trade in general, by keeping these variables in the regression. As a result, the coefficient on the NATO variable indicates whether NATO membership has a different impact than membership in a generic defence alliance.

Table 4 presents the regression results of the impact of being in NATO and the EU, above and beyond being a member of a military alliance and a preferential trade agreement (PTA) on exports, using the two estimation methods discussed in the previous section: PPML for models (1) to (3) and log-linear regression for models (4) to (6). We report the results for the sample that includes internal trade. Bilateral, reporter-year, and partner-year fixed effects are included in all model specifications. The standard errors are clustered at bilateral pairs. Each variable's coefficient, standard error, and percentage change in exports associated with a unit increase in the explanatory variable (holding other variables constant) are provided.

According to the PPML estimates (models 1–3), NATO membership is strongly associated with a statistically significant increase in exports, with coefficients ranging from 0.215 to 0.488, which translates into the percentage increase in exports due to NATO membership between 24.0% and 62.9%. The log-linear regression estimates (Models 4–6) generate similar outcomes as the PPML results, with NATO membership positively and significantly impacting exports, with the percentage increase ranging from 39.8% to 90.8%.

EU membership also has a strong positive and significant effect on exports, with PPML estimates (models 2 and 3) providing coefficients of 0.388 and 0.311, respectively, leading to export increases of 47.4% and 36.5%. The log-linear regression estimates (models 5 and 6) give even larger estimates, with positive and significant coefficients of 0.636 and 0.626, translating into export increases of 88.9% and 87.0%.

Table 4
Export, EU and NATO.

	(1)	(2)	(3)	(4)	(5)	(6)
NATO	.488**	.215**	.231**	.646**	.344**	.335**
	(.049)	(.044)	(.057)	(.055)	(.057)	(.058)
% change	62.9	24.0	26.0	90.8	41.1	39.8
EU		.388**	.311**		.636**	.626**
		(.030)	(.041)		(.042)	(.042)
% change		47.4	36.5		88.9	87.0
Military alliance, Yes = 1	.451**	.320**	.106	.262**	.234**	.254**
	(.096)	(.075)	(.068)	(.083)	(.081)	(.082)
% change	57.0	37.7	11.2	30.0	26.4	28.9
PTA, Yes = 1	.416**	.409**	.164**	.303**	.297**	.294**
	(.052)	(.052)	(.024)	(.022)	(.022)	(.022)
% change	51.6	50.5	17.8	35.4	34.6	34.2
Observations	974 736	974 736	967 207	583 774	583 774	576 767
R^2	.975	.975	.895	.87	.87	.87

$^+$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$ Robust standard errors in parentheses.
Data is Directions of Trade (DOT) in 1960–2018. The dependent variable is the value of total export in USD (Models (1)–(3)) or the log of value of total export (Models (4)–(6)) from reporting country i to partner country j at time t. Models (1)–(3) are estimated by PPML. Models (4)–(6) are estimated by linear regression. In models (3) and (6), the sample is restricted to only positive trade flows. In all models, we control for bilateral, reporter-year, and partner-year fixed effects. Errors are cluster at country-pair level.

Membership in a military alliance is significantly associated with export increases in models 1 and 2 (coefficients of 0.451 and 0.320) and not statistically significant in model 3. The percentage change in exports ranges from 11.2% to 57.0% in the PPML estimated models. Log-linear regression estimates also produce positive and significant coefficients in models 4 to 6, with a more modest impact on exports compared to the PPML estimates, ranging from 26.4% to 30.0%.

The results suggest that membership in NATO positively and significantly impacts export levels above the impact of a generic military alliance, with the magnitude of these effects varying across different model specifications and estimation methods. The positive effect of NATO on trade may come from several sources: protecting and securing trade routes, lowering uncertainty and boosting investments across the member countries, and also direct trade of military and military-related products, and support of military activities.

6.3. Robustness

6.3.1. Alternative model specifications

The robustness checks for the effects of NATO and military alliances on exports are conducted using the PPML method across different model specifications on the sample that includes the internal trade data. The results are presented in Table 5. In our analysis of the robustness of the impact of NATO membership on exports, we employed various model specifications to examine the consistency of this relationship. In the balanced panel analysis (model 1), we find that NATO membership is associated with a substantial 45.5% increase in exports. This effect demonstrates robustness across different time periods; specifically, before 1990 (model 2), NATO membership was correlated with a 29.9% increase in exports, while the period after 1990 (model 3) showed a slightly diminished yet positive effect of 20.8%. Incorporating controls for applied tariffs (model 4) slightly reduced the magnitude of NATO's impact to 14.7%; however, it also substantially reduced the sample size due to data availability on tariffs. Further analysis considering different types of alliances (model 5) revealed a specific positive effect of NATO membership, leading to a 22.9% increase in exports, indicating the unique role of NATO beyond general alliance effects. Political distances between countries are a factor that determine trade flows (Umana Dajud, 2013). Controlling for the political distance between countries (model 6) still produced a positive and significant impact of NATO on bilateral exports. These robustness checks across diverse model specifications highlight the consistently positive association between NATO membership and export performance.

We find that EU membership has a positive effect on exports. The highest impact is observed for the sample before 1990, indicating that EU membership could increase exports by up to 43.8%. There is also a considerable overlap in EU and NATO membership. We include the interaction between EU and NATO membership (model 7) to investigate whether the results are primarily driven by the NATO members within the EU or there are benefits of being the NATO member that goes beyond being the EU member. The results demonstrate that being a member has a complementarity with the interaction terms having a positive and significant effect .149. It is still beneficial to join NATO even for non-EU countries, as shown by the positive and significant coefficient of NATO.

The effect of military alliances on exports varies significantly across different specifications. It is not significant in the balanced panel and before 1990 models, but it becomes significantly positive after 1990 (coefficient is .491), when controlling for applied tariffs (.384), and when political distances are considered (.318). This suggests a substantial variation in how military alliances

Table 5
Export, EU and NATO.

	(1) Export	(2) Export	(3) Export	(4) Export	(5) Export	(6) Export	(7) Export
NATO	.455**	.299**	.208**	.147**	.208**	.229**	.124**
	(.080)	(.063)	(.041)	(.036)	(.044)	(.044)	(.043)
EU	.363**	.438**	.378**	.049	.382**	.387**	.347**
	(.045)	(.052)	(.026)	(.033)	(.031)	(.030)	(.037)
NATO × EU							.149**
							(.052)
Military alliance, Yes = 1	.126	−.016	.491**	.384**	.318**		.335**
	(.10)	(.093)	(.070)	(.062)	(.075)		(.075)
RTA, Yes = 1	.377**	.232**	.274**	.147**	.404**	.410**	.409**
	(.065)	(.039)	(.039)	(.030)	(.052)	(.052)	(.052)
Tariff				−.049**			
				(.0034)			
Political distance					−.049*		
					(.020)		
Neutrality						−.336	
						(.30)	
Non-aggression						−.102	
						(.17)	
Entente						.343*	
						(.16)	
Observations	445 972	252 080	636 734	495 488	967 342	974 736	974 736
R^2							
$r2_p$	.979	.963	.977	.977	.975	.975	.975

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$ Robust standard errors in parentheses.
Data is Directions of Trade (DOT). The dependent variable is the value of total export in USD from reporting country i to partner country j at time t. In Model (1), we use the balanced panel, keeping only countries that are present over the whole period 1960–2018. Model (2) is estimated on the sample in 1960–1989. Model (3) is estimated on the sample in 1990–2018. Model (4) controls for the bilateral applied tariffs. Model (5) breaks military alliances into different types, according to the correlates of war (COW) classification. Model (6) additionally controls for political distances. Model (7) adds the interaction between EU and NATO membership. Models are estimated by the PPML method. In all models, we control for exporter-year, importer-year, and pair fixed effect. Standard errors in parentheses are cluster at country-pair.

influenced exports depending on the period and model specifications. RTA membership is positively associated with exports across all models, with coefficients ranging from .147 to .410. The strongest effect is observed when breaking down defence alliances into more specific categories (model 5). The control for applied tariffs in model 4 indicates a negative and significant coefficient (−.049), suggesting that a higher applied tariff is associated with a decrease in exports, consistent with the theoretical model, which introduces tariffs as part of the trade costs. Model 5, which breaks down defence alliances into more specific categories, shows significant variation. Notably, ententes are associated with an increase in exports (.343), while neutrality and non-aggression pacts do not significantly affect exports. Political distance (model 6) has a negative and statistically significant effect on exports (−.049), indicating that greater political distance reduces export levels.

These robustness checks suggest that NATO and EU membership consistently enhance export levels, with variations observed across different time periods and model specifications. The impact of RTAs is also significant, while the results for military alliances are more mixed. The inclusion of control variables such as MFN tariffs and political distance provides additional insights into the factors affecting export performance.

6.3.2. Staggered difference in differences

The staggered difference-in-differences (SDiD) method by Callaway and Sant'Anna (2021) is an extension of the traditional DID approach, designed to analyse the effects of policy interventions or treatments that are implemented at different times across different groups or entities. This method is particularly relevant in observational studies where the timing of treatment varies among the treated units, allowing for a more nuanced understanding of the treatment effects over time. Since both defence and NATO membership are stretched over half a century, it is important to check whether our results reported in the previous section regarding the impact of NATO on exports withstand this robustness check. We also use this alternative method to develop a stronger understanding of the impact of defence alliances.

In a traditional DiD setup, the effect of a treatment is estimated by comparing the changes in outcomes over time between a treated group and a control group. However, when the treatment is not applied simultaneously to all units but rather staggered across different times, the standard DiD approach may not adequately capture the effects of the treatment. The staggered DiD method addresses this by comparing each treated unit with only the units that have not yet been treated, effectively exploiting the variation in treatment timing to identify causal effects. It is also an effective method to explore the heterogeneity of the impact since the average treatment effect on treated (ATT) can be calculated by year, cohort, and, as in the event study, by duration since its implementation.

A summary of the results from the SDiD analysis estimating the causal effect of the staggered implementation of defence and NATO alliances is presented in Table 6. Results are organized separately for NATO and defence alliances. The coefficient represents

Table 6
Staggered difference in difference.

Description	NATO	Defense
	A: Simple average	
ATT: ln Export	.238**	−.550**
	(.039)	(.109)
	B: Calendar average	
ATT: ln Export	.461**	−.542**
	(.052)	(.099)
	C: Cohort average	
ATT: ln Export	.172**	−.412**
	(.035)	(.089)
	D: Event study average	
Pre-event	.031**	−.020
	(.006)	(.017)
Post-event	.503**	−.962**
	(.084)	(.238)

$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$.
Notes: The outcome variable is $\ln Export$. A simple average of all $ATT(g,t)$ is reported in Panel A. Average calendar ATT is reported in Panel B. Group average or cohort average are reported in Panel C. Panel D gives an overview of the event study with average pre- and post-treatment coefficients. More detailed results for calendar, group, and event ATT are presented with series of figures. The staggered difference in difference is implemented in Stata, using the csdid package (Rios-Avila et al., 2023).

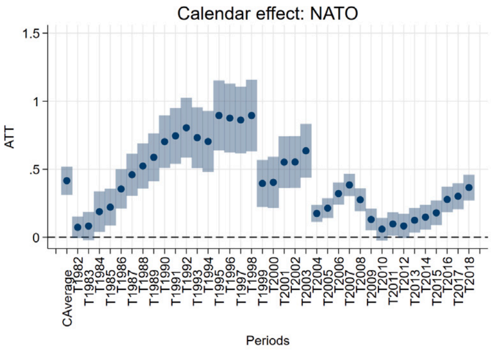
the average treatment effect on the natural log of bilateral exports of joining NATO or forming a defence alliance. The results of SDiD are presented in several different ways; each allows us to look at the results from a different perspective. The simple average shows the basic SDiD estimate without considering the timing of the treatment. The calendar average reports the results by the year in which the treatment (joining NATO or a defence pact) occurred. The cohort average shows the effects across different 'cohorts' or groups of countries that were treated at the same time. The event study average looks at the effect over time before and after the treatment. It is broken down into pre-event and post-event to examine how the impact of the treatment changes over time.

The NATO alliance has a significant impact on bilateral exports. The simple average method reveals a notable average increase of 23.8% in exports for countries post their accession to NATO. Furthermore, the calendar average approach, which associates export increases with the subsequent years following NATO membership, indicates a more pronounced average boost of 46.1% in exports. Lastly, the cohort average, focusing on groups of countries that entered NATO simultaneously, shows a comparatively modest average increase of 17.2% in exports. These findings collectively underscore the positive correlation between NATO membership and enhanced export performance among member states.

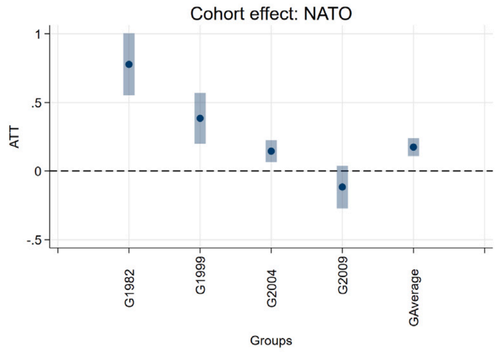
In the analysis of the impact that entering into generic defence agreements has on the export capabilities of the countries involved, three averaging methodologies offer insight into a consistent downward trend. Utilizing the simple average approach, we observe a significant average decrease of 55.0% in exports after the formation of defence agreements. Similarly, the calendar average method, which aligns export declines with the years following the establishment of such agreements, reveals a closely related average decrease of 54.2% in exports. Meanwhile, the cohort average, which examines the collective export performance of countries entering into defence agreements simultaneously, indicates a somewhat lesser average decrease of 41.2% in exports. In sum, these results highlight a negative association between participation in defence agreements and the export performance of the countries involved. The table also highlights the pre-event and post-event coefficients for an event study analysis, showing significant increases in exports after NATO membership and significant decreases after generic defence agreements. We now turn to consider the results in more detail with a series of figures.

SDiD of NATO effect

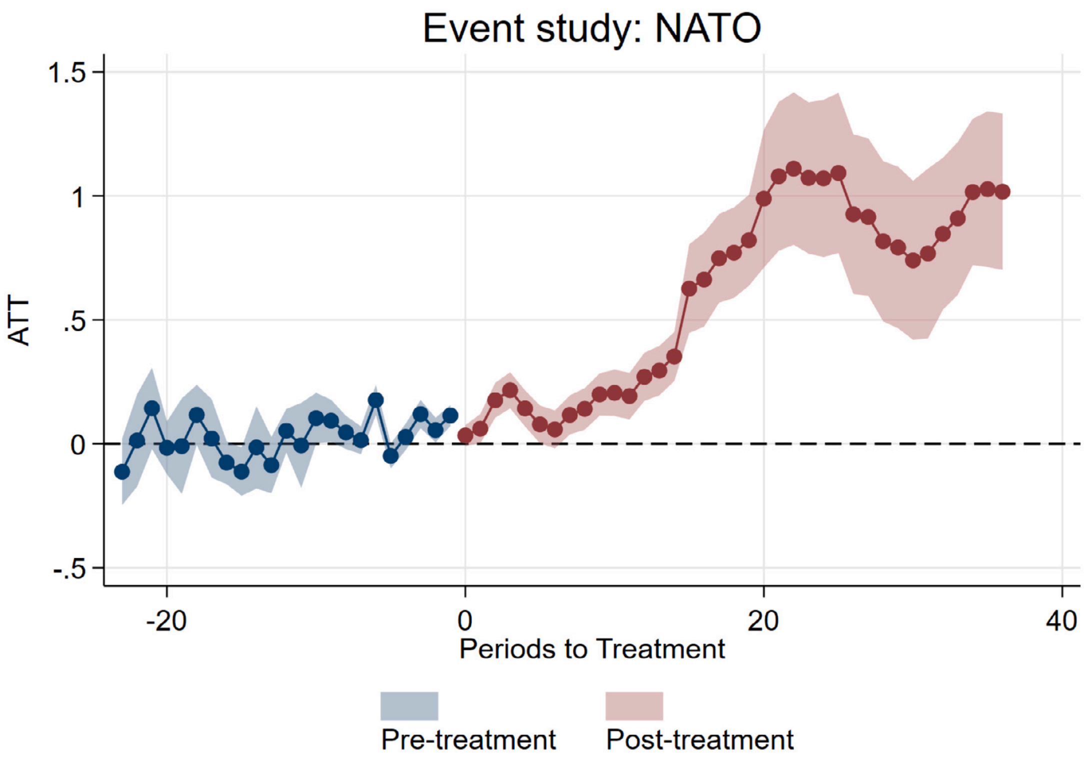
Fig. 3 presents a summary of the results for a country joining NATO. Panel (a) presents the evolution of the estimated ATT. The shaded blue areas around the blue dots represent the 95% confidence intervals for each estimate. The chart shows an increasing trend in ATT from around 1982 until the early 1990s, suggesting that the association with NATO had an increasingly positive effect on bilateral exports during this period. Following this, there is a period of volatility, indicating fluctuations in the impact of NATO on bilateral exports. The latter part of the graph, particularly after 2010, shows a decreasing trend in ATT, implying that the positive effect of NATO on bilateral exports might be diminishing or becoming more uncertain. However, more recent years indicate a revival of the positive impact of NATO on trade between its members. The patterns could be explained by the cycles of NATO activity, where NATO was considered to have a more important role during the Cold War and in the first decade after the collapse of the Soviet Block, culminating around the war in Yugoslavia. Moreover, the ATT had a positive trend in 2000–2007, which was a period of NATO expansion and the war in Iraq. However, trade with new members is expected to take time to be realized, which may be why there was an overall decline in the average effect of NATO. The global financial crisis of 2008 had a strong negative impact on trade, which also affected the trade between the members of NATO. The activity picked up again due to increasing geopolitical tensions in the Middle East and Europe post-2014. The graph in panel (b) shows ATT impact of the NATO membership for different cohorts of countries that joined NATO at different points in time. The horizontal axis is labelled with groups identified by the year they joined NATO, such as "G1982", "G1999", "G2004", "G2009", and a final group labelled "GAverage". These groups represent cohorts of countries that joined NATO in the years 1982, 1999, 2004, and 2009, with GAverage representing the average effect



(a) Calendar effect



(b) Cohort effect



(c) Price regulation

Fig. 3. Staggered difference in difference analysis of joining NATO on the bilateral exports. (a) Average effect of joining NATO by year; (b) Average effect of joining NATO by cohort; and (c) Event study of joining NATO. All outcomes are compared to never-treated bilateral pairs. The shaded areas around the dots represent the 95% confidence intervals for each estimate. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

across all cohorts. The "G1982" cohort has the highest positive ATT, suggesting a significant positive effect of joining NATO in that period. The subsequent cohorts ("G1999", "G2004", "G2009") exhibit lower ATTs, with G2009 becoming negative. The "GAverage" is an aggregation of the ATTs across all cohorts and shows a positive effect. This graph is useful for understanding how the impact of joining NATO may differ for countries that joined at different times. It suggests that the earliest cohort experienced the most substantial positive effect, with varying effects for later cohorts.

Event study approach

The event study graph in panel (c) presented depicts the ATT over a sequence of periods relative to a specific event or intervention, which in this case is related to NATO and its impact on bilateral exports. The blue line and shaded area represent the estimated ATT before the treatment along with its confidence interval. The line fluctuates around zero, suggesting that before the treatment, there was no significant difference in the bilateral exports due to NATO. The shaded blue area represents the confidence interval, showing the range of uncertainty around the estimate. The red line and shaded area illustrate the estimated ATT after the treatment. There is a noticeable upward trend after the treatment, indicating that the bilateral exports increased following the event related to NATO. From this graph, we can infer that the duration of the treatment related to NATO has an increasingly positive impact on bilateral exports, as evidenced by the upward trajectory in the post-treatment period. The widening confidence intervals in the post-treatment phase also suggest increasing variability in the estimates as time progresses after the treatment.

SDiD defence effect

Figs. 4(a)–4(c) represent an analysis of the effect of a defence alliance on export levels, assessed through different lenses: by calendar year, cohort, and as an event study. The calendar effect analysis suggests variability in the impact of the defence alliance on exports over time, with an overall negative trend in recent years. The event study indicates that before the treatment, exports were relatively stable but suffered a significant negative impact after the treatment. The cohort effect analysis shows that the impact of the defence alliance on exports varies by cohort, with some cohorts experiencing more negative effects than others. While the event study suggests a clear negative post-treatment effect, the calendar and cohort analyses reveal that the impact varies over time and across different groups of countries. This variability can be due to numerous factors, including changes in global politics, economics, or shifts in the strategic priorities of the defence alliance over time.

Overall, this additional evidence continues to support the earlier findings that NATO membership is associated with an increase in exports for member countries. In terms of generic defence agreements, these latest results suggest that they are likely to have a negative impact on trade. This could be due to the specific economic and political characteristics of NATO as compared to other defence alliances.

6.4. Counterfactual analysis of trade flows and welfare analysis

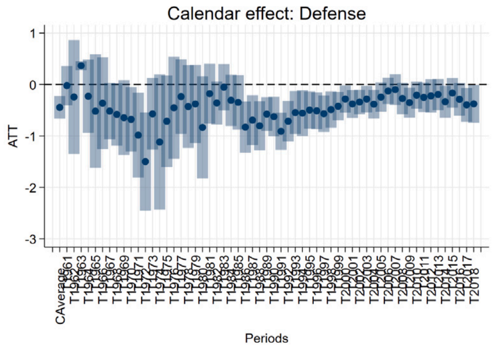
Moving to the final stage of our analysis, Table 7 shows the results of simulations for the ten different geopolitical scenarios discussed in Section 5. Scenario 1, where Finland and Sweden join NATO, results in substantial positive changes in their economic performance. Finland and Sweden experience significant increases in exports (24.9% and 27.2%, respectively) and GDP (7.0% and 7.3%). This reflects the economic benefits of enhanced security and political stability provided by NATO membership. It also highlights that the economic gains are likely to exceed the cost of spending 2% of GDP on defence as required from NATO members. The EU, UK, and USA also see positive but smaller changes in their economic indicators, indicating that integrating new members into NATO has broader economic benefits for existing members. Conversely, countries like Brazil, China, and India experience slight negative impacts on exports and GDP, likely due to shifts in trade dynamics and increased competition.

Scenario 2 considers Ukraine joining NATO and the EU. We can identify a positive impact on Ukraine's exports and GDP. In terms of the percentage change in GDP (7.6%) and exports (16.7%), the impact on Ukraine is similar to the impact on Finland and Sweden in scenario 1. This scenario suggests that dual membership of NATO and the EU provides significant economic advantages by enhancing trade opportunities and political stability. This scenario underscores the potential economic gains for Ukraine and the broader positive implications for its Western allies.

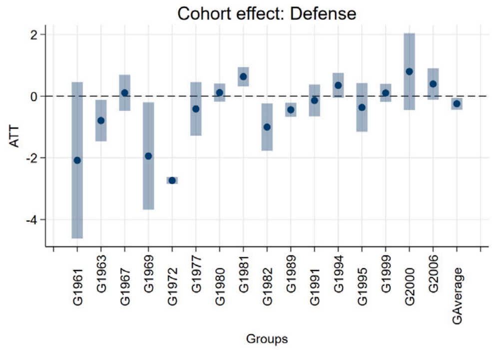
If Ukraine joins NATO but not the EU, in scenario 3, we see a smaller positive welfare effect on Ukraine than in scenario 2, which highlights the importance of EU membership in maximizing economic benefits for countries joining NATO. While the impact of all three countries (Finland, Sweden and Ukraine) joining NATO (and Ukraine joining the EU) creates an even stronger positive impact on the GDP of Sweden and Finland compared to the simulation in scenario 1, and Ukraine compared to scenario 2. The EU benefits substantially, with a 2.6% increase in exports and a 0.8% increase in GDP. The USA and UK also see positive impacts. Conversely, Brazil, China, and India experience more noticeable negative effects, reflecting the competitive pressures and shifting trade flows resulting from this broader NATO membership.

Scenario 5 assumes that the US leaves NATO. This simulation predicts a negative impact on EU exports and GDP, with the EU experiencing a non-negligible decline in exports (−0.4%) and GDP (−0.1%). The negative impacts extend to other NATO members, although to a lesser degree. The USA also faces a sizable decline in exports (−16.1%) and minor negative effects on GDP (−0.4%), highlighting the economic interconnectedness and mutual benefits of the alliance. Scenario 6 considers the extreme benchmark of NATO disintegration. This indicates severe negative consequences for the EU, US and UK, with significant declines in EU exports (−12.5%) and GDP (−2.3%), while the impact on US exports is −15.2% and on GDP is −0.4%, with the asymmetry in the results for GDP reflecting the more closed economy of the US relative to the EU. Interestingly, non-NATO countries like Brazil and China see small positive changes, possibly due to altered geopolitical dynamics and reduced competition from a weakened NATO.

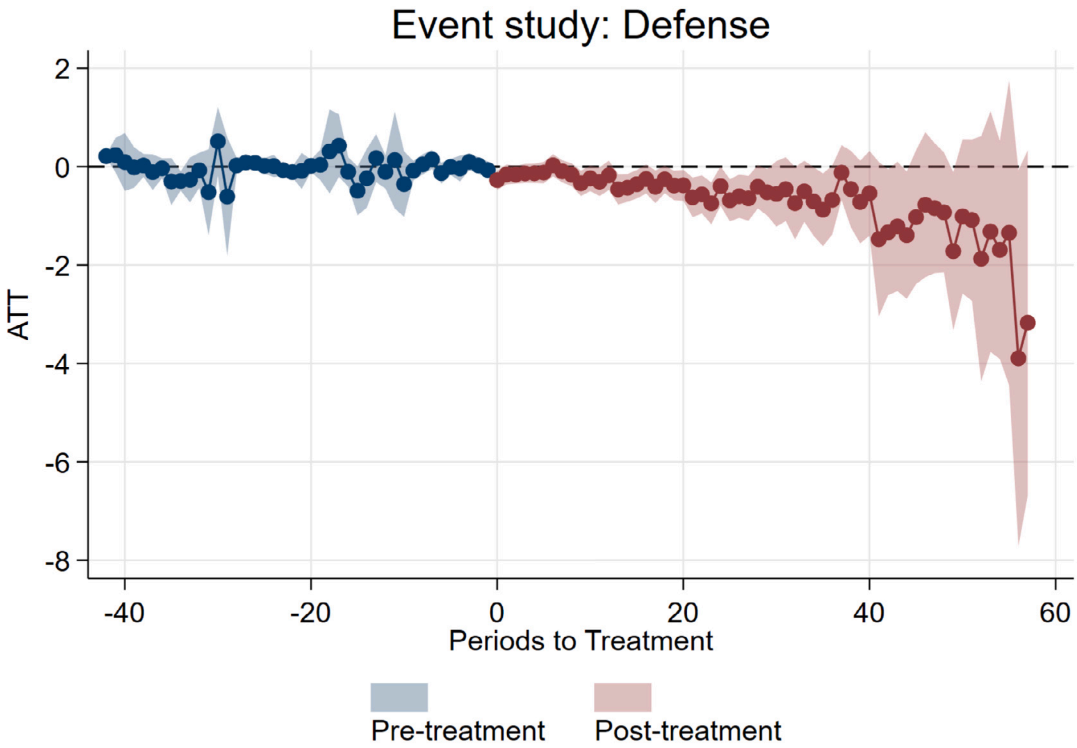
Scenarios 7, 8, and 9 refer to SCO members forming a military alliance. Scenario 7, with nine SCO members, shows significant positive impacts for China and India, with substantial increases in exports and GDP. Scenario 8, expanding to 11 members, and Scenario 9, further expanding to 25 members, amplify these positive effects. The EU, USA, and other Western countries experience negative impacts, reflecting shifting trade alignments resulting from a strengthened SCO. These scenarios highlight the



(a) Calendar effect



(b) Cohort effect



(c) Price regulation

Fig. 4. Staggered difference in difference analysis of joining defence alliance on the bilateral exports. In (a) you can see the average effect of joining defence alliance by year. In (b) you can see the average effect of joining defence by cohort. In (c) you can see the event study of joining defence. All outcomes are compared to never-treated bilateral pairs.

economic potential for SCO members in enhancing their political and military cooperation. Finally, scenario 10 combines NATO's disintegration with the SCO's expansion into a 25-member military alliance. The economic consequences are profound, with the EU, USA, and UK facing significant negative impacts on exports and GDP. In contrast, China and India benefit immensely from the new geopolitical landscape, experiencing substantial increases in their economic indicators. This scenario underscores the potential for a dramatic shift in global economic power dynamics, driven by changes in military and political alliances.

These simulations underscore the complex relationship between political alliances and global trade. The results suggest that changes in military and political alliances, such as NATO and the SCO, could have profound impacts on global economic

Table 7
Results of simulation of scenarios 1–10.

Scenario	Region	Exports CGE[a] Δ, %	Exports FGE[b] Δ, %	Price[c] Δ, %	IMR[d] Δ, %	GDP[e] Δ, %	GDP[f] Bln. USD
Scenario 1 — Finland and Sweden joining NATO							
1	Brazil	−0.138	−0.104	−0.011	0.000	−0.011	1038.466
1	China	−0.114	−0.073	−0.019	−0.014	−0.004	9402.439
1	EU	0.616	0.833	0.100	−0.036	0.137	13 474.372
1	Finland	24.884	25.384	3.806	−3.008	7.025	250.685
1	India	−0.168	−0.128	−0.003	0.005	−0.009	2421.707
1	Rest of the World	−0.065	−0.002	−0.004	−0.003	−0.001	19 168.337
1	Saudi Arabia	−0.113	−0.050	−0.027	−0.005	−0.022	591.618
1	Sweden	27.166	27.510	3.931	−3.148	7.308	446.643
1	UK	1.136	1.359	0.012	−0.095	0.106	1805.153
1	USA	0.546	0.608	−0.051	−0.065	0.014	7906.943
1	Ukraine	−0.324	−0.168	−0.046	0.077	−0.123	151.825
Scenario 2 — Ukraine joining NATO and EU							
2	Brazil	−0.043	−0.031	−0.003	0.000	−0.004	1038.466
2	China	−0.036	−0.022	−0.006	−0.005	−0.001	9402.439
2	EU	0.133	0.188	0.028	−0.004	0.032	13 474.372
2	Finland	−0.117	−0.067	−0.007	0.021	−0.028	250.685
2	India	−0.063	−0.046	−0.001	0.002	−0.003	2421.707
2	Rest of the World	−0.032	−0.006	−0.005	−0.001	−0.004	19 168.337
2	Saudi Arabia	−0.049	−0.019	−0.012	−0.002	−0.009	591.618
2	Sweden	−0.111	−0.063	−0.004	0.021	−0.025	446.643
2	UK	0.170	0.214	0.007	−0.009	0.016	1805.153
2	USA	0.174	0.194	−0.015	−0.019	0.004	7906.943
2	Ukraine	16.639	16.659	4.177	−3.197	7.617	151.825
Scenario 3 — Ukraine join NATO but not EU							
3	Brazil	−0.036	−0.026	−0.003	0.000	−0.003	1038.466
3	China	−0.030	−0.018	−0.005	−0.004	−0.001	9402.439
3	EU	0.098	0.152	0.033	−0.012	0.044	527.310
3	Finland	−0.098	−0.055	−0.006	0.018	−0.024	250.685
3	India	−0.052	−0.038	−0.001	0.002	−0.003	2421.707
3	Rest of World	−0.034	−0.014	−0.005	0.008	−0.013	151.608
3	Saudi Arabia	−0.041	−0.016	−0.010	−0.002	−0.008	591.618
3	Sweden	−0.092	−0.052	−0.004	0.018	−0.022	446.643
3	UK	0.147	0.182	0.005	−0.008	0.013	1805.153
3	USA	0.145	0.160	−0.013	−0.016	0.004	7906.943
3	Ukraine	13.604	13.619	3.457	−2.665	6.290	151.825
Scenario 4 — Finland, Sweden and Ukraine join NATO (and EU for Ukraine)							
4	Brazil	−0.183	−0.136	−0.014	0.001	−0.015	1038.466
4	China	−0.151	−0.096	−0.026	−0.020	−0.006	9402.439
4	EU	2.555	2.889	0.481	−0.335	0.833	527.310
4	Finland	25.061	25.641	3.845	−3.025	7.085	250.685
4	India	−0.234	−0.176	−0.005	0.007	−0.012	2421.707
4	Rest of World	−0.183	−0.136	−0.014	0.001	−0.015	1038.466
4	Saudi Arabia	−0.164	−0.070	−0.039	−0.008	−0.032	591.618
4	Sweden	27.308	27.726	3.965	−3.157	7.354	446.643
4	UK	1.298	1.566	0.019	−0.103	0.121	1805.153
4	USA	0.716	0.799	−0.065	−0.083	0.018	7906.943
4	Ukraine	17.111	17.360	4.326	−3.295	7.880	151.825
Scenario 5 — US leave NATO							
5	Brazil	0.122	0.031	0.000	−0.010	0.010	1038.466
5	China	0.056	0.007	0.023	0.021	0.002	9402.439
5	EU	−0.418	−0.428	0.012	0.094	−0.082	13 474.372
5	Finland	0.119	0.089	0.052	0.024	0.028	250.685
5	India	0.070	0.037	0.018	0.015	0.004	2421.707
5	Rest of the World	−0.638	−0.724	0.001	0.108	−0.106	19 168.337
5	Saudi Arabia	0.045	0.007	0.034	0.025	0.009	591.618
5	Sweden	0.131	0.102	0.055	0.026	0.029	446.643
5	UK	−0.897	−0.913	0.070	0.154	−0.083	1805.153
5	USA	−16.118	−16.140	−0.622	−0.213	−0.410	7906.943
5	Ukraine	0.088	0.057	0.052	0.019	0.034	151.825

(*continued on next page*)

Table 7 (*continued*).

Scenario	Region	Exports CGE[a] Δ, %	Exports FGE[b] Δ, %	Price[c] Δ, %	IMR[d] Δ, %	GDP[e] Δ, %	GDP[f] Bln. USD
Scenario 6 — NATO disintegration							
6	Brazil	0.604	0.316	0.020	−0.030	0.049	1038.466
6	China	0.368	0.191	0.113	0.098	0.014	9402.439
6	EU	−12.465	−13.222	−1.219	1.084	−2.275	13 474.372
6	Finland	1.621	1.016	0.274	−0.115	0.389	250.685
6	India	0.581	0.437	0.087	0.057	0.031	2421.707
6	Rest of the World	−0.996	−1.292	0.041	0.226	−0.181	19 168.337
6	Saudi Arabia	0.440	0.234	0.241	0.155	0.085	591.618
6	Sweden	1.944	1.224	0.294	−0.148	0.443	446.643
6	UK	−18.751	−19.430	−2.383	−0.721	−1.673	1805.153
6	USA	−15.237	−15.572	−0.800	−0.413	−0.388	7906.943
6	Ukraine	1.141	0.718	0.392	−0.047	0.439	151.825
Scenario 7 — SCO 9							
7	Brazil	−0.129	−0.165	−0.064	−0.053	−0.011	1038.466
7	China	4.350	4.291	0.432	0.262	0.170	9402.439
7	EU	−0.039	−0.080	−0.050	−0.042	−0.009	13 474.372
7	Finland	−0.107	−0.135	−0.057	−0.032	−0.025	250.685
7	India	11.415	11.541	−0.515	−1.117	0.609	2421.707
7	Rest of the World	0.266	0.263	−0.002	−0.093	0.092	19 168.337
7	Saudi Arabia	−0.140	−0.170	−0.115	−0.088	−0.027	591.618
7	Sweden	−0.073	−0.107	−0.054	−0.037	−0.016	446.643
7	UK	−0.059	−0.100	−0.044	−0.039	−0.006	1805.153
7	USA	−0.171	−0.196	−0.020	−0.016	−0.004	7906.943
7	Ukraine	−0.179	−0.186	−0.080	−0.012	−0.068	151.825
Scenario 8 — SCO 11							
8	Brazil	−0.133	−0.168	−0.064	−0.054	−0.011	1038.466
8	China	4.404	4.346	0.436	0.264	0.172	9402.439
8	EU	−0.042	−0.082	−0.051	−0.042	−0.009	13 474.372
8	Finland	−0.115	−0.140	−0.059	−0.032	−0.027	250.685
8	India	11.501	11.629	−0.515	−1.121	0.614	2421.707
8	Rest of the World	0.286	0.285	−0.001	−0.098	0.098	19 168.337
8	Saudi Arabia	−0.144	−0.173	−0.117	−0.090	−0.028	591.618
8	Sweden	−0.079	−0.112	−0.055	−0.037	−0.018	446.643
8	UK	−0.063	−0.103	−0.044	−0.039	−0.006	1805.153
8	USA	−0.177	−0.200	−0.020	−0.016	−0.005	7906.943
8	Ukraine	−0.202	−0.194	−0.086	−0.010	−0.077	151.825
Scenario 9 — SCO 25							
9	Brazil	−0.221	−0.253	−0.076	−0.058	−0.018	1038.466
9	China	5.220	5.175	0.472	0.268	0.204	9402.439
9	EU	−0.074	−0.118	−0.060	−0.043	−0.016	13 474.372
9	Finland	−0.180	−0.204	−0.072	−0.030	−0.043	250.685
9	India	13.670	13.851	−0.551	−1.273	0.731	2421.707
9	Rest of the World	0.869	0.883	0.011	−0.163	0.176	19 168.337
9	Saudi Arabia	5.080	5.069	0.888	−0.118	1.007	591.618
9	Sweden	−0.131	−0.164	−0.066	−0.037	−0.029	446.643
9	UK	−0.108	−0.151	−0.049	−0.039	−0.010	1805.153
9	USA	−0.279	−0.300	−0.013	−0.006	−0.007	7906.943
9	Ukraine	−0.309	−0.286	−0.111	0.007	−0.117	151.825
Scenario 10 — NATO disintegration and SCO 25							
10	Brazil	0.384	0.064	−0.056	−0.087	0.031	1038.466
10	China	5.578	5.373	0.585	0.366	0.218	9402.439
10	EU	−12.550	−13.344	−1.280	1.039	−2.292	13 474.372
10	Finland	1.447	0.815	0.201	−0.146	0.347	250.685
10	India	14.218	14.270	−0.453	−1.205	0.761	2421.707
10	Rest of the World	−0.134	−0.412	0.053	0.064	−0.004	19 168.337
10	Saudi Arabia	5.498	5.304	1.121	0.028	1.093	591.618
10	Sweden	1.818	1.062	0.228	−0.185	0.414	446.643
10	UK	−18.870	−19.582	−2.433	−0.762	−1.684	1805.153
10	USA	−15.519	−15.868	−0.812	−0.418	−0.395	7906.943
10	Ukraine	0.842	0.437	0.282	−0.041	0.323	151.825

[a] Conditional general equilibrium.
[b] Full general equilibrium.
[c] Factory gate price in source country.
[d] Inward multilateral resistance.
[e] GDP excluding services.
[f] GDP excluding services.

performance, trade flows, and regional economies, with some countries standing to gain significantly, while others might face economic challenges. The EU, in particular, is expected to benefit from the accession of Finland, Sweden and Ukraine. On the other hand, the withdrawal of the US, further disintegration of the NATO block or deepening of the SCO alliance are all expected to negatively impact European trade and welfare.

7. Concluding remarks

The comprehensive analysis undertaken in this study highlights the multifaceted impacts of political alliances, specifically NATO, on bilateral trade and the broader economic landscape. Our empirical results confirm that NATO membership positively influences trade flows between member countries. Specifically, regression outcomes indicate a significant positive impact of NATO on bilateral trade, demonstrating that alliances foster economic interconnections that are not limited to defence cooperation. Notably, this study uncovers that the benefits of NATO membership extend significantly beyond those of generic defence alliances, which at times may even negatively affect trade.

Further, our simulation exercises provide insight into the economic implications of various geopolitical scenarios involving NATO. Notably, the accession of smaller countries to NATO emerges as economically beneficial, revealing that the boost to their economies from increased trade likely outweighs the 2% GDP defence spending requirement, essentially making NATO membership self-financing. Conversely, while a hypothetical US exit from NATO would negatively impact its members, the simulations suggest such an event would not be catastrophic. However, the potential disintegration of NATO could have severe economic repercussions, far exceeding the costs of maintaining the alliance. In contrast, the formation of rival alliances under the SCO framework appears to boost trade and GDP for its members but negatively affects NATO countries, indicating the significant economic stakes involved in the geopolitical orientation and alliance structures. For Europe in particular, quite apart from any defence considerations, the trade and welfare impacts of NATO will be increased by the accession of new members such as Finland, Sweden and Ukraine. Moreover, our findings suggest that it is in the European interest to avoid a US withdrawal or further disintegration of NATO, while further deepening of the SCO block would not be welcome.

Despite the robust findings, this study acknowledges limitations that pave the way for future research. Firstly, while our simulations offer valuable insights into the economic effects of political alliances, they inevitably rely on assumptions that may not capture all nuances of real-world dynamics. Further exploration into the mechanisms through which alliances affect trade, considering factors such as security guarantees and political stability, could enrich our understanding. Additionally, the evolving nature of global geopolitics, with emerging challenges and alliances, warrants ongoing analysis to assess international trade and economic welfare implications comprehensively.

In conclusion, our study underscores the critical role of political alliances, particularly NATO, in shaping global trade patterns and economic outcomes. As the world navigates a period of heightened geopolitical tensions and shifting alliances, understanding these dynamics remains paramount for policymakers and scholars alike. Future research should continue exploring the economic dimensions of political alliances, considering their direct impacts on trade and their broader implications for global economic stability and prosperity.

CRediT authorship contribution statement

Karen Jackson: Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. **Oleksandr Shepotylo:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Appendix

A.1. Model

A.1.1. The setup

There are N countries, each producing a unique variety, i. Country i is endowed with L_i units of labor and K_i units of capital. It also has a certain level of productivity, A_i, which depends, among other things, on human capital endowment and political

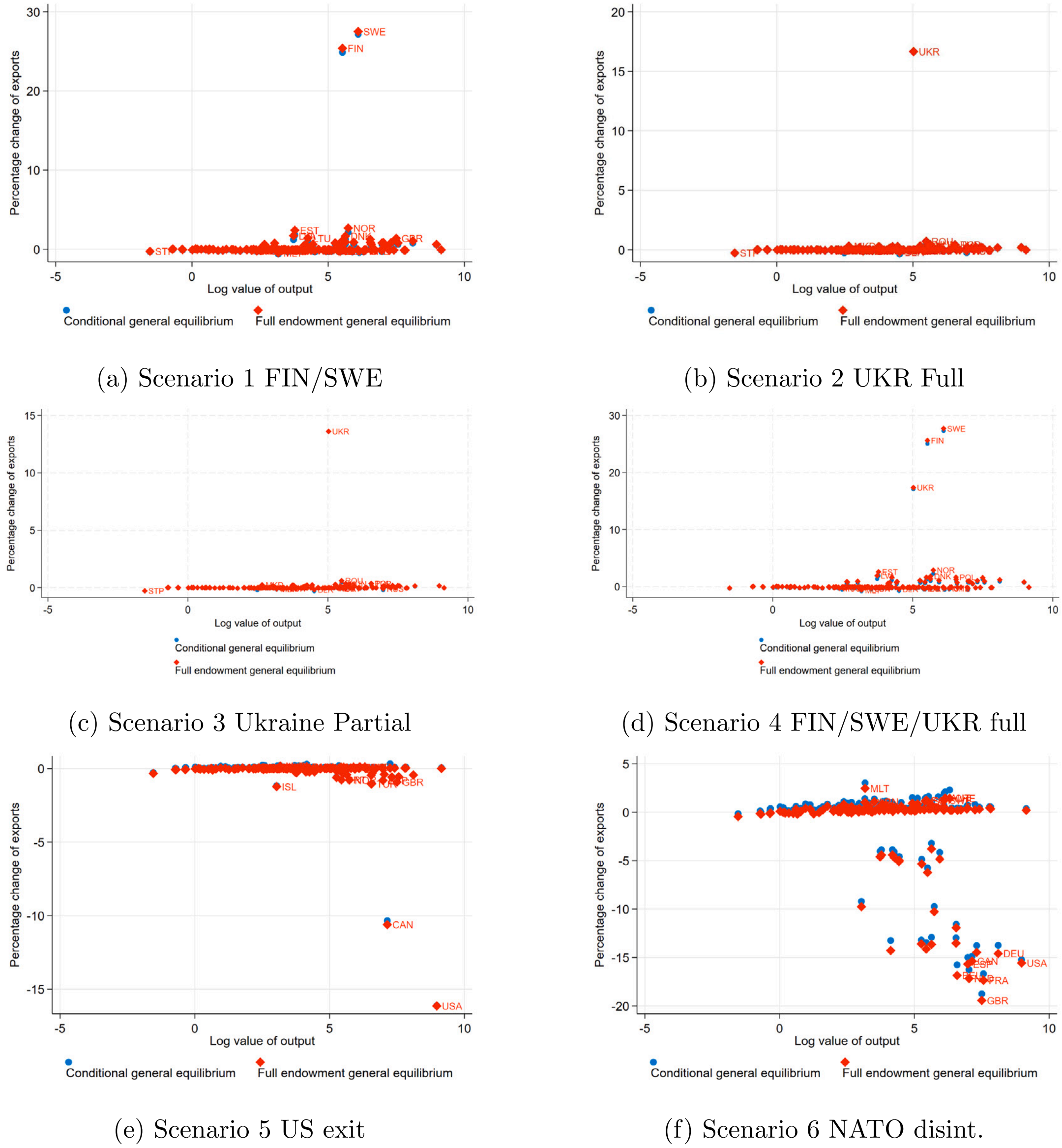


Fig. A.1. Impact of NATO scenarios on bilateral trade in conditional and general equilibrium analysis.

stability, which is exogenous by assumption. A representative consumer in country j has a constant elasticity of substitution utility from consuming different varieties.

$$U_j = \left[\sum_i \left(\frac{C_{ij}}{\mu_{ij}} \right)^{(\sigma-1)/\sigma} \right]^{\sigma/(\sigma-1)} \tag{13}$$

where σ is elasticity of substitution and μ_{ij} is a preference parameter, which depends on political relations between two countries. The consumer maximizes (13) subject to the budget constraint

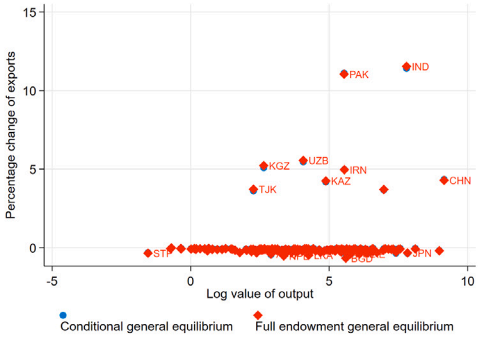
$$\sum_j P_{ij} C_{ij} = E_j \tag{14}$$

where E is expenditures, P_{ij} is price of product i in country j and C is consumption.

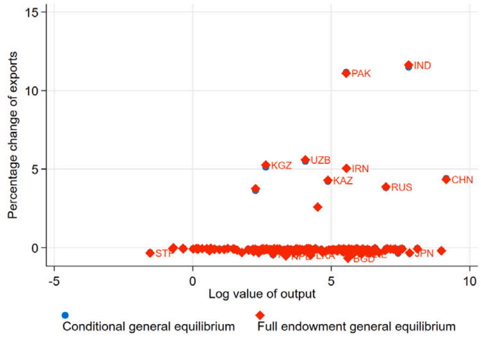
To sell a variety produced in country i to country j incurs a trade cost: $\tau_{ij} \geq 1$ units of good i is required to deliver one unit of this good, with $\tau_{ij} = 1$ only when $i = j$. In particular, we assume that trade cost is parametrically described as

$$\tau_{ij}^{1-\sigma} = \exp(\gamma_{MA} MA_{ij} + Z_{ij}\gamma_Z) + e_{ij} \tag{15}$$

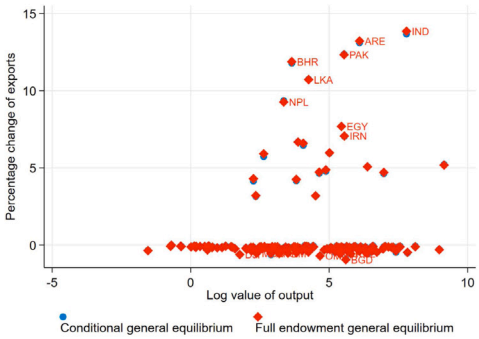
where $dist_{ij}$ is distance, $pa_i j$ is a bilateral political affinity of nations, and Z is the set of additional controls.



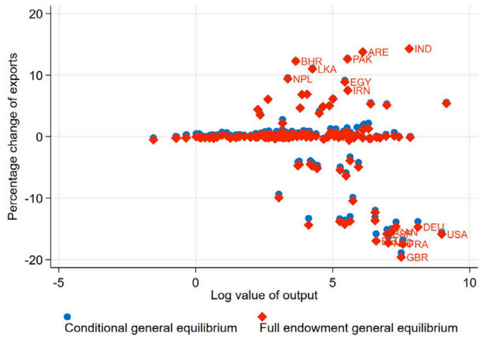
(a) Scenario 7 SHOS 9



(b) Scenario 8 SHOS 11



(c) Scenario 9 SHOS 25



(d) Scenario 10 NATO disint + SHOS 25

Fig. A.2. Impact of SCO scenarios on bilateral trade in conditional and general equilibrium analysis.

A.1.2. Equilibrium

We start by noting the following:

$$\tilde{C}_{ij} = \left(\frac{C_{ij}}{\mu_{ij}}\right) \tag{16}$$

and

$$\tilde{P}_{ij} = P_{ij} \times \mu_{ij} \tag{17}$$

we end up with a standard model that is well-described in the literature. A consumer maximizes a symmetric utility function

$$U_j = \left[\sum_i \tilde{C}_{ij}^{(\sigma-1)/\sigma}\right]^{\sigma/(\sigma-1)} \tag{18}$$

subject to the budget constraint

$$\sum_j \tilde{P}_{ij}\tilde{C}_{ij} = E_j \tag{19}$$

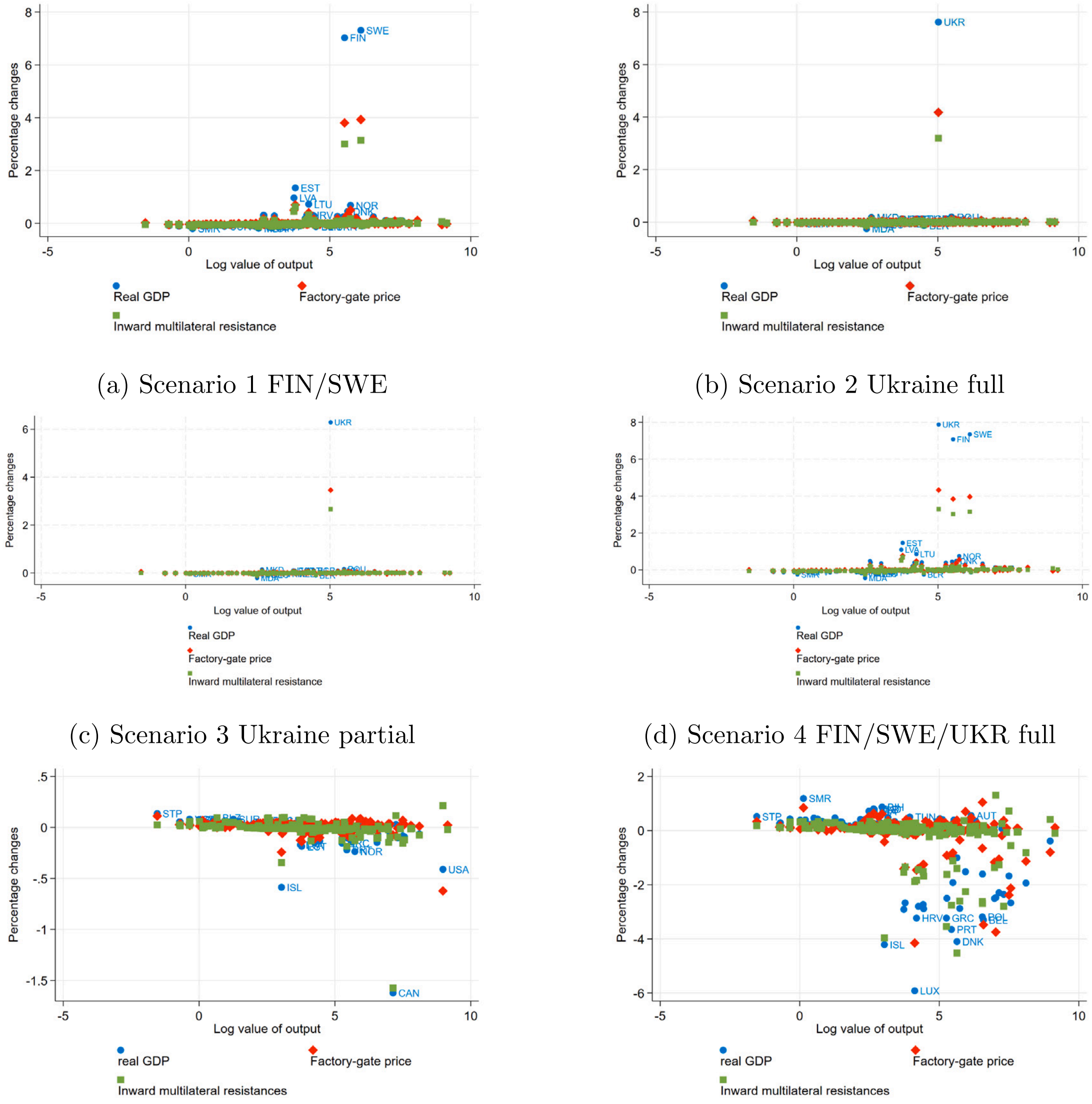
The global equilibrium is described by trade flows

$$X_{ij} = \frac{Y_i E_J}{Y_w}\left(\frac{\tau_{ij}}{\Omega_i P_j}\right)^{(1-\sigma)} \tag{20}$$

where the total value of output is either consumed internally or exported

$$Y_i = P_i Q_i = \sum_j X_{ij} \tag{21}$$

where P_i is price index of variety i.



(a) Scenario 1 FIN/SWE (b) Scenario 2 Ukraine full

(c) Scenario 3 Ukraine partial (d) Scenario 4 FIN/SWE/UKR full

(e) Scenario 5 US exit (f) Scenario 6 NATO disint.

Fig. A.3. Impact of NATO scenarios on prices, inward multilateral resistance and real GDP per capita in the general equilibrium.

We also assume that current trade imbalances remain constant in both the current and counterfactual equilibria

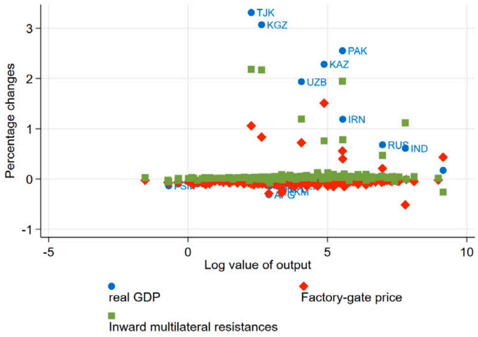
$$Y_i = \phi E_i \tag{22}$$

The outward resistance term is given by

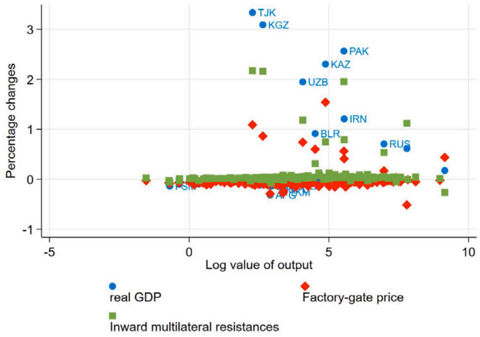
$$\Omega_i^{1-\sigma} = \sum_j \frac{E_j}{Y_w} \left(\frac{\tau_{ij}}{P_j}\right)^{1-\sigma} \tag{23}$$

The inward resistance term is given by

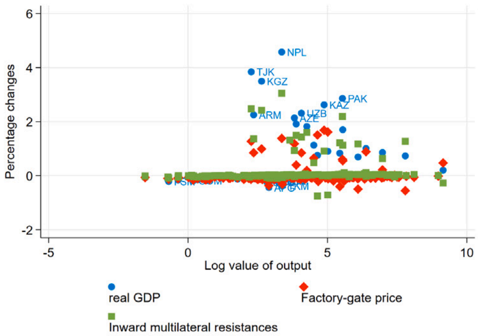
$$P_j^{1-\sigma} = \sum_i \frac{Y_i}{Y_w} \left(\frac{\tau_{ij}}{\Omega_j}\right)^{1-\sigma} \tag{24}$$



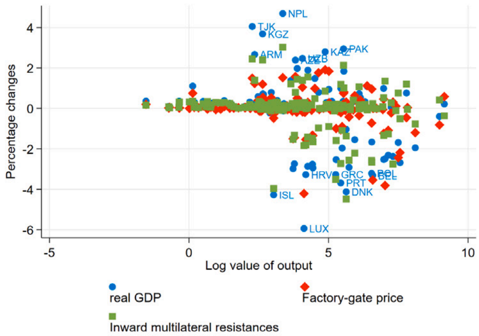
(a) Scenario 7 SHOS 9



(b) Scenario 8 SHOS 11



(c) Scenario 9 SHOS 25



(d) Scenario 10 NATO disint + SHOS 25

Fig. A.4. Impact of SCO scenarios on prices, inward multilateral resistance and real GDP per capita in the general equilibrium.

A.2. Additional results

Figs. A.1 and Fig. A.2 report the full set of results for all countries in terms of changes in trade in conditional and full general equilibria. Each sub-figure represents a different scenario, with the x-axis showing the log value of output and the y-axis displaying the percentage change in exports due to the scenario. In these scatter plots, the blue and red dots represent simulations of trade changes under each scenario in conditional and full general equilibrium, respectively. The general equilibrium lines suggest that when the broader economic adjustments are considered, the impact of these scenarios is magnified compared to the conditional analysis, which holds other economic factors constant. In scenarios 1 and 2, we can identify strong positive effects for Sweden, Finland and Ukraine, as discussed in Section 6.4 and shown in Table 7. For scenario 5, we should note the large negative trade impact on Canada as well as the US. On the other hand, there is a spread of points on the plot for scenario 6, suggesting a much broader impact across a range of countries. For scenarios 7-9, there is a positive impact on the countries joining the military alliance with the most pronounced effects on countries such as India and Pakistan. Finally, the plot for scenario 10 emphasises the large number of positive and negative effects across different regions of the world. Overall the figures highlight the complex and varied impact that political changes can have on trade, depending on the scale and direction of the existing trade flows between countries.

Figs. A.3 and A.4 showcase the impact of the same geopolitical scenarios described previously on other economic indicators– prices, inward multilateral resistance (IMR), and real GDP per capita – in the general equilibrium context. Looking across these plots allows us to make a number of important observations. There are some deviations from the trade patterns we discussed in Section 6.4. Namely, in scenario 5 Canada is expected to be harder hit than the US in terms of percentage change in GDP. Also, the UK is no longer the hardest hit by the disintegration of NATO when we consider the percentage change in GDP; Luxembourg is worst off. Furthermore, the scenarios where we simulate the SCO military alliance we see large impacts on Tajikistan, Kyrgyzstan and Nepal, while UAE continues to expect significant effects in terms of GDP as well as trade. In terms of welfare, India and Russia are not expected to be the biggest beneficiaries of the various formulations of SCO military alliances. In these charts we continue to see the same clustering around zero for scenarios 1-5 and a spread of points in the remaining scenarios.

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