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The Fragmentation Paradox: De-risking Trade and Global Safety

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Highlights

- We develop a quantitative model of trade and conflicts and apply it to the US-China relationship.
- All welfare-relevant geoeconomic factors, such as the realized costs of war, the concessions to prevent it, and the probability of escalation, depend on the opportunity cost of war, itself shaped by observed trade flows.
- The growing US dependence to Chinese products over the past thirty years has increased the cost of geopolitical disputes with China for the US.
- While decoupling from China could offer geopolitical benefits, we highlight a fundamental security dilemma: Decoupling can paradoxically raise the risk of escalation by weakening incentives for restraint.

Abstract

We develop a model of international trade and geopolitical disputes, embedding a diplomatic game of escalation to conflict within a quantitative model of trade. Bilateral disputes arise exogenously, and rival countries engage in negotiations to avoid war. In equilibrium, negotiations may fail, resulting in conflict. All welfare-relevant geoeconomic factors, such as the realized costs of war, the concessions to prevent it, and the probability of escalation, depend on the opportunity cost of war, itself shaped by observed trade flows. We provide a simple procedure to estimate these factors in a model of trade calibrated to current data. This approach is then used to quantify the geoeconomic factors characterizing the US-China relationship, both historically and under various ``decoupling'' scenarios. We find that the growing US dependence to Chinese products and markets over the past thirty years has increased the cost of geopolitical disputes with China for the US. In this context, decoupling from China through increased tariffs may offer geopolitical benefits. Yet, the analysis highlights a fundamental security dilemma: because export and import dependencies influence bargaining power in negotiations, decoupling may reduce the diplomatic concessions needed to maintain peace but can paradoxically raise the risk of escalation by weakening incentives for restraint.

Keywords

International Trade, Geopolitical Disputes, Interstate Conflict, Geoeconomics, Fragmentation, Derisking.

JEL

F1, F5.

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1 Introduction

Geopolitical tensions are intensifying worldwide and, after decades of market-driven globalization, trade dependencies now emerge as instruments of strategic leverage in diplomatic disputes. In response, a growing literature studies the economic consequences of a possible "de-globalization" shaped by geopolitical blocks (Goldberg and Reed, 2023; Alfaro and Chor, 2023; Baqaee et al., 2024; Bonadio et al., 2024; Clayton et al., 2025c; Gopinath et al., 2025). While the welfare effects of rising international trade barriers are well-understood, less is known about the strategic use of trade policy to pursue geopolitical goals. What are the tradeoffs between the economic and diplomatic objectives? Is there a potential feedback from trade policy to geopolitical risk? To what extent have recent changes in global trade patterns contributed to rising international tensions? This paper proposes a theoretical framework to address these questions, combining qualitative insight with quantitative analysis.

In this paper, we analyze how trade policy shapes the negotiation process through which two geopolitical rivals may become belligerents. To this end, we embed a diplomatic game between two countries operating on global markets into a quantitative model of trade. The game formalizes how geopolitical disputes are resolved—or not—by countries' leaders. Diplomacy is subject to informational asymmetries, which give rise to on-path equilibria in which disputes are either settled through unilateral transfers or escalate into war. This outcome is determined by a small set of welfare-relevant variables that we refer to as geoeconomic factors. The trade model, augmented with a calibrated war scenario, is then used to quantify these factors. Building on this framework, we assess the economic versus diplomatic trade-offs associated with using trade policy for geopolitical purposes. We apply the approach to quantify the geoeconomic factors characterizing the US-China trade relationship between 1995 and 2020, both historically and under alternative "decoupling" scenarios.

We start with the diplomatic game in which two countries try to resolve an exogenous bilateral dispute. Although both leaders understand that peace Pareto-dominates war, negotiations may nonetheless break down due to private information regarding each leader's valuation of war costs. To resolve the dispute peacefully, leaders (optimally) adopt a Nash bargaining protocol, which involves announcing their respective utility costs of war. The leader reporting the highest cost is required to concede a transfer to the other in order to avoid war. However, incentives to understate these costs may lead both leaders to report implausibly low valuations, resulting in a failure of negotiations, and the onset of open conflict.

In this setting, economic interactions are overshadowed by a latent risk of war and welfare consists of two components. The first is real consumption in peacetime, which increases with trade integration due to standard trade gains. The second, denoted (net) *geoeconomic loss*, comprises three factors. Remarkably, they can be all expressed as functions of the countries' *Opportunity Cost of War* (OCW), a sufficient statistic defined as the difference in real consumption between peace (the inside option) and war (the outside option): this property substantially simplifies the model's empirical implementation. Two factors of the geoeconomic loss—the probability of escalation and the true cost of war (i.e., when negotiation fails)—are increasing in the *joint* OCW. In contrast, the third factor, denoted the peace-keeping transfer (i.e., when negotiation succeeds), is increasing in the *asymmetry* in OCW: the country facing a higher opportunity cost ends up compensating its rival to avoid war.

The opportunity costs of war, OCW, and, by extension, the associated geoeconomic factors, can be evaluated using general equilibrium outcomes of a quantitative trade model with input-output linkages. Trade in inputs matters quantitatively because value chains tend to be spatially concentrated, a feature that amplifies the economic costs of war for the most integrated country pairs. A central element of this analysis is the specification of a relevant "war scenario," which specifies how negotiation failure disrupts the economy. The model can accommodate a wide range of scenarios, ranging from pure trade wars to high-intensity military confrontations. In our application, we focus on a scenario involving a symmetric, conventional interstate war. Under this specification, the opportunity cost of war arises from three sources. First, potential factor losses reduce real consumption proportionally to their share in aggregate income. Second, war-induced economic damages—modeled as TFP loss—propagate along the entire value chains and affect final consumption in proportion to the Domar weights of the damaged sectors. Third, trade disruptions caused by conflict lower consumption through direct and indirect effects on consumer prices. These shocks also induce general equilibrium reallocations of consumption and production across countries and sectors.

In sum, our model extends results in Martin et al. (2008) and Thoenig (2024) in order to characterize the *entire* set of welfare-relevant geoeconomic factors that emerge from the diplomatic game, which we then compute within a more general trade model solved in general equilibrium. We show how the full general equilibrium analysis of trade policy makes *both import and export dependence* (in final goods and inputs) relevant in the welfare consequences of conflicts. We also adapt functional forms of the bargaining game in order to obtain a sufficient statistic approach of geoeconomic factors compatible with a quantitative trade model, robust to natural extensions such as accounting for military expenditures or for the autocratic nature of the governments, and amenable to empirical analysis.

Armed with this model, we can examine the patterns and evolution of geoeconomic factors through a range of historical and counterfactual experiments. We do so in the context of rising geopolitical tensions between China and the United States. Following China's accession to the WTO in 2001, the U.S. significantly increased its bilateral trade deficit with China, becoming increasingly dependent on Chinese intermediate and final goods. Meanwhile, China's dependence on the US market increased, with consequences for the elasticity of Chinese wages to shocks originating from the US. While the economic consequences of this "China shock" have been widely studied in the trade literature, its geopolitical implications remain less well understood.[1] We first use the observed evolution of trade over the

[1] Two economic impacts of the U.S.-China trade relationship have received particular attention in the literature: first, the evaluation of the China shock on labor markets (see Autor et al., 2013; Pierce and Schott,

past thirty years to show that the China shock contributed to increase the joint opportunity cost of a U.S.-China armed conflict, thereby increasing the likelihood that their geopolitical disputes would be resolved peacefully. At the same time, the growing asymmetry in bilateral trade flows (both for exports and imports) altered the relative diplomatic bargaining power between the two sides, shifting it in China's favor. According to the calibrated version of our model, China was conceding a transfer equivalent to 0.2% of U.S. real consumption in the mid-1990s as a diplomatic cost of maintaining peace. This transfer gradually declined throughout the 2000s and 2010s and had effectively disappeared by 2015. Interestingly, our estimates reveal that even when the probability of war is very close to zero, as it is in most years in our baseline calibration, the peace-keeping transfers can still be substantial. This finding underscores that the welfare impact of conflicts is not confined to actual war outbreaks; its diplomatic containment entails significant costs.

Our second exercise assesses whether the protectionist trade policies enacted under the first Trump administration in 2018 (maintained under the Biden administration and subsequently intensified under the second Trump administration) can be rationalized as an effective strategy for restoring diplomatic bargaining power. To this end, we run a series of simulations in which we "decouple" the U.S. by increasing its import tariffs on Chinese products, and compare the geoeconomic factors between the pre- and post- decoupling worlds. The analysis reveals a fundamental security dilemma: While decreasing trade dependence on its geopolitical rival lowers the opportunity cost of war for the U.S. (and thereby reduces its diplomatic costs of maintaining peace *and* the consumption losses if war nevertheless occurs), this strategy can backfire. By weakening incentives to show restraint during negotiations, import tariffs tend to increase the risk of an armed conflict, which is the *fragmentation paradox* we refer to in our title. Our quantitative estimates help navigate this tradeoff between decoupling and endogenous conflict risk. A key parameter in this trade-off is the magnitude of informational noise, as calibrated in the diplomatic game. Intuitively, this parameter shapes the level of *global safety*, defined as the factual probability of peaceful de-escalation. When global safety is high, the (positive) feedback effect of decoupling on conflict risk is particularly welfare-reducing, as the true cost of war substantially exceeds the peace-keeping cost of diplomacy. By contrast, in low-safety environments—where the underlying probability of conflict is already elevated—reducing wartime consumption losses through bilateral decoupling becomes dominant.

In our baseline scenario (where global safety is assumed to be high), simulations confirm that raising import tariffs entails net geoeconomic losses: the increased risk of conflict more than offsets the gains from enhanced bargaining power. In this case, the calibrated model implies that the optimal U.S. tariff on Chinese imports is 8%. This number should be compared with the 13% optimal tariff that maximizes peacetime real consumption—via terms-of-trade effects—which, in our model, constitutes the relevant welfare metric when abstracting from geopolitical considerations. We then explore scenarios in which global safety deteriorates. As expected, the geopolitical rationale for decoupling strengthens: by lowering the true cost of war, import tariffs become more beneficial. We show that the optimal tariff of our model is monotonically decreasing in global safety. To recover the 13% optimal tariff implied by traditional trade models, the factual probability of peaceful

2016; Jaravel and Sager, 2019, among many others); and second, assessments of the welfare effects of the 2018 US-China trade war (e.g. Fajgelbaum et al., 2020; Amiti et al., 2019; Cavallo et al., 2021; Khandelwal and Fajgelbaum, 2022).

de-escalation must however fall below 60%. In sum, unless global safety is already significantly compromised, geopolitical considerations should dampen—rather then amplify—the incentives to pursue decoupling strategies.

Recent related literature. Our paper contributes to the rapidly expanding field of geoeconomics, recently surveyed in Thoenig (2024), Mohr and Trebesch (2024), and Clayton et al. (2025b). Within this literature, a body of theoretical work investigates the interactions between geopolitical tensions and international trade. Kleinman et al. (2024) derive a theoretical measure of bilateral "economic friendship" (when a productivity shock in one country benefits income in another), and show that the empirical variation in this measure explains changes in"political friendship" over a 40 years period. Clayton et al. (2025a) develop a framework for analyzing how hegemonic nations exert macroeconomic power through trade and financial interdependencies in global production networks. In Clayton et al. (2025c), the same authors provide a method to quantify geoeconomic power, seen as the maximum economic cost that the hegemon can inflict on a target before the latter decides to not comply with the demands of the hegemon. The theory-derived measure aggregates bilateral dependence on the hegemon with substitution elasticities along the production process. Liu and Yang (2025) use the same building blocks (import dependence weighted by elasticities) to construct a measure of asymmetry in the bilateral import dependence (and therefore power) of country pairs. This measure is positively associated with bilateral engagement and negotiations. Becko et al. (2025) study optimal trade policies when geopolitical power is involved and study how hegemonic powers use the signature of FTAs and the level of their MFN tariffs to incentivize small countries into political alignment. Those papers, like us, treat trade structure as a lever of geopolitical power. However, their analysis focuses on economic security in peacetime, whereas our work examines the interplay between trade and armed conflict risk.

Closer to our analysis of trade and military conflicts, Becko and O'Connor (2024) build a dynamic trade model in which peacetime trade and industrial policies can be used strategically to manipulate an adversary's terms of trade in anticipation of future conflict. The authors emphasize the role of trade as a commitment device in a context of rising escalating tensions. Kooi (2024) models national security policies aimed at strengthening domestic resilience against geopolitical shocks, showing how investment subsidies and sanctions shape negotiation power and resilience during conflict. We share this emphasis on pre-war economic strategy, highlighting how trade structure influences both the costs and incentives in diplomatic bargaining. Compared to these contributions, our approach models the feedback effects that trade patterns and trade policies have on the *endogenous* probability that disputes escalate into full conflict.

Among the more data-oriented papers, Alekseev and Lin (2024), like us, link the security and trade margins within a quantitative general equilibrium framework to study optimal trade policy. In their paper, national security is modeled as an externality and their focus lies on dual-use goods concentrated in strategic sectors. Using input-output data and defense procurement records, they show how defense-related industries shape trade outcomes at the macroeconomic level. Bonadio et al. (2024) use trade data from 2015 to 2023 to detect empirical fragmentation patterns and bloc formation in response to geopolitical shocks. Their gravity-based approach assigns countries to the U.S., China, or non-aligned blocs and quantifies GDP losses from decoupling. As in our paper, they aim to quantify the economic costs of fragmentation. However, their primary focus is on documenting the endogenous formation of trade blocs, whereas we take geopolitical alignment as given. In the same vein, Gopinath et al. (2025) use granular bilateral data to quantify trade and investment fragmentation along geopolitical lines.

Finally, the paper contributes to the recent literature on supply chain diversification under disruption risk (see Antras et al., 2017; Bonadio et al., 2021; Grossman et al., 2023, 2024, for early contributions). While these studies take the occurrence of the disruptive factor (e.g., a pandemic or a political crisis) as exogenous, our analysis allows trade policy to feed back into the conflict risk itself.

The paper is structured as follows. Section 2 sets up our model of trade and wars, which combines a game of diplomatic negotiation and a general model of trade in final and intermediate goods. In Section 3, we calibrate the model to illustrate how the evolution of trade patterns between 1995 and 2020 affected geoeconomic factors between the United States and China. We then subject the model to trade policy counterfactuals in section 4 to study how "decoupling" by the United States affects the welfare of both countries. Finally, Section 5 concludes.

2 A model of trade, diplomacy and conflict

We build a model of international trade and interstate war that combines a gravity model of trade in final and intermediate consumption goods with a diplomatic game of escalation to conflict. The former provides a robust method to quantitatively assess the economic impact of war and policy shocks, while the latter addresses a conceptual challenge known as the paradox of war. This paradox captures why rational leaders, given the substantial costs of war, are not always able to deescalate tensions and prevent conflicts.

2.1 The global setup

There are N countries engaged in international trade characterized by gravity patterns of bilateral trade flows. This will be useful when quantifying the opportunity cost of war. The specific details of the trade model are discussed in section 2.3.

Two rival countries, labeled n and m, are assumed to face a geopolitical dispute. The underlying cause of the dispute–be it economic, political, cultural, or religious–is not essential for the analysis. What matters is that, in the absence of a successful diplomatic resolution between their respective leaders, the dispute escalates into a full-blow conflict. A successful negotiation outcome is a utility transfer $\widetilde{T}_{nm}$ from country n to country m, which can be either positive or negative: a positive value indicates a concession by n, while a negative value reflects a concession by m. In order to avoid the complexity of modeling third-party interventions, the countries $\ell \neq \{n, m\}$ are considered neutral and do not interfere with the negotiation process. In the model, disputes are treated as exogenous factors, while the likelihood of escalation is endogenous.

Timing. The timing of the model is composed of the following stages: (0) the dispute arises; (1) leaders of countries n and m choose an optimal diplomatic protocol; (2) private information is revealed; (3) depending on the negotiation outcome, either peace or war between countries n and m occurs; (4) production, trade, and consumption are realized for all countries.

Preferences. Leaders care about welfare of the population and balance economic interests against geopolitical considerations when deciding whether or not to engage in war. Their utility criterion encompasses the (log of) real consumption C of the representative agent, supplemented by v, referred to as *geopolitical valence*, that represents the valuation of a state-controlled public good. Geopolitical valence can be interpreted in two complementary ways: (i) a divisible material public good that can be transferred between countries, such as jurisdiction over territory, access to natural resources, or control of strategic assets like waterways; (ii) an intangible asset, encompassing elements such as national prestige, reputation or ego rents accruing to political leaders. Technically, v serves as an "external" good (similar to the numeraire good in Grossman and Helpman, 1994) that enters linearly into both leaders' utility functions and is transferable between countries in the diplomatic game.

Specifically, consider one of the two rival countries $k \in \{n, m\}$. At stage 2, following the revelation of private information but prior to the diplomatic negotiation and potential transfer, the utility under peace (*inside option*) and under war (*outside option*) are given by:

$$U_k(\text{peace}) = \log C_k(\text{peace}) + v_k, \quad \text{and} \quad \widetilde{U}_k(\text{war}) = \log C_k(\text{war}) + v_k - \tilde{u}_k, \qquad (1)$$

where C_k denotes real consumption, determined endogenously by the trade equilibrium as described in Section 2.3. The terms v_k and $v_k - \tilde{u}_k$ represent the valuation of the public good under peace and war, respectively. The random variable $\tilde{u}_k$, referred to as the war shock, captures the uncertain net utility loss (or gain) from war. This shock is privately observed by the leader of country k and may be positive or negative. Thanks to the additively separable and logarithmic specification of utility, both geopolitical valence v_k and war shock $\tilde{u}_k$ can be interpreted in percentage points of real consumption.[2] If a diplomatic agreement is reached, the dispute is resolved peacefully, and countries n and m obtain their inside option adjusted by the negotiated transfer: $U_n(\text{peace}) - \widetilde{T}_{nm}$ and $U_m(\text{peace}) + \widetilde{T}_{nm}$. In the absence of an agreement, war occurs and each country receives its respective outside option.

A key factor influencing the rivals' decision to settle disputes peacefully is the opportunity cost of war. We define the opportunity cost of war for country $k \in \{n, m\}$ as the logarithmic difference in its aggregate consumption between the inside option and the outside option:[3]

[2] While the main focus is on the rival countries n and m, for completeness we also specify the utility of third-party countries ℓ, who do not receive a private war shock. Their utility depends solely on whether peace or war prevails between n and m: $U_\ell(\text{peace}) = \log C_\ell(\text{peace})$ and $U_\ell(\text{war}) = \log C_\ell(\text{war})$. Although neutral, these countries may still be affected through war-related trade disruptions and general equilibrium effects, as global trade flows adjust in response to conflict.

[3] It should be noted that all objects in the model are conditional on a geopolitical dispute involving countries n and m. For instance, the opportunity cost of a war with m, for country n, should ideally be denoted $\texttt{OCW}_{n|nm}$. In the rest of the paper, we abuse the notation and remove the reference to the countries involved

$$\texttt{OCW}_k \equiv \log C_k(\text{peace}) - \log C_k(\text{war}). \tag{2}$$

We also define the utility cost of war as $\widetilde{\texttt{UCW}}_k \equiv U_k(\text{peace}) - \widetilde{U}_k(\text{war})$. Combining (1) and (2) yields

$$\widetilde{\texttt{UCW}}_k = \texttt{OCW}_k + \tilde{u}_k. \tag{3}$$

Finally, we assume that peace Pareto dominates war in the sense that the joint value of rivals' surplus in peace is larger that their joint surplus in war:

$$\widetilde{U}_n(\text{war}) + \widetilde{U}_m(\text{war}) < U_n(\text{peace}) + U_m(\text{peace}). \tag{4}$$

Using the definition of $\widetilde{\texttt{UCW}}$, equation (4) can also be written as

$$0 < \widetilde{\texttt{UCW}}_n + \widetilde{\texttt{UCW}}_m. \tag{5}$$

This assumption is standard in the conflict literature and captures the empirical fact that wars destroy economic surplus at the aggregate level. Still, it may be the case that one country is better off in war than in peace—for example, if $\widetilde{U}_m(\text{war}) > U_m(\text{peace})$. Although our baseline framework does not explicitly model the outcome of war in terms of victory or defeat, such a situation could be interpreted as country m being victorious. One of our theoretical extensions addresses this explicitly by modeling war outcomes as a function of military spending.

The assumption in (5) ensures that the set of peace-maintaining transfers is non-empty.[4] As a result, under perfect information about the realizations of war costs, the two rival countries would always reach an agreement on a transfer, and war would never occur. In what follows, we show how asymmetric information on these costs may prevent such an agreement from being reached.

2.2 A game of diplomatic negotiation

Diplomacy is modeled as a bargaining game under asymmetric information that builds upon the setup developed by Myerson and Satterthwaite (1983). At stage 1, leaders are assumed to have full discretion in choosing the protocol through which negotiations are conducted–ranging from ultimatum (i.e., unilateral take-it-or-leave-it offer) to repeated meetings with sequential offers and counter-offers. This assumption of unconstrained diplomacy allows the framework to remain robust across a variety of institutional specifications.

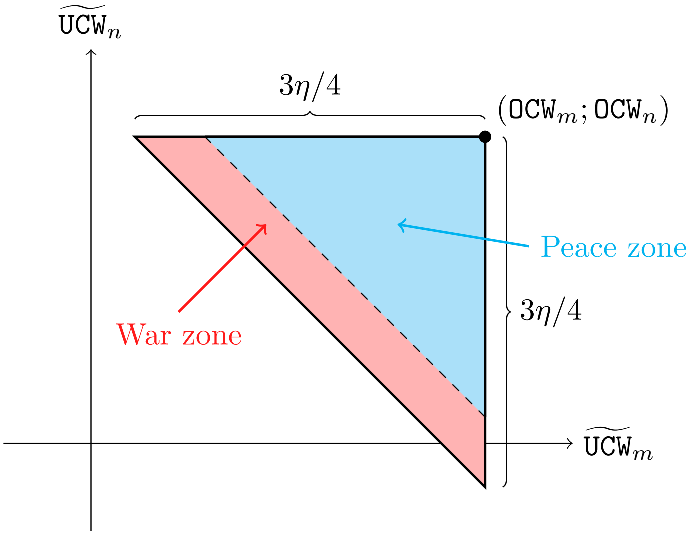
To further align the model with the realities of interstate negotiations, we assume that diplomatic protocols are non-binding and that leaders' types are correlated. The former assumption implies that each leader retains the right to unilaterally exit the negotiation table and initiate conflict, regardless of any attempt to prevent them from doing so. The latter reflects the possibility that war losses borne by one country may partially reflect gains for the other. Accordingly, when leaders privately observe their own war shock, they can update their beliefs about the shock and disagreement payoff of their rival. To capture this idea, $\tilde{u}_n$ and $\tilde{u}_n$ are assumed to be jointly uniformly distributed over a triangle in $\mathbb{R}^2$

in the conflict. This explains that we will sometimes have variables that pertain to country n, and are thus indexed by n, but depend on equilibrium values for both countries n and m.

[4] This set includes all transfers such that: $\widetilde{U}_n(\text{war}) < U_n(\text{peace}) - \widetilde{T}_{nm}$, and $\widetilde{U}_m(\text{war}) < U_m(\text{peace}) + \widetilde{T}_{nm}$.

with a shape that induces a negative correlation between the two variables. The support of both $\tilde{u}_n$ and $\tilde{u}_m$ is $[-3\eta/4, 0]$, where η is a positive parameter measuring the extent of informational asymmetry.[5] Figure 1 provides a graphical representation of these parametric assumptions and their implications for the utility costs of war which connect to the war shocks through equation (3). The outer black triangle represents the support of the joint uniform distribution of $(\widetilde{\texttt{UCW}}_m, \widetilde{\texttt{UCW}}_n)$. The downward slope of the hypotenuse illustrates the negative correlation between those utility costs of war. The Pareto-ranking condition (5) ensures that the hypotenuse does not lie in the south-west quadrant relative to the origin. Note that some realizations of the utility cost of war may be negative—this corresponds to cases in which a country is better off at war than under peace.

Figure 1 – The diplomatic game in one graph



Notes: The outer black triangle represents the full support of the joint uniform distribution of the utility costs of wars $(\widetilde{\texttt{UCW}}_m, \widetilde{\texttt{UCW}}_n)$. The blue triangle is the subset of peace-preserving joint realizations; the red trapezoid is the subset of war-inducive joint realizations.

Solving the game. Rational leaders will adopt the diplomatic protocol that is ex-ante efficient. Solving for this problem relies on Compte and Jehiel (2009) who apply mechanism design to the case of non-binding protocols and correlated types. We report hereafter the most important results and relegate all computational details to Appendix 7.

The second-best mechanism—the one that is optimally adopted by the two countries at stage 1 before information is revealed—is a Nash bargaining protocol that takes the following form:

1. Each leader of country $k \in \{n, m\}$ announces a utility cost of war $\widetilde{\texttt{UCW}}_k^a$.
2. Country leaders check whether the two announcements are compatible with the aggregate resource constraint as given by (5). This compatibility condition can be expressed

[5] We assume $\eta < \frac{4}{3}(\texttt{OCW}_n + \texttt{OCW}_m)$ such that condition (4) holds for all realizations of the war shocks. The choice of bounds for the support is a matter of normalization in all formulas and has no consequence on the theoretical analysis.

as:

$$0 < \widetilde{\mathtt{UCW}}^a_n + \widetilde{\mathtt{UCW}}^a_m. \tag{6}$$

3. In the case of incompatible announcements, diplomatic negotiations are halted, and war is initiated, with each country receiving its true utility in war.
4. In the case of compatible announcements, peace is maintained, and the following (positive or negative) utility transfer $\widetilde{T}_{nm}$ from country n to country m is implemented:

$$\widetilde{T}_{nm} = \frac{\widetilde{\mathtt{UCW}}^a_n - \widetilde{\mathtt{UCW}}^a_m}{2}. \tag{7}$$

   As explained above, this utility transfer takes the form of a transfer of geopolitical valence, that is, a share of the public good. Country n concedes a positive transfer to country m when the utility cost of war announced by its leader is larger than the one announced by the other leader. Conversely, if the announcement of n is smaller, n receives a positive transfer.

This Nash-bargaining protocol features a diplomatic trade-off. On the one hand, each leader has an incentive to announce the smallest possible utility cost of war to extract more concessions and receive a larger transfer. On the other hand, this increases the risk of violating the compatibility condition and breaking the negotiations. The following equations formalize this trade-off.

Optimal announcement: In appendix 7, we show that it is optimal for leader n to announce

$$\widetilde{\mathtt{UCW}}^a_n = \frac{2}{3}\widetilde{\mathtt{UCW}}_n + \frac{1}{12}\mathtt{OCW}_n - \frac{1}{4}\mathtt{OCW}_m, \tag{8}$$

where the utility cost of war is privately observed while the other two components are public information. The optimal announcement of leader m is symmetric. This expression shows that leaders strategically misreport their true utility cost of war (the coefficient 2/3).[6] This is detrimental to the negotiation process when the realized $\widetilde{\mathtt{UCW}}$s are low: In this configuration, leaders cannot distinguish between truthful and strategic reporting and the risk of violating the compatibility constraint increases, leading to a breakdown in negotiations and an escalation into war. To see it formally, we combine (6) and (8) to rewrite the compatibility condition under optimal announcements:

$$\widetilde{\mathtt{UCW}}_n + \widetilde{\mathtt{UCW}}_m > \frac{1}{4}\left(\mathtt{OCW}_n + \mathtt{OCW}_m\right). \tag{9}$$

The realizations of the utility costs of war that satisfy this condition define the "peace zone" (in blue) in Figure 1. Conversely, negotiation breakdown occurs when this inequality is violated—i.e. for joint realizations lying in the "war zone" (in red). The break-even threshold, where the left-hand and right-hand sides of the condition are equal, is represented by the dashed line.

[6] The direction of misreporting depends on the realized value of $\widetilde{\mathtt{UCW}}$. When the realization is large and positive, leaders have an incentive to under-report in order to extract larger concessions. By contrast, when the realization is negative—or even positive but small—over-reporting becomes optimal as it reduces the risk of a negotiation breakdown.

Probability of appeasement: We denote with s_{nm} the probability of a successful negotiation. Graphically, it corresponds to the ratio of the peace zone over the total surface of the triangle. By definition it is equal to :

$$s_{nm} = \texttt{Pr}\left(0 < \widetilde{\texttt{UCW}}_n^a + \widetilde{\texttt{UCW}}_m^a\right), \tag{10}$$

which, combined with (8) and the retained distributional assumption on the war shocks, leads to

$$s_{nm} = \begin{cases} \frac{1}{\eta^2} \times \left[\texttt{OCW}_n + \texttt{OCW}_m\right]^2, & \text{if} \quad \texttt{OCW}_n + \texttt{OCW}_m < \eta \\ 1 & \text{otherwise.} \end{cases} \tag{11}$$

The numerator captures the maximal loss in terms of joint surplus of n and m when war occurs; the denominator is a measure of the (uniform) dispersion of private information; both variables are scaled in percentage-points of real consumption. Therefore, the probability of peace is a-dimensional and corresponds to a ratio of squared percentage-points. The interpretation is straightforward. Any increase in $\texttt{OCW}$s translates into better chances to settle the dispute and avoid war. By contrast, more dispersed private information harms the odds of a successful negotiation and makes peace less likely. Conversely, for a low enough dispersion of private information, negotiation always succeeds and peace is maintained with certainty.

Peace-Keeping Costs: Whenever diplomacy is successful, which happens for joint realizations of $\widetilde{\texttt{UCW}}$s belonging to the peace zone, one country has to concede some utility transfer to the other. Using (7) and (8), one obtains the transfer from n to m:

$$\widetilde{T}_{nm} = \frac{\texttt{OCW}_n - \texttt{OCW}_m}{2} + \frac{\tilde{u}_n - \tilde{u}_m}{3}. \tag{12}$$

Taking its expectation conditional on peace, we get the expected *Peace-Keeping Cost*:

$$\mathbb{E}\left[\widetilde{T}_{nm}|\text{peace}\right] \equiv \texttt{PKC}_{nm} = \frac{\texttt{OCW}_n - \texttt{OCW}_m}{2}. \tag{13}$$

In expectation, country n has to concede a positive transfer whenever the differential between $\texttt{OCW}_n$ and $\texttt{OCW}_m$ is positive. Indeed, such a positive differential tends to lower n's negotiation power in the diplomatic game. The logic is reversed in the case of a negative differential.[7]

True Cost of War: A peaceful settlement is reached whenever the joint realization of $\widetilde{\texttt{UCW}}$s is large. It is only for the bottom of the distribution (lying in the war zone) that disputes may escalate into war. In other words, diplomatic negotiations have the virtue of avoiding the most destructive forms of wars. This translates into the property that the

[7] In our setting, the role of trade asymmetries materializes in peace-compatible diplomatic concessions. Tzavellas and Wei (2024) discuss how such asymmetries may also influence the probability of escalation in a setting where the trade equilibrium endogenously shapes the extent of informational frictions in the bargaining game. By contrast, our model assumes that wartime utilities are *additively* separable in deterministic consumption and a country's private signal. As a result, trade and informational asymmetries are independent, and the former do not impact conflict risk.

average utility cost of war, conditional on escalation to war, is smaller than its unconditional average:

$$\mathbb{E}\left[\widetilde{\mathtt{UCW}}_n|\text{war}\right] \equiv \mathtt{TCW}_n = \underbrace{\mathtt{OCW}_n - \frac{\eta}{4}}_{=\mathbb{E}\left[\widetilde{\mathtt{UCW}}_n\right]} - \underbrace{\frac{1}{4}\frac{\left[\mathtt{OCW}_n + \mathtt{OCW}_m\right]^2}{\left[\eta + \mathtt{OCW}_n + \mathtt{OCW}_m\right]}}_{\text{War Intensity Mitigation}}. \tag{14}$$

Note that this object is defined only when war has a non-zero probability of occurrence, namely for $s_{nm} < 1$ in Equation (11).[8]

Welfare in the shadow of war We can finally compute the ex-ante expected welfare, at the first stage of the game, just after the geopolitical dispute arises but before diplomatic negotiations are settled. It is a weighted average of conditional expected utilities, weighted by the probabilities on the outcome of the negotiation

$$\mathbb{E}[\widetilde{U}_n] = s_{nm}\left(U_n(\text{peace}) - \mathbb{E}\left[\widetilde{T}_{nm}|\text{peace}\right]\right) + (1 - s_{nm})\left(U_n(\text{peace}) - \mathbb{E}\left[\widetilde{\mathtt{UCW}}_n|\text{war}\right]\right). \tag{15}$$

The equation simplifies into:

$$\mathbb{E}[\widetilde{U}_n] = U_n(\text{peace}) - \mathcal{L}_n, \quad \text{with} \quad \mathcal{L}_n = s_{nm} \times \mathtt{PKC}_{nm} + (1 - s_{nm}) \times \mathtt{TCW}_n, \tag{16}$$

where $\mathcal{L}_n \geq 0$ represents the *geoeconomic loss*. In this equation, the variables $\{s_{nm}, \mathtt{PKC}_{nm}, \mathtt{TCW}_n\}$ can be all derived from $\mathtt{OCW}_n$ through the relations (11), (13) and (14). In the rest of the paper, these three variables are referred to as the vector of *geoeconomic factors*, and most of the quantitative analysis aims to estimate their relative strength. The relation also highlights the multi-faceted welfare impact for country n of increasing $\mathtt{OCW}_n$, namely its opportunity cost of war with m. First, it reduces welfare simply because the costs are larger in wartime ($\mathtt{TCW}_n$ can be shown to be an increasing function of $\mathtt{OCW}_n$). Second, it diminishes the negotiation power of country n, which is compelled to make more concessions to maintain peace. This peace-keeping channel (a rise in $\mathtt{PKC}_{nm}$) also reduces welfare. Third, it raises the probability of a peaceful settlement (s_{nm}), thereby enhancing welfare.[9] In that sense, $\mathtt{OCW}_n$ is a sufficient statistic for the geoeconomic loss of n and its three components. Section 2.3 will show how to measure $\mathtt{OCW}_n$ through the trade part of our model.

[8] The condition which ensures that the true costs of wars are greater than the costs incurred to maintain peace is $[\mathtt{OCW}_n + \mathtt{OCW}_m]^2 + \eta\,(\mathtt{OCW}_n + \mathtt{OCW}_m) - \eta^2 > 0$. Within the range of positive joint opportunity costs of war, this is true when $\mathtt{OCW}_n + \mathtt{OCW}_m > \frac{\eta(\sqrt{5}-1)}{2} \simeq 0.62\eta$. Hence, the condition that peace Pareto-dominates war, $\mathtt{OCW}_n + \mathtt{OCW}_m > 0.75\eta$, guarantees that $\mathtt{TCW}_n > \mathtt{PKC}_{nm}$. Note that this condition can also be written as $s_{nm} + \sqrt{s_{nm}} > 1$.

[9] As a benchmark for our policy analysis, it is useful to compute the welfare level achieved under the first-best diplomatic protocol—that is, in the absence of informational asymmetries. In this case, bargaining never fails, a transfer is always agreed upon, and war does not occur along the equilibrium path (see the discussion below equation 4). Setting $s_{nm} = 1$ in equation (16) and applying (13), we obtain:

$$U_n^* \equiv \mathbb{E}[\widetilde{U}_n \mid s_{nm} = 1] = U_n(\text{peace}) - \mathtt{PKC}_{nm}, \quad \text{with} \quad \mathtt{PKC}_{nm} = \frac{\mathtt{OCW}_n - \mathtt{OCW}_m}{2}. \tag{17}$$

This expression shows that first-best welfare is still affected by geoeconomic factors even when diplomacy consistently succeeds in defusing tensions. In this idealized setting, geoeconomic loss arises solely from the diplomatic concessions made to preserve peace. Accordingly, even in the absence of bargaining frictions, trade policy may pursue a dual objective: increasing real consumption and reducing the opportunity cost of war differential with geopolitical rivals.

Extensions. Appendix 8 presents three extensions. The first considers the case in which one country is led by an autocrat with a intrinsic taste for armed conflict. In this setting, the democratic leader retains the same objective function as in the baseline model, while the autocrat derives an additional ego rent from waging war against her rival. As long as this ego rent is public information, the second-best bargaining protocol remains unchanged. The only difference with the baseline model is that the ego rent lowers the autocrat's perceived utility cost of war. As a result, the joint utility cost of war is shifted downward, strictly reducing the probability of appeasement. The peace-keeping transfer must now reflect this increased asymmetry in utility costs, requiring the democratic leader to offer greater compensation to the warlike autocrat.

The second extension examines the role of special interest groups in shaping diplomatic outcomes. In particular, some industries may benefit from wartime conditions and lobby the government to pursue such outcomes, while others benefit from peace. We incorporate this possibility by extending the model to include lobbying contributions in the leader's objective function, following Grossman and Helpman (1994). Once again, as long as lobbying parameters are public information, the structure of the second-best bargaining protocol is preserved. This extension highlights two geoeconomic effects of special interests that work in opposite directions. First, they raise the joint opportunity cost of war, which increases the probability of appeasement. This occurs because wartime profits, which now enter directly into leaders' objective functions decline (as does real income). Second, when pro-war interests dominate pro-peace ones, lobbying reduces the opportunity cost of war and raises the likelihood of conflict.

The third extension explicitly models war as a contest over the total value $(v_n + v_m)$ of the external public good. Victory allows a country to appropriate the entire value; defeat implies a complete loss. A defense sector influences the probability of victory with military capacities assumed to be exogenous, predetermined, and publicly observed. Under these assumptions, the structure of the diplomatic game and the second-best protocol remain intact. The probability of reaching a peace-preserving agreement is unaffected since the joint opportunity cost of war remains unchanged; war simply being a zero-sum redistribution of the contested good. However, military capacities shape the peace-keeping transfer: the militarily advantaged country receives a larger transfer in peacetime in exchange for agreeing to peace.

All three extensions retain analytical tractability, as the geoeconomic factors continue to depend on $\mathtt{OCW}_n$ and $\mathtt{OCW}_m$ as sufficient statistics. However, quantification in each case requires measurement of an additional parameter: the autocrat's ego rent, the leader's weighting of special interests, or the value of the contested good. Since these parameters are difficult to observe in the data, we abstract from them in our quantitative exercises. Importantly, the appendix shows that none of these extensions alter the marginal welfare impact of trade policy, including the optimal degree of decoupling analyzed in Section 4.2.

2.3 Trade Model

The model is closed by plugging the diplomatic game into a general equilibrium model of trade, drawing upon the extensive literature on quantitative trade models reviewed in Costinot and Rodríguez-Clare (2014), and extended to general input-output structures by

Baqaee and Farhi (2024). In this section, we present the general setup and results, which are detailed in Appendices 9 and 10. The parametric assumptions used in our simulations are detailed in Appendix 11.

The economy is composed of a set N of countries, a set G of producers, and a set F of factors. The sets of producers and factors from country n are denoted G_n and F_n, respectively. The supply of factors is exogenous and immobile across countries.[10] Goods are instead traded internationally, for both final and intermediate consumption. Each country has a representative household that earns factor revenues and consumes.

Firms produce with a constant-returns-to-scale technology which combines intermediate inputs and primary factors:

$$q_i = A_i F_i \left(\{x_{ji}\}_{j \in G}, \{l_{fi}\}_{f \in F_n} \right), \quad i \in G_n, \quad n \in N, \tag{18}$$

where q_i is the quantity of output i, A_i is a productivity shifter, x_{ji} is the intermediate consumption of input j and l_{fi} is the quantity of factor f used in production. In what follows, firms are assumed to price at their marginal cost.[11]

The representative household in country n has homothetic preferences:

$$C_n = C_n \left(\{c_{in}\}_{i \in G} \right),$$

where c_{in} denotes the consumption of good i. In equilibrium, the representative household maximizes the utility of consumption under the following budget constraint:

$$\sum_{i \in G} \tau_{in} p_i c_{in} \leq \sum_{f \in F_n} w_f L_f,$$

where $\tau_{in} p_i$ is the price of good i, inclusive of trade costs τ_{in}.[12] w_f and L_f respectively denote the price and quantity of factor f. The above equation assumes that domestic factor remuneration is the sole source of income. In particular, it abstracts from residual profits and current account imbalances that could otherwise influence national expenditures in the static equilibrium. Including these components would not alter the core insights but would require additional assumptions about how conflict affects such income sources–assumptions that are difficult to calibrate empirically.

The equilibrium of this model is characterized by a set of prices p_i, factor prices w_f, intermediate consumptions x_{ji}, factor demands l_{fi}, outputs q_i and consumption choices c_{in}, such that i) producers minimize costs given the production function and factor prices, ii) households maximize the utility of consumption under the budget constraint, and iii)

[10] Baqaee and Farhi (2024) further allow factors in country n to be owned by foreign households, in which case some of the revenues from domestic factors enter foreign gross national expenditure. We abstract from this possibility in what follows.

[11] All results continue to hold true if firms price at a constant markup. Under variable markups, the formula for the opportunity cost of war is augmented with a weighted sum of markup adjustments.

[12] In what follows, we will index τ with either country or firm identifiers. τ_{nm} thus denotes the trade cost between countries n and m when τ_{ij} denotes the trade cost for intermediate consumption sourced by firm j from firm i and τ_{in} is the trade cost applying to sales of firm i in country n. By definition, $\tau_{ij} = \tau_{nm}, \forall i \in G_n$ and $j \in G_m$.

the markets for all goods and factors clear:

$$L_f = \sum_{i \in G_n} l_{fi}, \quad \forall f \in F_n,\ n \in N \tag{19}$$

$$q_i = \sum_{n \in N} \tau_{in} c_{in} + \sum_{j \in G} \tau_{ij} x_{ij}, \quad \forall\, i \in G \tag{20}$$

2.4 Computing OCWs

The objective of this section is to compute the OCWs, which serve as the basis for determining other geoeconomic factors. Equation (2) indicates that OCWs can be derived by comparing the real consumption of each country during wartime and peacetime. Therefore, the analysis involves comparing the economic equilibrium in peace (factual) with the hypothetical state of war between countries i and j (counterfactual). In what follows, we will use the notation Δ to denote the difference between peacetime and wartime.[13] In this section, we use first-order approximations to provide tractable intuitions about the magnitude and heterogeneity of the effect of war shocks (appendix 11 contains the details on how we parametrize and solve the model, while appendix 12 shows how the economy responds to counterfactual shocks). Our computations in section 3 do not rely on approximated results and are robust to large changes to trade costs and TFP.

War damages. Essential to the analysis is the modeling of how war affects the economy, which entails various degrees of freedom. In order to strike a balance between simplicity and realism, we adopt the following parameterization for war damages. First, we allow for human and capital losses, $\Gamma \equiv \Delta \log L_f < 0$ where the losses are restricted to $f \in F_\ell,\ \ell = n, m$, with m and n the belligerent countries. Second, we allow for economic damages, which we model as productivity losses in belligerent countries, $\alpha \equiv \Delta \log A_i < 0$, for $i \in G_\ell,\ \ell = n, m$. Finally, in line with empirical evidence (Glick and Taylor, 2010; Martin et al., 2008), we assume that trade frictions increase between belligerents and with the rest of the world. More specifically, we denote $\tau^{bil} \equiv \Delta \log \tau_{ij} = \Delta \log \tau_{ji} > 0,\ i \in G_n,\ j \in G_m$ the shock to bilateral trade costs and $\tau^{mul} \equiv \Delta \log \tau_{ij} = \Delta \log \tau_{ji} > 0,\ i \in G_n \bigcup G_m,\ j \notin G_n \bigcup G_m$ the shock to multilateral trade costs of the belligerents with the rest of the world. Frictions between third countries are assumed to be unaffected: $\Delta \log \tau_{ij} = 0,\ \forall i \notin G_n \bigcup G_m,\ j \notin G_n \bigcup G_m$. Because war increases spatial frictions, it induces a partial move back to autarky. The foregone trade gains become a component of the costs associated with war. These assumptions are natural and general, but it is important to note that the model can be extended to accommodate more complex scenarios.

Input-output weights. How wars affect real consumption in the model critically depends on the complex impact of initial shocks that have both direct and indirect influence, the latter mediated through input-output linkages. We follow Baqaee and Farhi (2024) and introduce a set of notations that will be useful to derive the results. First, we define the

[13] More precisely, $\Delta \log x \equiv \log \frac{x(\text{war})}{x(\text{peace})}$ where $x(\text{peace})$ is the peacetime value of variable x and $x(\text{war})$ its counterfactual value in case of a conflict.

cost-based input-output network as the G by G matrix Ω with ijth element:

$$\Omega_{ij} = \frac{\tau_{ij} p_i x_{ij}}{\sum_{i \in G} \tau_{ij} p_i x_{ij} + \sum_{f \in F_n} w_f l_{fj}}, \quad \forall j \in G_n,\ i \in G,\ n \in N.$$

Ω_{ij} measures the *direct* contribution of good i to producer j's costs. In the simulations, we calibrate Ω_{ij} using international Input-Output Tables.

Production is also characterized by a matrix of external factor usages, a F by G matrix Ω^F which fj-th element measures the contribution of factor f to j's costs:

$$\Omega^F_{fj} = \begin{cases} \frac{w_f l_{fj}}{\sum_{i \in G} \tau_{ij} p_i x_{ij} + \sum_{f \in F_n} w_f l_{fj}}, & \forall j \in G_n, f \in F_n, n \in N \\ 0 & \forall j \in G_n, f \notin F_n, n \in N \end{cases}$$

Ω^F_{fj} is the *direct* contribution of factor f to j's costs, calibrated with the socio-economic accounts of the database.

Given Ω, we can now define the economy's cost-based Leontief inverse, a G by G matrix, $\Psi \equiv (I - \Omega')^{-1}$. Elements of the inverse of Ψ are denoted Ψ_{ij} and measure the *full* (direct and indirect) incidence of good i on j's production costs:

$$\Psi_{ij} = \mathbb{1}_{i=j} + \Omega_{ij} + \sum_{k \in G} \Omega_{ik} \Omega_{kj} + \sum_{k \in G} \sum_{k' \in G} \Omega_{ik} \Omega_{kk'} \Omega_{k'j} + ...$$

Finally, we can define the cost-based Domar weights:

$$\lambda_{in} = \sum_{j \in G} b_{jn} \Psi_{ij} \quad \text{and} \quad \Lambda_{fn} = \sum_{j \in G} \lambda_{jn} \Omega^F_{fj},$$

where $b_{jn} \equiv \frac{\tau_{jn} p_j c_{jn}}{\sum_{i \in G} \tau_{in} p_i c_{in}}$ is the weight of good j in (nominal) consumption in country n. Domar weights measure the influence of each good and factor on the consumption basket in country n.

The opportunity cost of war. The opportunity cost of war is equal to minus the change in real consumption in country n between peacetime and wartime:

$$\texttt{OCW}_n = -\Delta \log C_n \equiv \Delta \log P^{CPI}_n - \Delta \log \sum_{f \in F_n} w_f L_f,$$

where P^{CPI}_n is the final consumption price aggregator. By Shepard's Lemma, P^{CPI}_n can be written as a weighted average of good-level price adjustments:

$$\Delta \log P^{CPI}_n = \sum_{i \in G} b_{in} \Delta \log \tau_{in} p_i.$$

Using the production function (18), we show in the Appendix that the vector of prices can be written as a function of productivity shocks, trade cost shocks and wage adjustments affecting the firm itself or one of its direct or indirect suppliers, through the downstream propagation of cost shocks along the production network. Plugging prices into the definition of the ideal price index finally implies:

$$\Delta \log P^{CPI}_n = -\sum_{i \in G} \lambda_{in} \Delta \log A_i + \sum_{f \in F} \Lambda_{fn} \Delta \log w_f + \sum_{i \in G} b_{in} \Delta \log \tau_{in} + \sum_{i \in G} \lambda_{in} \sum_{l \in G} \Omega_{li} \Delta \log \tau_{li}, \tag{21}$$

Shocks are transmitted to the CPI according to the cost-based Domar weights. Iceberg trade costs impact final prices directly (proportionally to b_{in}) and indirectly, through their impact on production costs (proportionally to $\lambda_{in}\Omega_{li}$)

Combining the change in the consumer price index with the change in nominal consumption under the budget constraint finally implies:

$$\begin{aligned}
\texttt{OCW}_n &= \underbrace{-\sum_{i\in G}\lambda_{in}\Delta\log A_i}_{\text{Economic damages}} + \underbrace{\left[\sum_{i\in G} b_{in}\Delta\log\tau_{in} + \sum_{i\in G}\lambda_{in}\sum_{l\in G}\Omega_{li}\Delta\log\tau_{ln(i)}\right]}_{\text{Trade frictions}} \\
&- \underbrace{\sum_{f\in F_n}\tilde{\Lambda}_{fn}\Delta\log L_f}_{\text{Factor losses}} + \underbrace{\sum_{f\in F}(\Lambda_{fn}-\tilde{\Lambda}_{fn})\Delta\log w_f}_{\text{Wage adjustments}}\ , \qquad (22)
\end{aligned}$$

where $\tilde{\Lambda}_{fn}\left(\equiv \frac{w_f L_f}{\sum_{i\in G}\tau_{in}p_i c_{in}} \text{ if } f\in F_n, \text{ and } 0 \text{ otherwise}\right)$ is the contribution of factor f to income in country n. Equation (22) decomposes the opportunity cost of the war into i) the contribution of economic damages, which is positive given productivity losses ($\Delta\log A_i < 0$) in rival countries, ii) the foregone trade gains associated with a partial move to autarky ($\Delta\log\tau_{in} > 0$), iii) the negative effect of factor losses ($\Delta\log L_f < 0$) and iv) equilibrium wage adjustments.

The magnitude of wage adjustments does not have a closed-form in the general model although we can recover intuitions using market clearing conditions. For each factor, total income reflects total demand for that factor, such that $w_f L_f = \sum_{i\in G}\sum_m \Omega^F_{fi} y_{im}$, where y_{im} denotes the (nominal) sales of i in market m, aggregating final consumers and intermediate consumptions. The summation over destination markets of the sales of i is central in spatial economics and referred to as a market access or market potential term (Redding and Venables, 2004; Head and Mayer, 2004; Allen and Arkolakis, 2023). Expressed in terms of changes, we have $\hat{w}_f\widehat{L}_f = \sum_{i\in G}\sum_m \frac{\Omega^F_{fi}y_{im}}{w_f L_f}\hat{\Omega}^F_{fi}\hat{y}_{im}$, where $\hat{x} = x'/x$ denotes the ratio of variable x between the counterfactual and the factual equilibrium. Replacing $\hat{y}_{im} = \xi^C_{im}\hat{\tau}_{im}\hat{p}_i\hat{c}_{im} + \sum_{j\in G_m}\xi_{ij}\hat{\tau}_{ij}\hat{p}_i\hat{x}_{ij}$ with its equilibrium values, we obtain:

$$\Delta\log w_f = -\Delta\log L_f + \log\sum_{i\in G}\sum_m \frac{l_{fi}}{L_f}\hat{\Omega}^F_{fi}\left[\xi^C_{im}\hat{\tau}_{im}\hat{p}_i\hat{c}_{im} + \sum_{j\in G_m}\xi_{ij}\hat{\tau}_{ij}\hat{p}_i\hat{x}_{ij}\right], \qquad (23)$$

with ξ^C_{im} and ξ_{ij} respectively denoting the shares of final consumers originating from country m and intermediate consumption purchased by producers of good j in firm i's total sales. The war-induced decline in factor supply triggers an upward adjustment in wages. Beyond this direct effect, the full vector of shocks influences equilibrium wages more broadly through changes in the market potentials, i.e. the adjustments of both final and intermediate demand channeled through the global production network. As the effect of demand-side adjustments is scaled by the share of each market in domestic firms' total sales, war-induced shocks to large countries can generate meaningful wage adjustments, both for belligerent countries and for the rest of the world.

2.5 Bilateral trade dependence

Equation (22) shows that trade patterns influences the $\texttt{OCW}s$, and thereby shape the welfare-relevant geoeconomic factors. In particular, bilateral trade dependence feeds back into the risk of escalation. This insight was already emphasized in Martin et al. (2008), but in a much more stylized framework, featuring a single production factor, no general equilibrium adjustments in factor incomes, and no input-output linkages. As a consequence, there are several new relevant channels in our model.

In order to provide intuition about the various channels through which bilateral dependence affects conflictuality, it is useful to rewrite equation (22) with only labor and without production linkages:[14]

$$\begin{aligned}\texttt{OCW}_n^{\text{noIO}} &= -(\Gamma+\alpha)+\pi_{mn}\tau^{bil}+\sum_{\ell\neq m,n}\pi_{\ell n}\left(\alpha+\tau^{mul}\right)\\ &\quad -\Delta\log w_n^{\text{noIO}}+\sum_{\ell}\pi_{\ell n}\Delta\log w_\ell^{\text{noIO}}.\end{aligned} \tag{24}$$

The first line of (24) contains the same forces as in Martin et al. (2008): Wars entail direct losses of workforce and productivity (Γ and α both negative). In addition, bilateral and multilateral trade integration increases the country's exposure to war-related trade disruptions (τ^{bil} and τ^{mul}), and thus the cost of war. The decrease in wartime productivity pushes the relative price of domestically-produced goods up, which effect is attenuated through substitution away from domestic consumption. This consumption insurance against war-related domestic damages is captured by the $\pi_{\ell n}\alpha$ term over all sources $\ell \neq m, n$.[15]

The second line of (24) shows that relative wage adjustments also interact with the structure of trade to affect the opportunity cost of war. The first term reflects the direct and unitary effect of nominal wage change in n's aggregate income. The second term accounts for price changes due to endogenous GE adjustment of wages in all countries that enter n's price index. How are those wages adjusting? Using equation (23) together with our demand system for $\hat{\pi}_{n\ell}$ and an approximation that is valid for small enough adjustments, the equation for wages simplifies to:

$$\begin{aligned}\sigma\Delta\log w_n^{\text{noIO}} &= -\Gamma+(\sigma-1)\alpha+\sum_{\ell}\xi_{n\ell}\left[(1-\sigma)\Delta\log\tau_{n\ell}+\Delta\log B_\ell\right]\\ &= -\Gamma+(\sigma-1)\alpha-\xi_{nm}(\sigma-1)\tau^{bil}-\sum_{\ell\neq m,n}\xi_{n\ell}(\sigma-1)\tau^{mul}+\sum_{\ell}\xi_{n\ell}\Delta\log B_\ell,\end{aligned} \tag{25}$$

with σ the elasticity of substitution and $\Delta\log B_\ell \equiv (\sigma-1)\Delta\log P_\ell+\Delta\log w_\ell^{\text{noIO}}+\Gamma_\ell$, i.e. the aggregate demand adjustment in country ℓ. Since $\sigma > 1$, nominal wages in a warring country n are hurt by lost sales in adversary m and also in third countries. The more dependent n is on m for its exports and output (a high ξ_{nm}), the more costly the conflict. The model therefore combines the two kinds of trade dependence which makes wars costly: higher prices on imports and lower income from lost exports. *The more*

[14] See Appendix 10, where we investigate further the impact of external trade dependence on $\texttt{OCW}$ and resulting geoeconomic factors of the rival countries n and m.

[15] Note that this effect is not active with respect to the opponent m, since the latter experiences the same productivity shock α.

dependent a country is on both imports and exports with its rival, the more costly would a war be.

Finally, a novel insight from the welfare analysis in Section 2.2 concerns the role of trade asymmetries. Intuitively, countries that are more reliant on foreign value added have stronger incentives to preserve peace, which weakens their bargaining power by compelling them to compensate their foreign partners during diplomatic negotiations. This is particularly evident in the version of the model without production linkages, where diplomatic concessions are given by:

$$\begin{aligned}\mathrm{PKC}^{\mathrm{noIO}}_{nm} &= \frac{1}{2}\Bigg[\tau^{bil}(\pi_{mn}-\pi_{nm}) + (\alpha+\tau^{mul})\left(\sum_{\ell\neq m,n}(\pi_{\ell n}-\pi_{\ell m})\right) \\ &\qquad - \left(\Delta\log w^{\mathrm{noIO}}_{n} - \Delta\log w^{\mathrm{noIO}}_{m}\right) + \sum_{\ell}(\pi_{\ell n}-\pi_{\ell m})\,\Delta\log w^{\mathrm{noIO}}_{\ell}\Bigg] \quad (26)\end{aligned}$$

This expression shows that *asymmetries in bilateral import dependencies*, as captured by the term $(\pi_{mn}-\pi_{nm})$, lead to transfers from the more to the less trade dependent country. Specifically, PKC_{nm} increases with the difference between the share of country m's value added in country n's consumption and the reliance of m on country produced out of value added originating in n. These asymmetries are particularly relevant in the context of China's integration into global trade, during which the country accumulated sizable current account surpluses vis-à-vis the rest of the world (see next section).

The wage channel in (26) implies a similar impact of bilateral dependency through exports. Using (25), we can compute

$$\begin{aligned}-(\Delta\log w^{\mathrm{noIO}}_{n} - \Delta\log w^{\mathrm{noIO}}_{m}) = \frac{\sigma-1}{\sigma}\Bigg[&\tau^{bil}(\xi_{nm}-\xi_{mn}) + \tau^{mul}\sum_{\ell\neq m,n}(\xi_{n\ell}-\xi_{m\ell}) \\ &+\sum_{\ell}\frac{(\xi_{n\ell}-\xi_{m\ell})\Delta\log B_{\ell}}{1-\sigma}\Bigg]. \quad (27)\end{aligned}$$

Therefore if n depends more on its exports to m than the reverse $(\xi_{nm}-\xi_{mn}>0)$, n will have to make more concessions in the negotiations intended to avoid war.

In Appendix 10, we show that the logic underpinning equation (24) generalizes to the broader class of trade models considered in this paper, where goods are traded for both intermediate and final consumption. In these models, the sufficient statistics governing the geoeconomic consequences of trade can be recovered from (bilateral and multilateral) Domar weights. As the opportunity cost of war unambiguously increases in bilateral trade dependencies (in both directions), the probability of appeasement also rises with bilateral trade. This effect is reinforced as trade develops along global value chains, due to two-way bilateral flows along the value chain.

3 Application to the US-China historical relationship

3.1 Calibration of the trade model and war scenarios

In this section, we explain how we implement the quantitative trade model described in Section 2.3 to compute the geoeconomic factors entering the diplomatic game of Section 2.1. The key element of our quantification is the opportunity cost of war, i.e. the equilibrium change in real consumption due to a war shock. This lends itself naturally to Exact Hat Algebra methods, following Dekle et al. (2008).[16] As explained in Appendix 12, all equations of the model are first rewritten in relative terms, comparing the post-shock equilibrium with a baseline, pre-shock period. The shock formulation of the model makes it possible to solve for the impact of the shock conditional on calibrated values for a set of elasticities, as well as baseline values for aggregate consumption, sectoral trade flows and a number of production and consumption shares. The definition and chosen values are detailed in Table 1.

Table 1 – Calibrated parameters

Parameter	Value	Source	Interpretation
ω	.35	Baqaee and Farhi (2024)	CES between sectors (inter. C)
θ	.5	Baqaee and Farhi (2024)	CES between sectors (final C)
λ	.1	Baqaee and Farhi (2024)	CES between VA and inputs
σ_j (Goods)		Hertel et al. (2007)	Armington elasticities
σ_j (Services)		Ahmad and Schreiber (2024)	Armington elasticities
$\pi^l_{m,j,0}$		TiVA data	Labor shares
$\pi^X_{m,ij,0}$		TiVA data	Intermediate shares
$\pi^X_{nm,ij,0}$		TiVA data	Intermediate trade shares
$\pi^c_{n,j,0}$		TiVA data	Final consumption shares
$\pi^c_{mn,j,0}$		TiVA data	Final trade shares
$y_{nm,j,0}$		TiVA data	Trade flows
$P_{n,0}C_{n,0}$		TiVA data	Final consumption

The model is calibrated assuming nested CES functions on the production and consumption sides. At the bottom nest, consumptions for final and intermediate purposes at sector-level are CES across origin countries, with sector-specific elasticities calibrated based on estimates in Hertel et al. (2007) for goods and Ahmad and Schreiber (2024) for services. In upper nests, consumption of final and intermediate products involves complementarities, across sectors (elasticities of .5 and .35 for final and intermediate consumptions, respectively) as well as between value added and intermediate consumption (elasticity of .1). All the elasticities are calibrated as in Baqaee and Farhi (2024). Besides elasticities, trade flows and consumption shares are calibrated using data from the Trade in Value Added Database (release 2023, covering data from 1995 to 2020) constructed by the OECD. Compared to the general model, the calibrated version has a single factor of production, which we interpret as equipped labor.

[16] An alternative would be to use the first-order approximation proposed in Baqaee and Farhi (2024). In our context, the exact hat algebra is a more efficient solution because we implement large shocks, and would thus need to chain the numerical algorithm in Baqaee and Farhi (2024) a large number of times in order to recover precise estimates.

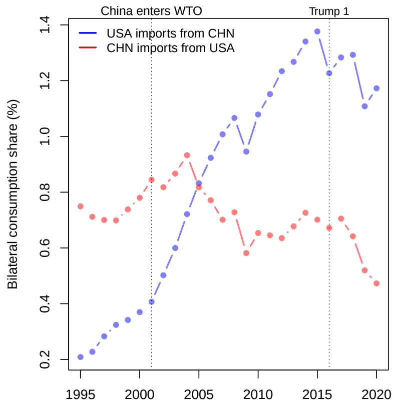
While all these calibration steps are standard in the quantitative trade literature, our diplomatic game requires additional parameters. We provide a short description of the calibration steps here, the details being relegated to appendix B. The first diplomacy-related parameter is the one accounting for war damages in terms of productivity, α. We calibrate it in our model using recent estimates of how wars affect output by Federle et al. (2024). Our target is a 13% contraction in real output (corresponding to the discounted value of the impulse response function reported in their figure 5). We target this contraction in output using country-year-specific TFP shocks. The war-related (iceberg) trade disruption shocks are $\tau_{\text{bil}} = 0.461$ and $\tau_{\text{mul}} = 0.026$, based on Glick and Taylor (2010). At this stage, we abstract from workforce/consumers losses, setting $\Gamma = 0$. Note that Γ only affects the level of OCW, irrespective of the evolution of trade patterns, should it be in the historical or the counterfactual analysis.

The last input in the calibration is η, a parameter that scales informational noise in diplomatic negotiations. From equation (11), η is negatively correlated with the probability of appeasement conditional on a dispute, given the sum of opportunity cost of wars. From that point-of-view, the parameter captures the notion of *global safety* when geopolitical disputes arise. Traditional calibration methods would typically rely on historical conflict data to discipline this parameter. However, the validity of such a backward-looking approaches is probably limited in our study of a potential U.S.–China conflict. Informational frictions in diplomacy are highly context-dependent, shaped by the existing communication channels, credibility of signaling, and the institutional environment governing bilateral interactions. Ideally, the calibration of η should be anchored in forward-looking assessments from diplomatic, defense, and intelligence sources. Under such an *intel-fed calibration*, our framework could be used to assess how trade policy might best respond to identified geopolitical threats. In the absence of such intel-fed calibration sources, we instead use η as a free parameter, the calibration of which targets the probability of de-escalation in the baseline (factual) equilibrium. Our baseline calibration targets a probability of de-escalation equal to one in 2018 ($s_{2018} = 1$). We later increase η to simulate a range of insecurity scenarios where the baseline probability varies from 1 to 0.6.

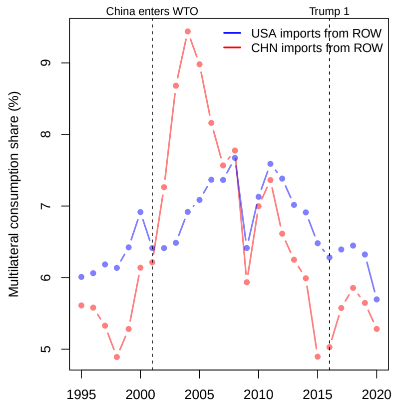
3.2 Historical evolution of geoeconomic factors

China-USA recent trade history: Figure 2 shows the patterns of US-China trade over the 1995-2020 period. This figure is using TiVA data and plots trade as a share of the importing country total consumption (including non-tradables). Panel (a) shows the well-known and impressive increase in the imports of the United States from China , which accelerates after China's accession to the WTO in 2001, slows down around 2012 before falling during Donald Trump's first term. On the other hand, US-made goods as a share of Chinese expenditure remain quite stable, with a stronger decline at the end of the period. Panel (b) shows that while not importing more from the US, there is a strong spike in Chinese imports from other countries after entering WTO, which is particularly influenced by increased demand for machinery and equipment coming from Japan and South Korea among other sources. The Chinese multilateral trade share then quickly comes back to levels experienced in the 1990s. On the contrary, the United States show a steady increase in multilateral imports over the whole period. The natural consequence is that the share of consumption spent on domestic goods falls by around 2 percentage points for the US over

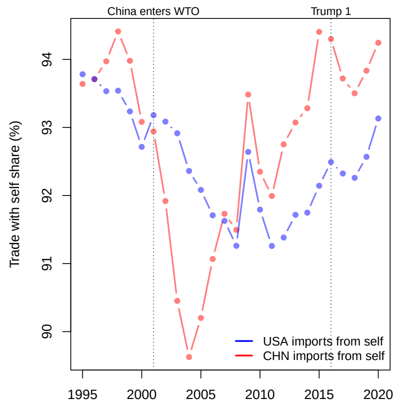
Figure 2 – Evolution of trade shares for the China-USA pair



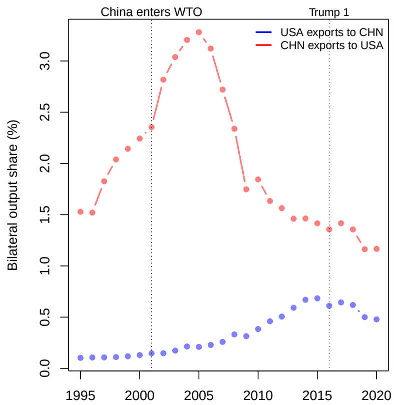
(a) Bilateral imports



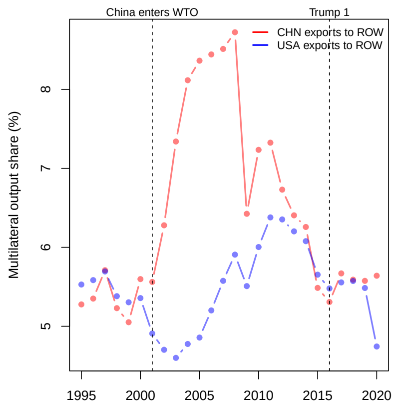
(b) Multilateral imports



(c) Domestic trade



(d) Bilateral exports

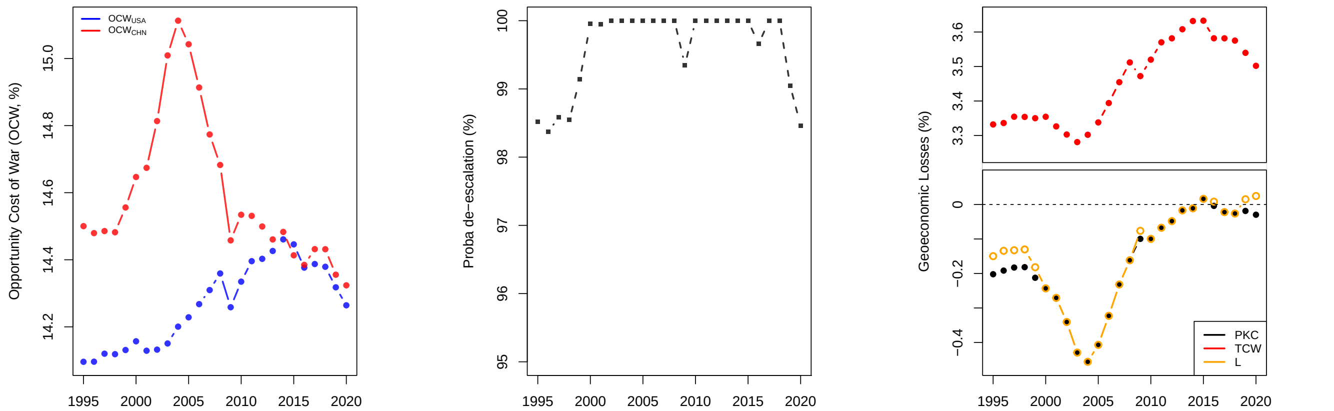


(e) Multilateral exports

the period (panel c). The end of period is characterized by a decrease in overall import propensity for the two countries.

In terms of export dependence, panel (d) shows that China became quite dependent on the US market around 2005, only to fall back in 2020 close to the 1995 level. The same pattern is apparent for Chinese exports to the rest-of-world (panel e). American exporters became more dependent on the Chinese market over the whole period, with the trend changing in the late 2010s (also for exports to the rest-of world). In terms of levels, the degree of bilateral export dependence of China to the US is about twice as high as the reverse (which, interestingly, looks like the mirror image of import dependence).

Figure 3 – Decomposing Geoeconomic Losses ($s_{2018} = 1$)



(a) Opportunity Cost of War (b) Probability of de-escalation (c) Geoeconomic Loss for USA

The consequences of those trade patterns of the last 25 years in terms of key statistics of our diplomatic model can be seen in figure 3. Panel (a) shows (in blue) that the increased share of US imports originating from China raised the opportunity cost of a bilateral war for the USA, which peaked in 2014, at 14.4% of real consumption. The TFP shock (α) calibrated to reduce output by 13% does most of the damage, leaving a still substantial loss around 1.3% due to trade interdependencies. For China, the opportunity cost of a war with the US is slightly lower in 2020 compared to 1995 (in red). The spike observed in the beginning of the 2000s might seem surprising since Chinese imports from the US did not increase so strongly in that period (figure 2(a)). As figure 2(d) shows, the dependence of China related to its exports to the US is the driving factor of its opportunity cost of war.[17] Both the import and export dependence channels are active over the period.

Panel (b) of figure 3 gives the evolution of the probability of deescalation. Recall that we use a calibration of η such that s is exactly 1 in 2018 given the observed OCW, using (11). This is a limiting case, and any decrease of the sum of the countries' opportunity cost of war results in a higher risk of escalation. This is what we see in panel (b): s falls below one immediately after 2018 because OCW falls for both countries. It rejoins the levels of the end of the 1990s where the sum of the opportunity costs of a conflicts was lower than in 2018. However, as can be seen in panel (c), the asymmetry in the evolution of bilateral dependence, (the difference in OCW) resulted in a substantial increase in Peace Keeping

[17]On top of the depressed exports to the US, a US-China war would also have hurt trade with the rest of the world (12% drop in our calibration), and in particular the spike in imports and exports from Asia that happened in those years (see panel (b) of Figure 2 for the aggregate increase in imports and appendix Figure 138 which provides origins by continent).

Costs for the US. These costs were negative until 2015, indicating that, on average, China had to make concessions to maintain peace. Those concessions were rapidly reduced after the 2004/2005 peak of Chinese multilateral openness and OCW, to reach essentially 0 in the recent years, due to the convergence in OCWs. The same panel also shows the True Cost of War (TCW), which is essentially the Opportunity Cost of War shifted down (from around 14% to around 3.5%) by the fact that diplomacy is effective at lowering the risks of high damage conflicts. It turns out that the evolution of TCW is qualitatively the same as PKC, but with a very different level (as shown on the broken y-axis of the figure). Finally, the geoeconomic costs $\mathcal{L}$ being the average of TCW and PKC weighted by s, we see the orange dots overlaying the black ones until s falls to a level smaller than 1. In those last years of our data, the diplomatic bargaining game is now overall disadvantageous for the USA. Over 20 years, the US has lost around 0.2 percent of real consumption as a result of decreased bargaining power in its diplomatic relationship with China.

4 Geoeconomics of decoupling

4.1 Decoupling in the shadow of war: theory

In this section, we add a trade policy decision margin to the sequence of events described on page 6. Specifically, at stage (0)—immediately following the emergence of a geopolitical dispute—country n weighs the costs and benefits of "decoupling" its economy from that of its geopolitical rival m. While our simulations primarily focus on an increase in bilateral tariffs, other scenarios (such as bilateral export taxes or subsidies) can also be envisioned.

According to Equation (16), the policy-induced change in welfare depends not only on real consumption but also on a set of geoeconomic variables. Let $\mathbb{E}[U_n]$ and $\mathbb{E}[U'_n]$ represent the expected utility under the status quo and under decoupling, respectively. The welfare gains attached to decoupling are given by:

$$\mathbb{E}[U'_n] - \mathbb{E}[U_n] = \log\left(\frac{C'_n(\text{peace})}{C_n(\text{peace})}\right) - \Delta\mathcal{L}_n, \tag{28}$$

where C' indicates real consumption when the policy is in force. This equation breaks down the welfare impact of decoupling in the shadow of war into two components. The first term captures the conventional policy-induced trade effects that arise under peacetime conditions–an object commonly measured in the existing literature which typically assumes away geopolitical risk when conducting policy evaluation. With tariff revenues, this term will be of ambiguous in sign, with a possibly positive optimal tariff (Costinot and Rodríguez-Clare, 2014). The second term, $-\Delta\mathcal{L}_n$, which we refer to as the *geoeconomic welfare gains*, can also be positive or negative.

This term embodies a *fundamental security dilemma* of geoeconomics: whether to increase or decrease bilateral trade dependence with geopolitical rivals. While the full resolution of this question requires quantitative evaluation, we outline the key underlying mechanisms below:

1. Decoupling reduces the bilateral import and export dependence of country n on its rival

m, thereby decreasing n's opportunity cost of war: $\Delta\texttt{OCW}_n < 0$. This, in turn, affects the other geoconomic factors and welfare.

2. Two factors make decoupling beneficial to n's welfare. First, in the event that negotiations fail and war breaks out, the true cost of war decreases, $\Delta\texttt{TCW}_n < 0$. Second, it improves country n's diplomatic bargaining power, leading n to make less concessions in order to maintain peace: $\Delta\texttt{PKC}_{nm} < 0$.
3. Under decoupling, a lower OCW reduces leaders' incentives to exercise discipline during diplomatic negotiations, thereby decreasing the probability of de-escalation: $\Delta s_{nm} < 0$. This is detrimental to country n's welfare.
4. Apart from those two effects on $\mathcal{L}_n$, raising trade barriers also affects (peacetime) real consumption $C_n(\text{peace})$ through the standard price index and terms-of-trade channels discussed in the trade literature.
5. Finally, decoupling has general equilibrium effects that spill over to the rival country's opportunity cost of war: $\Delta\texttt{OCW}_m < 0$. While country n reduces its import dependence on m, this also lowers m's export dependence on n, exerting downward pressure on its wages and facilitating trade diversification toward the rest of the world. As a result, $\texttt{OCW}_m$ declines. This in turn feed backs into all of n's geconomic factors: it partially offsets the initial reduction in $\texttt{PKC}_{nm}$ while amplifying the decline in s_{nm}. Although these GE effects may be second-order for small countries, they are far from negligible when two of the largest world economies are entering into geopolitical disputes.

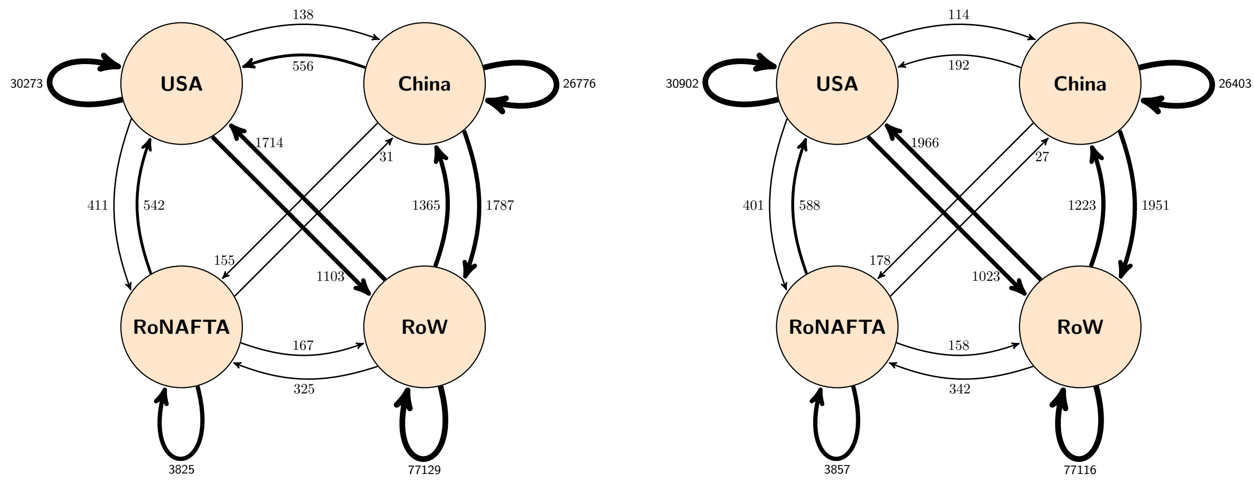
These countervailing forces generate a fundamental tension in the design of decoupling. When the net effect is positive, decreasing import sourcing and/or export dependence from rival nations is desirable. When negative, dependence should be increased.

4.2 Decoupling USA from China

We implement our decoupling exercise inspired by an empirically-relevant policy, namely the China-US trade war that was initiated in January 2018. In this scenario, set in 2018, we assume that the US increases its tariffs on imports from China with the intent and effect of altering its bilateral import dependence. The simulations are performed with changes in tariffs such that overall trade costs increase (with respect to their factual level) by a range of $[0\%, +50\%]$. Tariff revenues are redistributed to households. For each possible value of the increase in trade cost, we compute the counterfactual changes in trade shares, geoeconomic factors, real consumption and welfare gains of trade in the shadow of war.

The predicted changes in trade patterns are illustrated in figure 4, where panel (a) reports real trade flows from the 2018 TiVA dataset aggregated to four regions: The United States, China, the Rest of Nafta and the Rest of World. Panel (b) reports the same flows after a 25% increase in trade costs imposed on China by the United States. Table 131 in Appendix details the consequences in terms of aggregate trade shares. As expected, increasing trade costs is predicted to redirect trade flows: the counterfactual flows from China to the USA is only a third of the baseline. In terms of shares of expenditure, both countries increase the domestic part of their total consumption. The United States also import more from alternative sources, while the reallocation of Chinese expenditure is mostly towards self-trade. The reconfiguration of trade is the consequence of the general equilibrium effect of decoupling: Wages increase in the US due to upward pressures on domestic labor demand

Figure 4 – Observed trade flows vs USA derisking (25%) wrt CHN (bn USD)

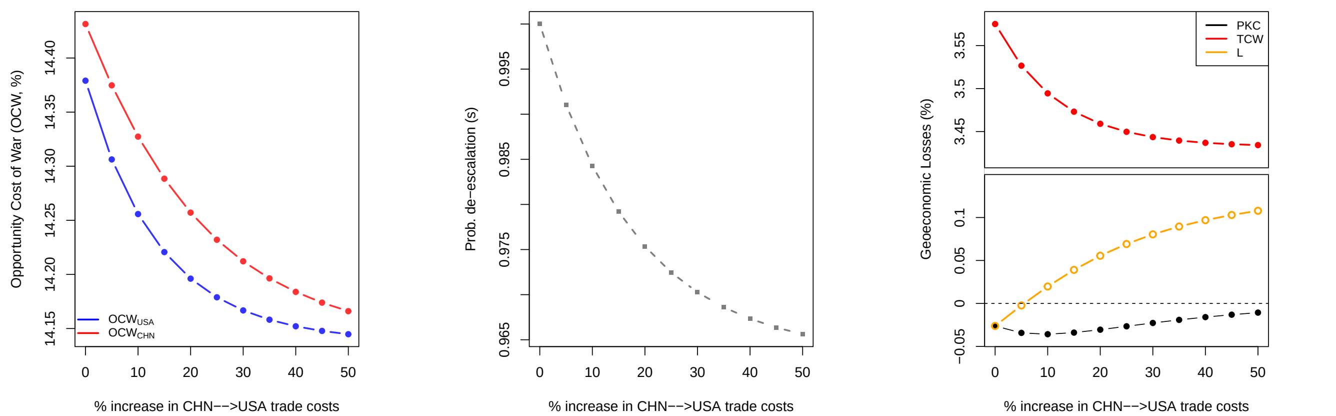


(a) Observed in 2018 (b) Counterfactual

while they are instead reduced in China (Figure 139). The adjustment in wages is the largest in China as the country's export dependence to the US is high, at 1.5% of Chinese firms' overall sales (Figure 2(d)).

As a consequence of this bilateral disengagement, *both* opportunity costs of war adjust. Panel (a) of figure 5 shows the fall in `OCW` for both countries. While the fall on the USA side seems very intuitive since this is the country imposing the unilateral trade policy, the fall in Chinese `OCW` comes from the more indirect effect on wages. The cut in exported values to the USA exerts downward pressures on Chinese relative wages, which makes Chinese products more attractive on all markets, including China itself. Since by the same logic, US exports are made more expensive, China reduces drastically its imports from the US, favoring its own varieties (even without any retaliation). This reduces the Chinese `OCW`. Since both opportunity costs of war drop in the counterfactual, the chances of finding a peace-keeping agreement also fall, as shown in panel (b) with the dotted line. The consequences of decoupling for deescalation probabilities is sizable. Compared to the baseline probability of appeasement (s_{2018}, set to one), derisking with a 25% increased trade cost on Chinese products reduces this probability by around 3 percentage points.

Figure 5 – "Derisking": Unilateral US increase in tariffs ($s_{2018} = 1$)



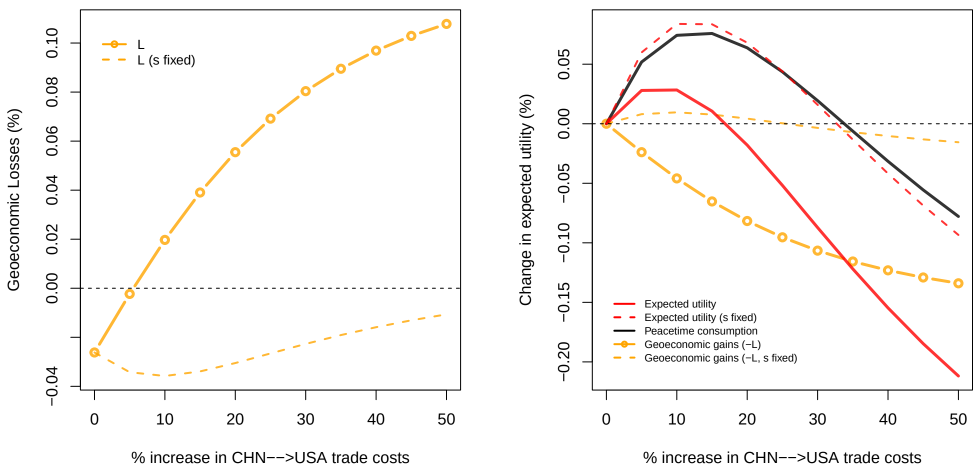
(a) Opportunity Cost of War (b) Probability of de-escalation (c) Geoeconomic Loss for USA

In terms of the geo-economic factors for the United States, panel (c) of figure 5 shows (in red) a fall in how costly would a war with China be (TCW), which is the prime intuitive motivation for the decoupling policy. Decoupling leaves the economic value of the (small) diplomatic concessions that China must make to the US for maintaining peace (PKC in black) broadly unchanged. Since the war is more likely with decoupling, the geoeconomic costs $\mathcal{L}$ get closer to TCW as trade costs are increased. Pushing in the other direction, the true costs of war are initially higher but decreasing while the PKC is essentially flat. The balance of the two effects is ambiguous, but it turns out that with our calibration, the total impact (orange line) is increasing, which means that the geoeconomic losses are made *worse by the policy*.

Full welfare implications are reported in figure 6. In panel (a), we compute $\mathcal{L}$ under different configurations; the plain line is the full version, the dashed one keeps s fixed at its initial calibrated value, here $s_{2018} = 1$. Hence, the dashed line is actually the same as PKC in this particular calibration. Regarding the full $\mathcal{L}$, it is therefore the endogenous increase in the probability of escalation which turns negative geoeconomic losses (for very low tariff increases) into positive territory. Would s stay constant, the peace-keeping costs would remain a benefit for the US even with very high tariffs.

Figure 6 – Welfare under the shadow of war ($s_{2018} = 1$)

(a) $\Delta\mathcal{L}_{\text{USA}}$ with and w/o Δs (b) Decomposing $\Delta\mathbb{E}[\tilde{U}_{\text{USA}}]$

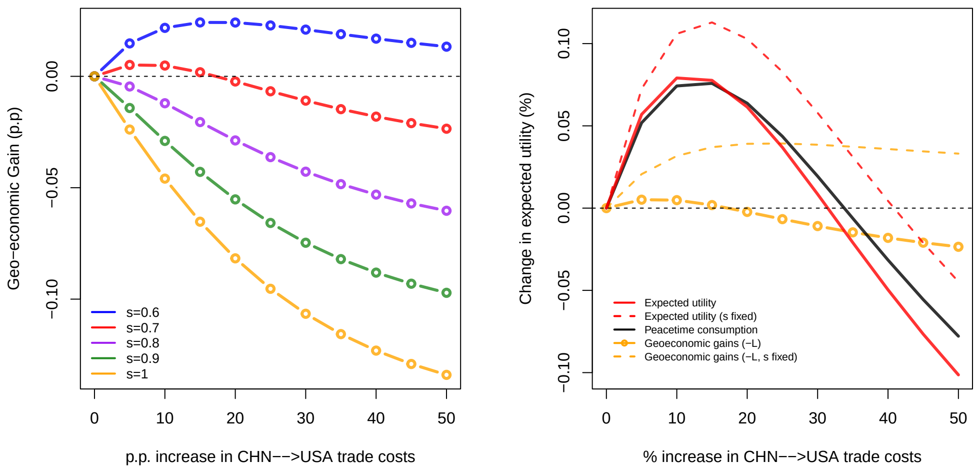


In panel (b), we report the peacetime real consumption change occurring when the US raises its bilateral trade barriers with China (in black). We note here that because of the tariff revenues, the optimal tariff is not zero even in peace (this mirrors the findings of Costinot and Rodríguez-Clare, 2014). As shown in equation (28), the full welfare needs to retrieve the change in geoeconomic costs compared to baseline from the change in peacetime consumption. We report $-\mathcal{L}$ in the plot with the same color and line types as in panel (a), such that the orange line can just be added to the black one to get full welfare as the red line. US welfare in the shadow of war starts out in positive territory as tariffs increase, but the gains are made *lower* by geoeconomic considerations. We have here an example of the fragmentation paradox highlighted by the title of our paper. An interesting result is that if a policy maker does not account for the change in the escalation probability, the decoupling policy looks like it adds a geoeconomic benefit to welfare changes (the dashed red line). When trying to reduce the costs associated with high bilateral dependence in case of a conflict, the government needs to account for the fact that lowering bilateral trade might raise the risk of that very event happening.

The counterfactuals shown until now all calibrate η such that $s_{2018} = 1$, that is a very secure situation where escalation is ruled out in the baseline year. Since the true level of η and s are unknown, we turn to an investigation about how varying this parameter driving the underlying insecurity changes predictions. We therefore re-calibrate η for $s_{2018} \in [0.6, 1]$ and recompute all outcomes of the derisking counterfactuals. Figure 7 shows the resulting geoeconomic gains for the United States, $-\mathcal{L}_{\text{USA}}$, depending on the initial calibrated level of s.

Figure 7 – Geoeconomic gains ($-\mathcal{L}_{\text{USA}}$) conditional on s

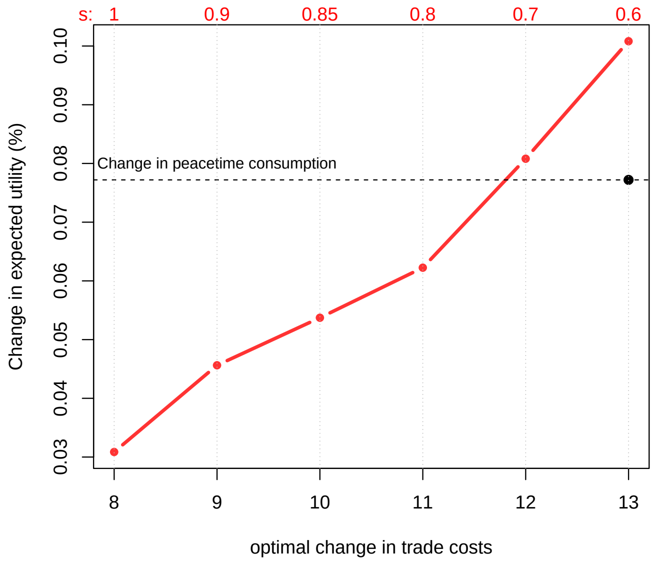
(a) $-\mathcal{L}_{\text{USA}}$ conditional on s (b) Welfare for $s_{2018} = 0.7$



Panel (a) uses the same orange curve as in figure 6 for the case $s_{2018} = 1$, showing negative gains that worsen as trade costs increase. As the bilateral diplomatic relationship becomes less secure (i.e. lower baseline s), geoeconomic gains become less negative, eventually turning positive. This shift occurs because, in a more insecure world, the reduction in the true cost of war becomes the dominant driver of geoeconomic gains, whereas it is nearly irrelevant when the probability of conflict is very low. In the scenarios displayed, decoupling begins to generate geoeconomic gains when the baseline probability of de-escalation to conflict in 2018 falls to 70% or below, an environment reflecting substantial geopolitical insecurity. Panel (b) reproduces the one from figure 6 with $s_{2018} = 0.7$, which shows indeed that the geoeconomic rationale is now improving the welfare consequences of decoupling for small increases of trade costs. If those increases get over 20% however, the geoeconomic gains become negative again, lowering overall welfare gains.

Our quantitative model thus delivers predictions regarding the optimal level of protection, when economic and geopolitical considerations are taken into account. The optimal tariff maximizes the expected utility (red lines in the (b) panels of Figures 6 and 7). In general, we shall not expect it to coincide with the tariff that maximizes peacetime consumption (black lines in the (b) panels of Figures 6 and 7). Figure 8 illustrates how the optimal tariff varies with the ex-ante probability of de-escalation. In the baseline calibration in which global safety is high ex-ante ($s = 1$), optimal derisking corresponds to a 8% increase in trade costs compared to baseline, substantially below the 13% increase that maximizes peacetime consumption. When the ex-ante probability of de-escalation falls, the optimal tariff becomes larger, as does the expected gain from decoupling. The reason is that

Figure 8 – Optimal derisking



decoupling then delivers less negative, and eventually positive, geoeconomic consequences, which add to the economic gain in peacetime.

Under the *intel-fed* calibration described in Section 3.1, our model could thus be used to assess how trade policy should best respond to identified geopolitical threats. In the absence of the requested data, our results show that decoupling strategies generally involve geoeconomic losses, unless the level of conflict risk is already high.

5 Conclusion

This paper develops a framework that embeds a diplomatic game of escalation to conflict into a quantitative model of international trade. It enables the estimation of how both import and export dependence shape the realized cost of war, the diplomatic concessions required to prevent it, and the probability of escalation.

Applied to U.S.–China relations, the model shows that their deepening bilateral trade integration over the past three decades increased the joint opportunity cost of armed conflict, thus promoting peaceful resolution. However, growing asymmetries in trade dependence, reflected in the widening U.S. trade deficit with China, gradually shifted bargaining power in China's favor. By 2015, diplomatic concessions from China, which were equivalent to 0.2% of U.S. real consumption in the 1990s, had effectively vanished. Simulations of decoupling scenarios reveal a core security dilemma: reducing import dependence on a geopolitical rival lowers both the cost of peace concessions and the true cost of war, but may simultaneously increase the risk of conflict by weakening bargaining discipline. This trade-off illustrates what we term the fragmentation paradox. In this respect, our framework offers a quantitative basis for determining the optimal degree of decoupling, conditional on a level of geopolitical threat informed by diplomatic and military intelligence.

More broadly, the approach brings diplomacy and latent endogenous conflict risk into the analytical toolkit of trade policy evaluation. By quantifying security dilemmas, it offers a flexible framework adaptable to other geopolitical contexts, such as the evolving EU–Ukraine–Russia nexus. Future extensions could explore *block derisking*, whereby trade costs are strategically adjusted across and within geopolitical alliances, or *smart derisking*, leveraging sector-level heterogeneity in trade dependencies. The framework also lends itself to the study of trade and financial sanctions as an instrument of geoeconomic statecraft. In an era where economic interdependence and security are deeply entwinned, this agenda offers critical tools to inform trade policy in an increasingly fragmented world.

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Appendix

7 Diplomatic Game

This section outlines the key stages and outcomes of the diplomatic game resolution. We skip the proof that the second-best protocol takes the form of the Nash bargaining protocol displayed on page 8. The proof is in Appendix A of Martin et al. (2008), referred to as MMT henceforth, which extends the setup covered in the claims B and C of Compte and Jehiel (2009).[18] We invite the reader to refer to these two articles to get a comprehensive understanding of the resolution process. Two results from MMT are particularly relevant for our analysis. In their Appendix A.1, they derive the optimal announcement strategy of each player in the diplomatic game, as well as the resulting post-transfer utility in the case of a successful agreement.

Optimal announcement. Our presentation of the model in Section 2.2 emphasizes the role of $\widetilde{\texttt{UCW}}$, which represents the utility *differential* between peace and war. In this respect, in the diplomatic game, rather than announcing a *level* of wartime utility, it is equivalent for the player to announce a utility differential:

$$\widetilde{\texttt{UCW}}_n^a \equiv U_n(\text{peace}) - a(\widetilde{U}_n^W), \tag{71}$$

where $a(\widetilde{U}_n^W)$ denotes the optimal announcement of wartime utility level derived in footnote 27 of MMT. Translated into our notation, this corresponds to:

$$a(\widetilde{U}_n^W) = \min \widetilde{U}_n(\text{war}) + \frac{1}{4}\Big(U_n(\text{peace}) + U_m(\text{peace}) - \min \widetilde{U}_n(\text{war}) - \min \widetilde{U}_m(\text{war})\Big) + \frac{2}{3}\Big(\widetilde{U}_n(\text{war}) - \min \widetilde{U}_n(\text{war})\Big). \tag{72}$$

Combining the two previous relations, rearranging the terms and using the definition $\widetilde{\texttt{UCW}}_n \equiv U_n(\text{peace}) - \widetilde{U}_n(\text{war})$, yields:

$$\widetilde{\texttt{UCW}}_n^a = \frac{2}{3}\widetilde{\texttt{UCW}}_n + \frac{1}{12}\max \widetilde{\texttt{UCW}}_n - \frac{1}{4}\max \widetilde{\texttt{UCW}}_m. \tag{73}$$

Under the parametric assumption $\tilde{u}_n \in [-3\eta/4, 0]$, equation (3) implies that $\max \widetilde{\texttt{UCW}}_n = \texttt{OCW}_n$. Equation (73) thus becomes:

$$\widetilde{\texttt{UCW}}_n^a = \frac{2}{3}\widetilde{\texttt{UCW}}_n + \frac{1}{12}\texttt{OCW}_n - \frac{1}{4}\texttt{OCW}_m. \tag{74}$$

which corresponds to equation (8) in the main text.

Geoeconomic factors. To save on notation in the remaining computations, we define the random variables $x = -\tilde{u}_n$ and $y = -\tilde{u}_m$ and the cutoff value $\bar{x} \equiv \frac{3}{4}(\texttt{OCW}_n + \texttt{OCW}_m)$. The parameterization retained in Section 2.2 implies that x and y both vary in the interval $[0, \bar{u}]$ with $\bar{u} = 3\eta/4$. Moreover, we assume that (x, y) are jointly uniformly distributed

[18] Compte and Jehiel (2009) assume that the sum of the outside options of the two players is bounded between 0 and the value of the joint surplus to be shared (V in their notation). MMT relax this restriction and allow the joint outside options to vary within a range $[\underline{v}_n + \underline{v}_m, \bar{v}_n + \bar{v}_m]$.

over a triangle in $\mathbb{R}^2$, so that the joint distribution of the utility costs of war is uniform over the black triangle represented in Figure 1 in the main text. Note that this triangle is the translation to our setting of the Figure 3 in MMT, with the important extension that we allow for asymmetric $\texttt{OCW}$s. Finally, the joint probability density function (pdf) of (x, y) is equal to the inverse of the surface of the black triangle: $\phi(x, y) = \frac{2}{\bar{u}^2}$ for (x, y) located in the triangle and $\phi(x, y) = 0$ otherwise.

In the Nash bargaining protocol, reaching an agreement requires the announcements of players n and m to be compatible with equation (5):

$$0 < \widetilde{\texttt{UCW}}_n^a + \widetilde{\texttt{UCW}}_m^a. \tag{75}$$

Inserting (74) into the previous relation characterizes the war shocks which are conducive to a peace-preserving agreement:

$$0 < \frac{3}{4}(\texttt{OCW}_n + \texttt{OCW}_m) + \tilde{u}_n + \tilde{u}_m. \tag{76}$$

In figure 1, a peace-preserving agreement happens for all realizations of $(\widetilde{\texttt{UCW}}_n, \widetilde{\texttt{UCW}}_m)$ that are located in the blue triangle. The probability of peace s_{nm} is given by the ratio of the surface of the blue over that of the outer black triangle. The previous condition can be compactly rewritten as $x + y < \bar{x}$ and we get:

$$s_{nm} = \texttt{Pr}\left(x + y < \bar{x}\right) = \int\int_{x+y<\bar{x}} \phi(x, y)dxdy = \begin{cases} \frac{\bar{x}^2}{\bar{u}^2} = \frac{(\texttt{OCW}_n + \texttt{OCW}_m)^2}{\eta^2} & \text{if} \quad \texttt{OCW}_n + \texttt{OCW}_m \leq \eta \\ 1 & \text{otherwise,} \end{cases} \tag{77}$$

which corresponds to equation (11) in the main text.

<u>Peace-Keeping Cost:</u>

The Nash bargaining protocol (Appendix A.1 in MMT) implements a peace-preserving transfer equal to:

$$\widetilde{T}_{nm} = \frac{(U_n(\text{peace}) - a(\widetilde{U}_n^W)) - (U_m(\text{peace}) - a(\widetilde{U}_m^W))}{2}$$

Using (71), this transfer can be expressed in terms of announced utility differentials:

$$\widetilde{T}_{nm} = \frac{\widetilde{\texttt{UCW}}_n^a - \widetilde{\texttt{UCW}}_m^a}{2}.$$

This relation corresponds to Equation (7) in the main text. In turn, we combine it with (74) to get:

$$\widetilde{T}_{nm} = \frac{\texttt{OCW}_n - \texttt{OCW}_m}{2} + \frac{\tilde{u}_n - \tilde{u}_m}{3} = \frac{\texttt{OCW}_n - \texttt{OCW}_m}{2} - \frac{x - y}{3}. \tag{78}$$

The first equality in the preceding relation corresponds to equation (12) in the main text.

The next step consists in computing the expected value of $\widetilde{T}_{nm}$ conditional on peace. In Figure 1 this boils down to averaging $\widetilde{T}_{nm}$ over all realizations (x, y) that are located in the blue triangle. Importantly, the two random variables are assumed to be uniformly distributed over the isosceles blue triangle. As a consequence, their expected values conditional on peace are identical:

$$\mathbb{E}\left[x|\text{peace}\right] = \mathbb{E}\left[y|\text{peace}\right].$$

Combining the last two relations leads to the characterization of the peace-keeping cost (equation (13) in the text):

$$\mathbb{E}\left[\widetilde{T}_{nm}|\text{peace}\right] \equiv \texttt{PKC}_{nm} = \frac{\texttt{OCW}_n - \texttt{OCW}_m}{2}. \tag{79}$$

<ins>True Cost of War:</ins>

The True Cost of War is equal to:

$$\texttt{TCW}_n = \mathbb{E}\left[\widetilde{\texttt{UCW}}_n|\text{war}\right] = \texttt{OCW}_n + \mathbb{E}\left[\tilde{u}_n|\text{war}\right] = \texttt{OCW}_n - \mathbb{E}\left[x|\text{war}\right] \tag{710}$$

As depicted in Figure 1, war happens whenever the joint realization of (x, y) is located in the red trapezoid. Hence, their joint pdf conditional on war, denoted $\psi(x, y)$, is a constant term ψ equal to the inverse of the surface of the red trapezoid, itself equal to the difference in the surfaces of the black and the blue triangles. Thus, $\psi(x, y) = \psi = \frac{2}{\bar{u}^2 - \bar{x}^2}$. This leads to:

$$\begin{aligned}
\mathbb{E}\left[x|\text{war}\right] &= \int\int_{(x,y)\in\Theta} x\psi(x,y)dxdy = \int_0^{\bar{x}}\int_{\bar{x}-x}^{\bar{u}-x} x\psi dxdy + \int_{\bar{x}}^{\bar{u}}\int_0^{\bar{u}-x} x\psi dxdy \\
&= \psi\int_0^{\bar{x}} xdx \int_{\bar{x}-x}^{\bar{u}-x} dy + \psi\int_{\bar{x}}^{\bar{u}} xdx\int_0^{\bar{u}-x} dy = \psi\int_0^{\bar{x}} x(\bar{u}-\bar{x})dx + \psi\int_{\bar{x}}^{\bar{u}} x(\bar{u}-x)dx \\
&= \psi(\bar{u}-\bar{x})\frac{\bar{x}^2}{2} + \psi\left[\bar{u}\frac{\bar{u}^2-\bar{x}^2}{2} - \frac{\bar{u}^3-\bar{x}^3}{3}\right] = \psi\frac{\bar{u}^3-\bar{x}^3}{6} = \frac{\bar{u}^3-\bar{x}^3}{3\left(\bar{u}^2-\bar{x}^2\right)}.
\end{aligned}$$

Inserting this relation into (710) and substituting $(\bar{u}, \bar{x})$ with their underlying values, we obtain:

$$\texttt{TCW}_n = \mathbb{E}\left[\widetilde{\texttt{UCW}}_n|\text{war}\right] = \texttt{OCW}_n - \frac{1}{4}\times\frac{\eta^3 - \left(\texttt{OCW}_n + \texttt{OCW}_m\right)^3}{\eta^2 - \left(\texttt{OCW}_n + \texttt{OCW}_m\right)^2} \tag{711}$$

It is useful to compare the previous relation with its unconditional expectation:

$$\mathbb{E}\left[\widetilde{\texttt{UCW}}_n\right] = \texttt{OCW}_n + \mathbb{E}\left[\tilde{u}_n\right] = \texttt{OCW}_n - \mathbb{E}\left[x\right], \tag{712}$$

where the last term is computed by integrating x over the entire triangle:

$$\mathbb{E}\left[x\right] = \int_0^{\bar{u}}\int_0^{\bar{u}} x\phi(x,y)dxdy = \int_0^{\bar{u}} x\frac{2}{\bar{u}^2}dx\int_0^{\bar{u}-x} dy = \int_0^{\bar{u}} x(\bar{u}-x)\frac{2}{\bar{u}^2}dx = \frac{\bar{u}}{3} = \frac{\eta}{4}.$$

Plugging (712) into (711) and using the preceding relation yields:

$$\texttt{TCW}_n = \mathbb{E}\left[\widetilde{\texttt{UCW}}_n|\text{war}\right] = \underbrace{\texttt{OCW}_n - \frac{\eta}{4}}_{=\mathbb{E}\left[\widetilde{\texttt{UCW}}_n\right]} - \frac{1}{4}\frac{\left[\texttt{OCW}_n + \texttt{OCW}_m\right]^2}{\left[\eta + \texttt{OCW}_n + \texttt{OCW}_m\right]}, \tag{713}$$

which corresponds to equation (14) in the main text.

8 Extensions

In this section, we present three natural extensions of our benchmark model. First, allowing one of the leaders to be autocratic, i.e. having a specific tolerance for conflict. Second, letting special interest groups which benefit differently from war, influence policy making. Third, account for military spending and how it influences the probability of "winning" the war. Those three extensions are meant to show how those realistic features can be introduced without changing the fundamental mechanics of the model, and in particular the diplomacy module, and the fact that $\texttt{OCW}$ is a sufficient statistic for geoeonomic factors.

A An autocratic leader

The baseline model treats the leaders of the geopolitical rivals symmetrically, in terms of their objective functions. In this section, we discuss what happens when a country is led by an autocrat, supposedly with a fundamental taste for armed conflicts.

In this extension, the "democratic" country n retains the same objective function as in the baseline model, whereas the "autocratic" country m derives an additional ego rent from waging war against n. The corresponding ex-ante utility cost of wars are therefore given by the following equations:

$$\widetilde{\texttt{UCW}}_n = \texttt{OCW}_n + \tilde{u}_n, \quad (814)$$
$$\widetilde{\texttt{UCW}}_m = \texttt{OCW}_m - \alpha_m + \tilde{u}_m, \quad (815)$$

where α_m denotes the (positive) ego rent which reduces the perceived utility cost of war.[19] This ego rent is assumed to be public information and sufficiently small to ensure that peace remains Pareto-superior to war, i.e. condition (5) holds and $\widetilde{\texttt{UCW}}_n + \widetilde{\texttt{UCW}}_m > 0$ for all realizations of the war shocks. This condition is satisfied whenever $\alpha_m < \texttt{OCW}_n + \texttt{OCW}_m + \min(\tilde{u}_n + \tilde{u}_m)$ with $\min(\tilde{u}_n + \tilde{u}_m) = -\frac{3\eta}{4}$ under the parameterization adopted in Section 2.2. Geometrically, the ego rent shifts the support of the autocrat's utility cost of war to the left along the x-axis, but this shift remains moderate enough so that the hypotenuse of the resulting triangle in Figure 81 never lies in the south-west quadrant, preserving the Pareto-ranking. By contrast, for larger values of α_m, condition (5) may be violated, rendering the set of peace-preserving transfers empty for some realization of war shocks (see footnote 4). In such instances, the compensation required to deter the autocracy from war exceeds the democratic country's willingness to pay, making conflict unavoidable. We assume that α_m is sufficiently small to rule out such cases for the remainder of the analysis.

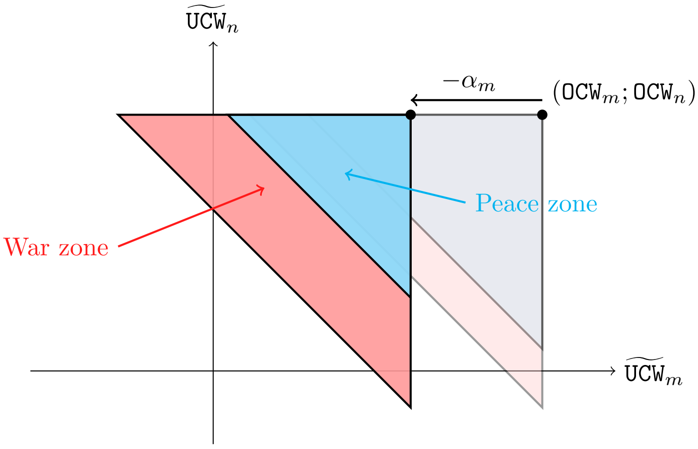
As long as this ego rent is public information across countries, the solution of the bargaining protocol is unchanged, and each country continues to misreport its true cost of war as in equation (8):

$$\widetilde{\texttt{UCW}}^a_n = \frac{2}{3}\widetilde{\texttt{UCW}}_n + \frac{1}{12}\texttt{OCW}_n - \frac{1}{4}\left(\texttt{OCW}_m - \alpha_m\right) \quad \text{and} \quad \widetilde{\texttt{UCW}}^a_m = \frac{2}{3}\widetilde{\texttt{UCW}}_m + \frac{1}{12}\left(\texttt{OCW}_m - \alpha_m\right) - \frac{1}{4}\texttt{OCW}_n.$$

Announcements must be large enough to avoid a negotiation breakdown and the outbreak

[19] The ego rent α_m is distinct from the war-induced TFP loss α, and the two should not be conflated.

Figure 81 – The diplomatic game with an autocratic country m



Notes: $\widetilde{\text{UCW}}_n$ and $\widetilde{\text{UCW}}_m$ are assumed jointly uniformly distributed. Leader in country m is assumed to recover an ego rent α_m in wartime.

of war. This requires that the compatibility condition holds:

$$\frac{1}{4}\left(\text{OCW}_n + \text{OCW}_m - \alpha_m\right) < \widetilde{\text{UCW}}_n + \widetilde{\text{UCW}}_m. \quad (816)$$

Exactly as in the baseline model, this condition is violated when the joint realization of the $\widetilde{\text{UCW}}$s is low. Graphically, the break-even line separating the peace zone (blue) and the war zone (red) in Figure 81 is shifted by less than α_m. As a result, the area of the war zone expands relative to the peace zone. This can be seen formally by computing the new probability of appeasement:

$$s_{nm} = \begin{cases} \frac{(\text{OCW}_n + \text{OCW}_m - \alpha_m)^2}{\eta^2} & \text{if} \quad \text{OCW}_n + \text{OCW}_m - \alpha_m \leq \eta \\ 1 & \text{otherwise.} \end{cases} \quad (817)$$

Thus, the probability of appeasement is strictly lower than in the baseline case: on average, the joint utility cost of war is shifted downward by the value of the ego rent. The true costs of war for both leaders are now given by:

$$\text{TCW}_n = \text{OCW}_n - \frac{\eta}{4} - \frac{1}{4}\frac{\left[\text{OCW}_n + \text{OCW}_m - \alpha_m\right]^2}{\left[\eta + \text{OCW}_n + \text{OCW}_m - \alpha_m\right]} \quad (818)$$

$$\text{TCW}_m = \text{OCW}_m - \alpha_m - \frac{\eta}{4} - \frac{1}{4}\frac{\left[\text{OCW}_n + \text{OCW}_m - \alpha_m\right]^2}{\left[\eta + \text{OCW}_n + \text{OCW}_m - \alpha_m\right]} \quad (819)$$

The peace-keeping cost now reflects the asymmetry in utility costs of war, requiring the democratic leader to compensate further the warlike autocrat who now faces a lower utility cost of entering into war:

$$\text{PKC}_{nm} = \frac{\text{OCW}_n - \text{OCW}_m + \alpha_m}{2}. \quad (820)$$

In this extended model, all geoeconomic factors can still be expressed as functions of sufficient statistics, namely $\{\text{OCW}_n, \text{OCW}_m\}$ and the ego rent parameter α_m. The formulas are actually identical to the baseline ones when expressed with the re-scaled opportunity cost of war of the autocrat: $\texttt{OCW}_m^{\text{autoc}} = \texttt{OCW}_m - \alpha_m$. Since the ego parameter is difficult to measure in the data, we abstract from it in our quantitative exercises. However, it is important to note that this additive ego rent does not affect the marginal welfare effect of trade policy, including the optimal level of decoupling analyzed in section 4.2. As we discuss next, this invariance result extends to any additive shift in utility costs that is both public information and independent of the structure of trade.

B Special interest groups and war for sale

In the presence of special interest groups, leaders may no longer maximize the utility of representative consumers during diplomatic negotiations. In particular, some industries may benefit from war outcomes and thus lobby the government in pursuit of these specific interests. We consider this possibility by extending the model to incorporate lobbying contributions additively in leader of country m's objective function, following Grossman and Helpman (1994). Equation (1) becomes:

$$\begin{aligned} U_m(\text{peace}) &= \beta_m \log \Pi_m(\text{peace}) + \log C_m(\text{peace}) + v_m, \\ \widetilde{U}_m(\text{war}) &= \beta_m \log \Pi_m(\text{war}) + \log C_m(\text{war}) + v_m - \tilde{u}_m, \end{aligned}$$

where β_m denotes the weight placed by country m's leader on the profits of special interest groups, and Π_m represents their real profits in peace and war. The quantitative trade model used in the empirical application assumes perfect competition and constant returns to scale, which implies zero profits. However, a minimal departure from these assumptions—monopolistic competition with constant markups and restricted entry, which belongs to the class of models of Arkolakis et al. (2012)—restores non-zero profits. Under CES monopolistic competition, aggregate profits are proportional to income, regardless of the level of trade barriers (see the NBER working paper version of Arkolakis et al., 2012). Let us consider a situation where the proportionality factor depends on the peace/war situation, such that

$$\Pi_m(\text{peace}) = \omega_m(\text{peace}) C_m(\text{peace}) \quad \text{and} \quad \Pi_m(\text{war}) = \omega_m(\text{war}) C_m(\text{war}),$$

where the ω_m terms capture in a reduced-form way how profits differ between peace and war, reflecting sector-specific demand and supply shifts. For example, the military-industrial complex may experience profit increases in wartime, whereas sectors of non-essential goods (like tourism) typically benefit more in peacetime. Aggregating across sectors, the net effect is ambiguous, so we allow $\omega_m(\text{peace})$ and $\omega_m(\text{war})$ to differ without imposing a specific ranking. Under these assumptions, the ex-ante utility costs of war become:

$$\widetilde{\texttt{UCW}}_n = \texttt{OCW}_n + \tilde{u}_n, \tag{821}$$

$$\widetilde{\texttt{UCW}}_m = \texttt{OCW}_m + \beta_m \left(\texttt{OCW}_m + \log \frac{\omega_m(\text{peace})}{\omega_m(\text{war})} \right) + \tilde{u}_m. \tag{822}$$

As long as the β_m and ω_m parameters are public information, the solution of the bargaining protocol remains identical to the baseline model. Moreover, the diplomatic game unfolds as in the preceding appendix section once we notice the formal equivalence between the

ego rent ($-\alpha_m$) in equation (815) and the special interests $\beta_m \left(\texttt{OCW}_m + \log \frac{\omega_m(\text{peace})}{\omega_m(\text{war})} \right)$ in equation (822). Figure 81 can now be used to illustrate the diplomatic impact of special interests in country m: the depicted leftward shift of the triangle corresponds to a parameter regime in which pro-war interests dominate pro-peace interests such that $\texttt{OCW}_m + \log \omega_m(\text{peace}) < \log \omega_m(\text{war})$.
All geoeconomic factors are given by the baseline model's formulas, using the following rescaled opportunity costs of war:

$$\texttt{OCW}_n^{\text{sp}} \equiv \texttt{OCW}_n, \tag{823}$$

$$\texttt{OCW}_m^{\text{sp}} \equiv \texttt{OCW}_m + \beta_m \left(\texttt{OCW}_m + \log \frac{\omega_m(\text{peace})}{\omega_m(\text{war})} \right). \tag{824}$$

These expressions highlight two geoeconomic effects of special interests. First, they increase the joint opportunity costs of war—through the term $\beta_m \texttt{OCW}_m$—which raises the probability of appeasement. Intuitively, the leaders' objective function now includes profits which decrease in wartime (like real income). This channel is amplified when pro-peace dominate pro-war special interests at the country-level (i.e. when $\omega_m(\text{peace})/\omega_m(\text{war}) > 1$) and is dampened in the opposite case. Second, they affect relative bargaining power and the peace-keeping cost, by modifying the cross-country differential in rescaled opportunity costs. The direction of this effect depends on both the strength of lobbying influence (β_m) and the nature of sectoral interests (pro-peace vs. pro-war, as captured by the ω_m ratio). While a full taxonomy of these effects would yield novel and policy-relevant insights, we leave such an investigation to future work.

In line with the preceding appendix section, we abstract from special interest groups in our quantitative exercises: measuring the β_m and ω_m parameters is empirically challenging; moreover, because lobbying enters additively in equations (821) and (822), it does not affect the marginal effect of trade policy on welfare–including the optimal degree of decoupling analyzed in Section 4.2.

C Who wins the war and military capacities

Our baseline model does not include a defense sector or military capacities, which obviously can influence the outcome of military conflicts. In order to consider how those affect our findings, let us introduce a minimal set of changes to the baseline setup:

1. Countries commit to (exogenous) respective military capacities G_n and G_m before the dispute arises.[20] Both G_n and G_m are publicly observable.
2. We model the probability of winning the war as the CES version of a Contest Success Function of military capacity (Couttenier et al., 2024), such that

$$\mathbb{P}(n \text{ beats } m) = \mathbb{P}\left(\log(G_m) + \varepsilon_m \leq \log(G_n) + \varepsilon_n\right)$$

where ε_n is a military efficiency shock of country n. We assume that this is revealed to both players only after the diplomatic protocol has taken place (and failed). If distributed

[20] This reflects time-to-build constraints on weaponry.

Gumbel, this probability of winning the war simplifies into:

$$\mathbb{P}(n \text{ beats } m) = \frac{G_n^\theta}{G_n^\theta + G_m^\theta},$$

with θ being the shape parameter of the Gumbel distribution. A larger θ means that the random part of military efficiency has low variance, which means that winning a conflict depends critically on military capacities rather than chance.[21]

3. The privately observed war shocks $\tilde{u}_n$ and $\tilde{u}_m$ are suffered in case of a conflict, independently of the outcome on the battlefield.[22]
4. The contest if war happens is about the full appropriation of the opponent's public good. Country n leaves the contest with $v_n + v_m$ if it wins the war, and 0 otherwise. As a result, the expected post-war transfer of the contested good from n to m is given by

$$\begin{aligned} W_{nm} &\equiv [1 - \mathbb{P}(n \text{ beats } m)]v_n - \mathbb{P}(n \text{ beats } m)v_m \\ &= \frac{G_m^\theta v_n - G_n^\theta v_m}{G_n^\theta + G_m^\theta}, \end{aligned} \tag{825}$$

which can be positive or negative.

Under these assumptions, the ex-ante utility cost of war can be decomposed as follows:

$$\begin{aligned} \widetilde{\mathtt{UCW}}_n &= [\log C_n(\text{peace}) + \nu_n] - [\log C_n(\text{war}) + \nu_n - \tilde{u}_n - W_{nm}] \\ &= \mathtt{OCW}_n + W_{nm} + \tilde{u}_n \end{aligned} \tag{826}$$

Like in the preceding extensions, it is convenient to work with a rescaled version of the opportunity cost of war: accordingly we define $\mathtt{OCW}_n^{\text{inc}} \equiv \mathtt{OCW}_n + W_{nm}$ which corresponds to the opportunity cost of war , *inclusive* of the expected post-war transfer of the contested good. By symmetry, we have that $W_{nm} = -W_{mn}$ and $\mathtt{OCW}_m^{\text{inc}} = \mathtt{OCW}_m - W_{nm}$.

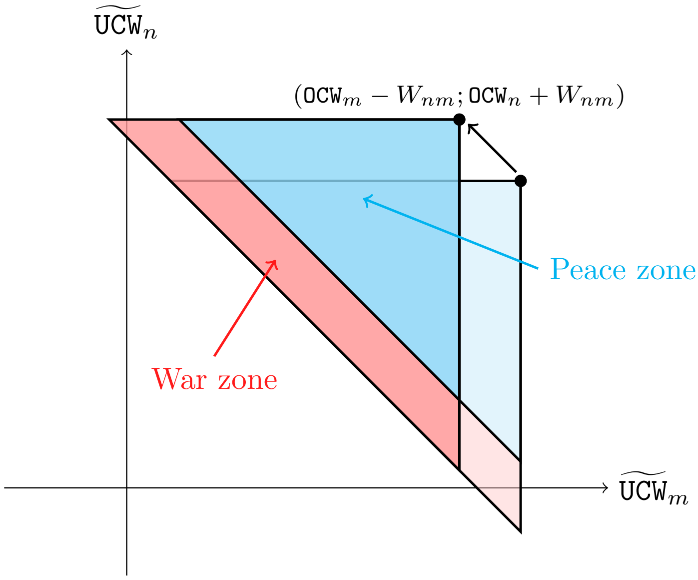
Figure 82 illustrates how the introduction of a post-war transfer of the contested good affects the support of the utility costs of war and the diplomatic game. When $W_{nm} > 0$, the expected post-war transfer from n to m is positive, and $\widetilde{\mathtt{UCW}}_n$ is augmented by the same amount that $\widetilde{\mathtt{UCW}}_m$ is reduced. The new negotiation triangle slides in the North-West direction, compared to the baseline (transparent) one. The structure of the game is therefore the same as in Section 2, since the functional form of (826) expressed with $\mathtt{OCW}_m^{\text{inc}}$ is the same as in (3) and the information structure is identical: $\mathtt{OCW}_n^{\text{inc}}$ being public information, while $\tilde{u}_n$ is privately observed. As a consequence , the second-best protocol remains unchanged, and all geoeconomic factors can still be written as function of two sufficient statistics, $\mathtt{OCW}_n^{\text{inc}}$, and $\mathtt{OCW}_m^{\text{inc}}$. More specifically, the announcement made by each party under the second-best protocol writes:

$$\begin{aligned} \widetilde{\mathtt{UCW}}_n^a &= \frac{3}{4}\mathtt{OCW}_n^{\text{inc}} - \frac{1}{4}\mathtt{OCW}_m^{\text{inc}} + \frac{2}{3}\tilde{u}_n \\ &= \frac{3}{4}\mathtt{OCW}_n - \frac{1}{4}\mathtt{OCW}_m + W_{nm} + \frac{2}{3}\tilde{u}_n, \end{aligned} \tag{827}$$

[21] This means that θ also is the elasticity of winning the war to military capacity. Couttenier et al. (2024) and Alekseev and Lin (2024) estimate this to be around 0.5.

[22] The intuition is that v_n is a material resource at stake during the conflict, while $\tilde{u}_n$ can be seen as the political, psychological and/or social cost of going at war for the population.

Figure 82 – The diplomatic game when country m has higher military capacities



Notes: $\widetilde{\text{UCW}}_n$ and $\widetilde{\text{UCW}}_m$ are assumed jointly uniformly distributed. We assume a positive post-war transfer from n to m, in expectation: $W_{nm} > 0$.

where the second line uses the definition of $\text{OCW}_n^{\text{inc}}$ and the fact that $W_{nm} = -W_{mn}$. The joint announcement compatibility condition to avoid war is still $\left(\widetilde{\text{UCW}}_n^a + \widetilde{\text{UCW}}_m^a\right) > 0$, which writes as

$$\frac{\text{OCW}_n + \text{OCW}_m}{2} + \frac{2(\tilde{u}_n + \tilde{u}_m)}{3} > W_{nm} + W_{mn} = 0.$$

Thus, the set of realization of war shocks $(\tilde{u}_n, \tilde{u}_m)$ that lead to negotiation breakdown is identical to the one of the baseline model, and the probability of escalation is unchanged:

$$s_{nm} = \begin{cases} \frac{(\text{OCW}_n + \text{OCW}_m)^2}{\eta^2} & \text{if} \quad \text{OCW}_n + \text{OCW}_m \leq \eta \\ 1 & \text{otherwise} \end{cases}$$

The peace-compatible transfer is defined as before:

$$\widetilde{T}_{nm} \quad = \quad \frac{\widetilde{\text{UCW}}_n^a - \widetilde{\text{UCW}}_m^a}{2} = \frac{\text{OCW}_n - \text{OCW}_m}{2} + W_{nm} + \frac{\tilde{u}_n - \tilde{u}_m}{3}. \tag{828}$$

And the peace-keeping cost is equal to:

$$\text{PKC}_{nm} = \mathbb{E}\left[\widetilde{T}_{nm} | \text{peace}\right] = \frac{\text{OCW}_n - \text{OCW}_m}{2} + W_{nm}. \tag{829}$$

Compared to the baseline case, when country m is best positioned after the war (a larger and positive W_{nm}), it receives a larger transfer in peacetime, in exchange of agreeing on a peaceful solution. Finally, the true cost of war is also inflated by the post-war transfer:

$$\text{TCW}_n = \mathbb{E}\left[\widetilde{\text{UCW}}_n | \text{war}\right] = \text{OCW}_n + W_{nm} + \mathbb{E}\left[\tilde{u}_n | \text{war}\right], \quad \text{with} \quad \mathbb{E}\left[\tilde{u}_n | \text{war}\right] = -\frac{\eta}{4} - \frac{1}{4}\frac{[\text{OCW}_n + \text{OCW}_m]^2}{[\eta + \text{OCW}_n + \text{OCW}_m]},$$

where the expectation of the war shock $\tilde{u}_n$ conditional on negotiation failure is unchanged compared to the baseline.

The model thus retains its tractability as the geoeconomic factors still depend on a small set of sufficient statistics. Besides $\texttt{OCW}_n$ and $\texttt{OCW}_m$, quantifying this extended model requires a measure of the expected post-war transfer (W_{nm}), which in theory depends on both relative military capacities and the values of the contested public good through equation (825). In the absence of good data on the latter, our quantification exercise neglects this element.

What are the consequences of predetermined military capacity for the design of trade policy? The expected post-war transfer entering additively in equation (826), the level of military capacity has no effect on the marginal welfare impact of trade policy and, consequently, does not influence the optimal degree of decoupling. When trade policy and military spending are instead decided jointly, the leader needs to take into consideration the interdependence of both policies. In particular, decoupling reduces peacetime production and, in consequence, is likely to harm the country's ability to build military capabilities; which in turn decreases the expected post-war transfer. We leave the analysis of these interactions to future work.

9 Equilibrium prices

Under the production function (18) introduced in Section 2.4, the vector of FOB prices changes can be written as:

$$\Delta \log \mathbf{p} = -\Delta \log \mathbf{A} + \Omega' \Delta \log \mathbf{p} + Diag\left(\Omega' \Delta \log \boldsymbol{\tau}\right) + \Omega^{F'} \Delta \log \mathbf{w},$$

where $\mathbf{A}$ denotes the $(G,1)$ vector of productivities, $\mathbf{w}$ the $(F,1)$ vector of external factor prices, and $\boldsymbol{\tau}$ is the (G,G) matrix of trade costs. $Diag(.)$ is the matrix-to-vector diagonal operator, i.e. we keep the diagonal terms of the $\Omega' \Delta \log \boldsymbol{\tau}$ matrix. Solving out for FOB prices implies:

$$\Delta \log \mathbf{p} \quad = \quad \Psi \left[-\Delta \log \mathbf{A} + Diag\left(\Omega' \Delta \log \boldsymbol{\tau}^{rep}\right) + \Omega^{F'} \Delta \log \mathbf{w} \right],$$

where $\Psi = (I - \Omega')^{-1}$ is the cost-based Leontief inverse.

10 OCW and the Geography of Import Sourcing

Under the assumptions on war damages detailed in Section 2.4, equation (22) simplifies into:

$$\begin{aligned} \texttt{OCW}_n \quad &= \quad -\alpha_n \tilde{\pi}_{nn} - \alpha_m \tilde{\pi}_{mn} + \tau^{bil} \left(\pi_{mn} + \breve{\pi}_{mn,n} + \breve{\pi}_{nm,n} \right) \\ &+ \quad \tau^{mul} \left[\sum_{\ell \neq n,m} \left(\pi_{\ell n} + \breve{\pi}_{\ell n,n} + \breve{\pi}_{\ell m,n} + \breve{\pi}_{n\ell,n} + \breve{\pi}_{m\ell,n} \right) \right] \\ &- \quad \sum_{f \in F_n} \tilde{\Lambda}_{fn} \Gamma_f + \sum_{f \in F} \left(\Lambda_{fn} - \tilde{\Lambda}_{fn} \right) \Delta \log w_f, \end{aligned} \tag{1030}$$

where $\pi_{\ell n} \equiv \sum_{i \in G_\ell} b_{in}$ is the consumption share of goods produced in ℓ on n's consumption, $\tilde{\pi}_{\ell n} \equiv \sum_{i \in G_\ell} \lambda_{in}$ measures the overall incidence of these goods on consumption, directly and through input-output relationships. Likewise, $\breve{\pi}_{\ell\ell',n} \equiv \sum_{i \in G_{\ell'}} \lambda_{in} \sum_{l \in G_\ell} \Omega_{li}$ denotes the exposure of country n to trade shocks affecting inputs from ℓ incorporated in goods produced in country ℓ'. Finally, recall that $\Gamma_f \equiv \Delta \log L_f$. This equation has a straightforward quantitative interpretation, with all variables scaled in percentage-points.

In (1030), all components are exogenous, except for the last one, which is scaled by (endogenous) wage adjustments. To recover intuitions about the direction of wage adjustments, one can use the labor-market clearing conditions, which in hat terms can be written as follows:

$$\hat{w}_f \widehat{\overline{L}}_f = \sum_{i \in G} \sum_m \frac{\Omega^F_{fi} y_{im}}{w_f \overline{L}_f} \hat{\Omega}^F_{fi} \hat{y}_{im}$$

where y_{im} denotes the (nominal) sales of firm i in market m, aggregated between final consumers and intermediate consumptions. This equation links wage adjustments to changes in the labor demand of all firms that use factor f, which depend on adjustments to their market potential.

In growth terms:

$$\Delta \log w_f = -\Gamma_f + \log \sum_{i \in G} \sum_m \frac{\Omega^F_{fi} y_{im}}{w_f \overline{L}_f} \hat{\Omega}^F_{fi} \hat{y}_{im} = -\Gamma_f + \log \sum_{i \in G} \sum_m \frac{l_{fi}}{\overline{L}_f} \xi_{im} \hat{\Omega}^F_{fi} \hat{y}_{im}$$

where $\frac{l_{fi}}{\overline{L}_f} = \frac{\Omega^F_{fi} y_i}{w_f \overline{L}_f}$ and $\xi_{im} \equiv \frac{y_{im}}{y_i}$ respectively denote the share of i in the overall demand of factor f and the share of market m in i's sales, both evaluated at the baseline period.

GIS in the absence of IO linkages. To build intuition, it is useful to compare the formula with a simpler world without production linkages and a single firm per country. In such a world, the Leontief inverse is the identity matrix and thus $\tilde{\pi}_{mn} = \pi_{mn}$ and $\breve{\pi}_{\ell\ell',n} = 0$. We further assume that economic and factor damages are symmetric ($\alpha_n = \alpha_m$ and $\Gamma_f = \Gamma$).[23] Finally, we will alleviate notations by considering a single factor of production per country, which we can think of as equipped labor. With a single factor of production, $\tilde{\Lambda}_{fn} = 1$ by definition. Moreover, wage adjustments are transmitted to country n in proportion to the country's exposure to domestic and foreign value added, which is also equal to the consumption share of domestic and foreign goods: $\Lambda_{\ell n} = \sum_{j \in G_\ell} \lambda_{jn} \Omega^F_j = \pi_{\ell n}$.

[23] The assumption that economic damages are equal can be interpreted as symmetry in military power.

Under these assumptions, we have:

$$\texttt{OCW}_n^{\text{noIO}} = -(\Gamma+\alpha) + \pi_{mn}\left(\tau^{bil} + d\log\frac{w_m^{\text{noIO}}}{w_n^{\text{noIO}}}\right) + \sum_{\ell\neq m,n}\pi_{\ell n}\left(\alpha + \tau^{mul} + d\log\frac{w_\ell^{\text{noIO}}}{w_n^{\text{noIO}}}\right) \tag{1031}$$

$$s_{nm}^{\text{noIO}} = \min\left\{1; \frac{1}{\eta^2}\left[-2(\Gamma+\alpha) + \tau^{bil}(\pi_{mn}+\pi_{nm}) + (\alpha+\tau^{mul})\left(\sum_{\ell\neq m,n}(\pi_{\ell n}+\pi_{\ell m})\right) + (\pi_{mn}-\pi_{nm})\Delta\log\frac{w_m^{\text{noIO}}}{w_n^{\text{noIO}}} + \sum_{\ell\neq m,n}\left(\pi_{\ell n}\Delta\log\frac{w_\ell^{\text{noIO}}}{w_n^{\text{noIO}}} + \pi_{\ell m}\Delta\log\frac{w_\ell^{\text{noIO}}}{w_m^{\text{noIO}}}\right)\right]^2\right\} \tag{1032}$$

$$\texttt{PKC}_{nm}^{\text{noIO}} = \frac{1}{2}\left[\tau^{bil}(\pi_{mn}-\pi_{nm}) + (\alpha+\tau^{mul})\left(\sum_{\ell\neq m,n}(\pi_{\ell n}-\pi_{\ell m})\right) + (\pi_{mn}+\pi_{nm})\Delta\log\frac{w_m^{\text{noIO}}}{w_n^{\text{noIO}}} + \sum_{\ell\neq m,n}\left(\pi_{\ell n}\Delta\log\frac{w_\ell^{\text{noIO}}}{w_n^{\text{noIO}}} - \pi_{\ell m}\Delta\log\frac{w_\ell^{\text{noIO}}}{w_m^{\text{noIO}}}\right)\right] \tag{1033}$$

Moreover, one can recover a standard labor-market clearing condition linking wage adjustments to changes in domestic firms' real market potential, used as a fixed point equation to solve for wages:

$$\hat{w}_n^{\text{noIO}}\widehat{\overline{L}}_n = \sum_\ell \xi_{n\ell}\hat{\pi}_{n\ell}\hat{w}_\ell^{\text{noIO}}\widehat{\overline{L}}_\ell$$

with $\xi_{n\ell}$ the share of market ℓ in total sales of firms in country n and $\hat{\pi}_{n\ell}$ capturing adjustments in the market share of n's firms in country ℓ. A standard assumption in trade models, which we later use in our calibration, is of CES preferences vis-à-vis different final consumption goods. Under this assumption, $\hat{\pi}_{n\ell} = \left(\frac{\hat{\tau}_{n\ell}\hat{w}_n}{\hat{A}_n\hat{P}_\ell}\right)^{1-\sigma}$ where σ is the elasticity of substitution. Using an approximation that is valid for small enough adjustments, the equation finally simplifies into:

$$\sigma\Delta\log w_n^{\text{noIO}} = -\Gamma_n + (\sigma-1)\alpha_n + \sum_\ell \xi_{n\ell}\left[(1-\sigma)\Delta\log\tau_{n\ell} + (\sigma-1)\Delta\log P_\ell + \Delta\log w_\ell^{\text{noIO}} + \Gamma_\ell\right]$$

Noting $\Delta\log B_\ell \equiv (\sigma-1)\Delta\log P_\ell + \Delta\log w_\ell^{\text{noIO}} + \Gamma_\ell$ the aggregate demand adjustment in country ℓ, we can use this equation to gather insights about the relative change in wages between belligerent countries:

$$d\log\frac{w_m^{\text{noIO}}}{w_n^{\text{noIO}}} = -(\xi_{mn}-\xi_{nm})\frac{\sigma-1}{\sigma}\tau^{bil} - (\xi_{nn}+\xi_{nm}-\xi_{mm}-\xi_{mn})\frac{\sigma-1}{\sigma}\tau^{mul} + \frac{1}{\sigma}\sum_\ell(\xi_{m\ell}-\xi_{n\ell})\Delta\log B_\ell \tag{1034}$$

and between belligerent and third-countries:

$$d \log \frac{w_n^{\text{noIO}}}{w_o^{\text{noIO}}} = -\frac{1}{\sigma}\Gamma + \frac{\sigma-1}{\sigma}\alpha - \xi_{nm}\frac{\sigma-1}{\sigma}\tau^{bil} - (1-\xi_{on}-\xi_{om}-\xi_{nn}-\xi_{nm})\frac{\sigma-1}{\sigma}\tau^{mul} + \frac{1}{\sigma}\sum_{\ell}(\xi_{n\ell}-\xi_{o\ell})\Delta \log B_\ell \tag{1035}$$

From equation (1034), we see that wage adjustments in the belligerent countries cancel each other if and only if their export portfolios are symmetric. This is no longer the case whenever the belligerent countries display heterogeneous export shares. Everything else equal, a country's relative dependence on it rival's demand ($\xi_{mn} > \xi_{nm}$) thus exerts negative pressure on its wage, through a larger exposure to trade disruptions that depresses labor demand. For the same reason, a country that is relatively more opened to trade ($\xi_{mm} < \xi_{nn}$) is more exposed to multilateral trade disruptions, which exerts negative pressure on its wages in wartime. Finally, heterogeneous exposures to individual destinations depress wages in the country that is relatively more exposed to countries which aggregate demand is more severely affected by the war shock. Likewise, equation (1035) implies that human losses exert a positive impact on the relative wage of belligerent countries, compared to the rest of the world, when productivity losses and trade disruptions instead push relative wages down.

Equations (1031) and (1032) convey insights for the mechanisms already present in Martin et al. (2008). A country's trade openess has ambiguous effects on the opportunity cost of wars. On the one hand, more opened countries (with high $\sum_{\ell \neq m,n} \pi_{\ell n}$) suffer less from domestic economic damages, as foreign sourcing serves as a consumption insurance. The decrease in wartime productivity leads to an increase in the relative price of domestically-produced goods, which effect is attenuated through substitution away from domestic consumption. However, trade integration increases the country's exposure to trade logistics disruption affecting the belligerent country (proportionally to π_{mn}) and the rest of the world (in proportion to $\sum_{\ell \neq m,n} \pi_{\ell n}$). The impact of trade integration on exposure to domestic and foreign shocks is somewhat counteracted by general-equilibrium wage adjustments as exposure to negative shocks exert downward pressures on relative wages, through their effect on the labor demand. Finally, the direct impact of factor losses (Γ) cannot be diversified through international markets, and thus does not depend to the first order on the structure of trade dependencies.

As the opportunity cost of war is unambiguously increasing in bilateral trade dependencies, the probability of appeasement (s_{nm}^{noIO}) also rises with bilateral trade shares $(\pi_{mn} + \pi_{nm})$, i.e. bilateral sourcing facilitates diplomacy. Instead, multilateral openness goes against it, if economic damages are large in comparison with multilateral disruptions ($-\alpha > \tau^{mul}$).[24] One direct implication of this result is that the impact of regional and multilateral trade liberalization on the prevalence of war can differ significantly. While RTAs may lower the incidence of regional conflicts, they may increase conflict with other regions. On the other hand, multilateral trade liberalization may lead to an increase in the occurrence of bilateral conflicts.

[24] The assumption that $-\alpha > \tau^{mul}$ implies that economic damages overturn the disruption of multilateral trade. MMT originally derived this theoretical prediction in a less general modeling setup. Empirical tests of the prediction have been performed in several papers, which are surveyed in Thoenig (2024).

Finally, equation (1033) underlines the consequences of *asymmetric* trade dependencies on diplomacy. Everything else equal, these asymmetries lead to a transfer from the most to the least trade dependent country, i.e. $\mathtt{PKC}^{\text{noIO}}_{nm}$ is increasing in the difference between the share of country m's products in country n's consumption and the reliance of m on country produced in n $(\pi_{mn} - \pi_{nm})$. Countries that are more reliant on foreign products have a stronger incentive to maintain peace, which forces them to compensate their foreign partners in order to maintain peace. This last conflict-related consequence of trade interdependence was not modeled in Martin et al. (2008).

Impact of global sourcing. The comparison of $\mathtt{OCW}^{\text{noIO}}_{n}$ and $\mathtt{OCW}_{n}$ shows the influence of input-output linkages. While the qualitative insights are left unchanged, the full impact of economic damages and trade logistic disruptions will tend to be amplified through their indirect effect on all production costs. As a consequence, the opportunity cost of wars is magnified by input-output relationships. On the other hand, the impact of trade integration may be bigger or smaller depending on the geography of production networks, summarized in the vector of Domar weights.

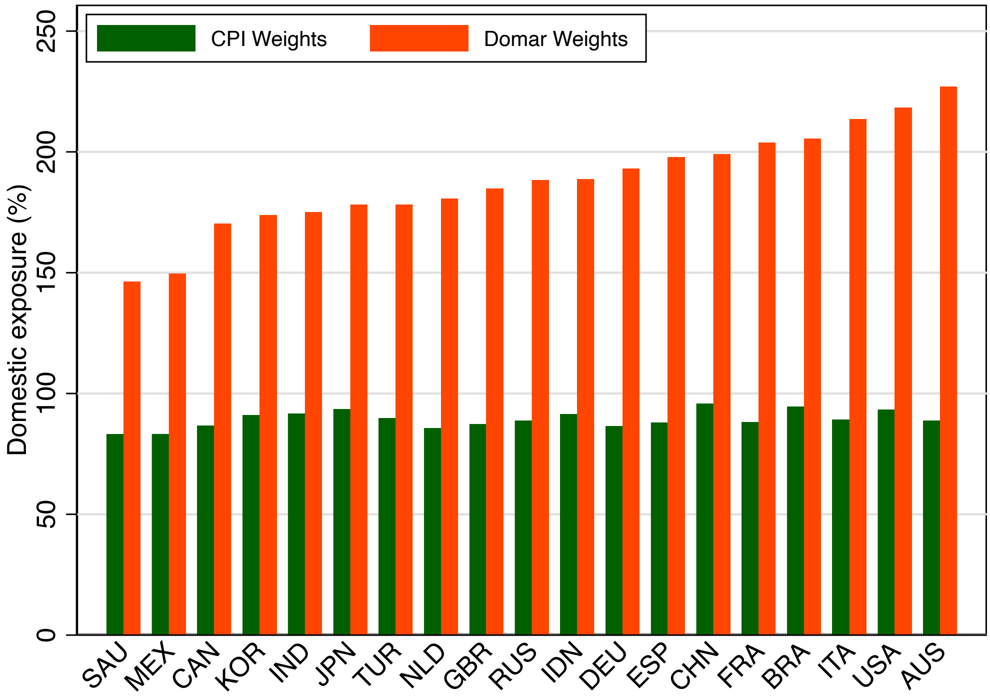
To provide an idea for the magnitude of the size of the amplification through IO networks, Figure 103 compares the sum of Domar weights for domestically-produced goods for the 20 largest economies in the world, in the full model and in the counterfactual world without any IO amplification (i.e. $\breve{\pi}_{nn}$ against π_{nn}).[25] As emphasized by the comparison of $\mathtt{OCW}_{n}$ and $\mathtt{OCW}^{\text{noIO}}_{n}$, these shares interpret as the elasticity of $\mathtt{OCW}$ to domestic productivity shocks. Without IO amplification, a domestic productivity shock translates to the real GDP in proportion to the contribution of domestic products in consumption (π_{nn}). In the data, this contribution lies between .62 and .96 and thus the direct elasticity of real GDP to domestic TFP shock is around .8. With IO amplification, the elasticity is substantially larger, between 1.10 and 2.71.

Likewise, Figure 104 compares the incidence of trade cost shocks, in the full model and without IO. The interpretation is the incidence of a 1% shock on all bilateral trade costs. Without IO linkages, this is equal to the share of non-domestic products in consumption $(1 - \pi_{nn})$. With IO linkages, there is an amplification through the indirect incidence of the shock on the whole vector of prices (including domestic prices), captured by $\sum_{\ell \neq n}(\pi_{\ell n} + \breve{\pi}_{mn,n} + \breve{\pi}_{nm,n})$. Quantitatively, the amplification represents between one third and 80% of the overall exposure of countries to trade shocks. With IO linkages, a 1% multilateral trade cost shock has an impact on countries in Figure 104 which varies between 12% for China to 42% for the Netherlands.

Finally, Figure 105 shows estimates of the bilateral dependence, for a subset of the 30 most dependent country pairs. Again, the figure compares the full model ("Domar weights", $\pi_{mn} + \breve{\pi}_{mn}$) with the counterfactual without IO linkages ("CPI weights", π_{mn}). Here, the interpretation is in terms of the elasticity of a country's real GDP to a 1% productivity shock affecting all sectors in its partner's country. The highest effect is found for the Irish exposure to US-specific trade cost shocks, at .40. The difference with and without IO linkages is sizeable because countries that tend to trade more together, also have more intertwined IO relationships which amplifies the direct effect of any foreign shock.

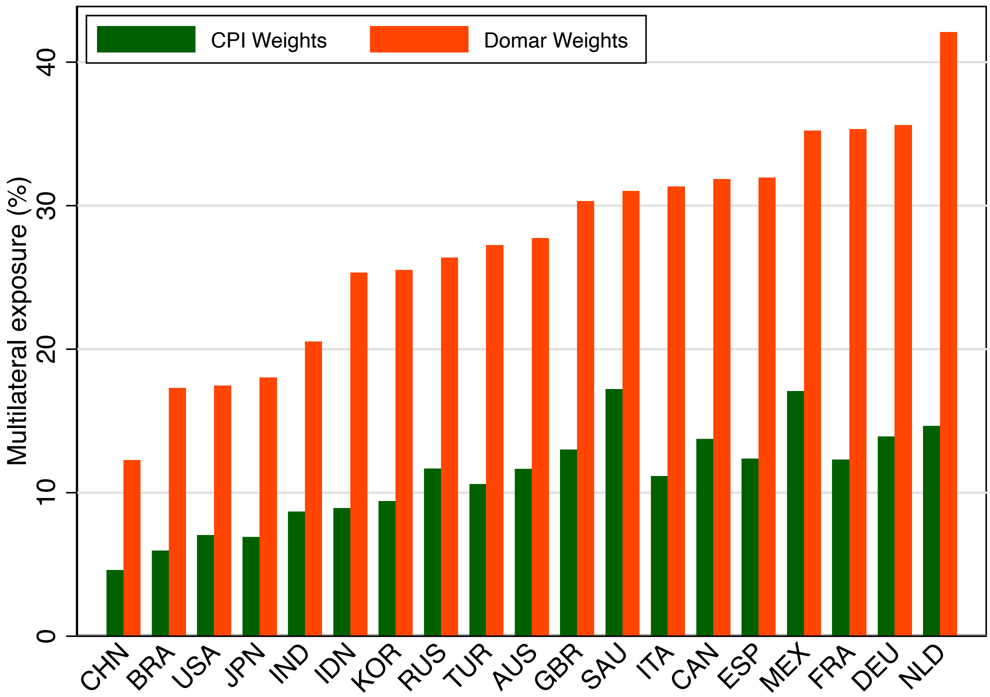
[25] Here, we use data from the OECD-TiVA database, for the year 2018, which we also use in the baseline calibration of the parameterized model as explained in Appendix 12.

Figure 103 – Incidence of domestic productivity shocks: Full model and counterfactual without IO amplification



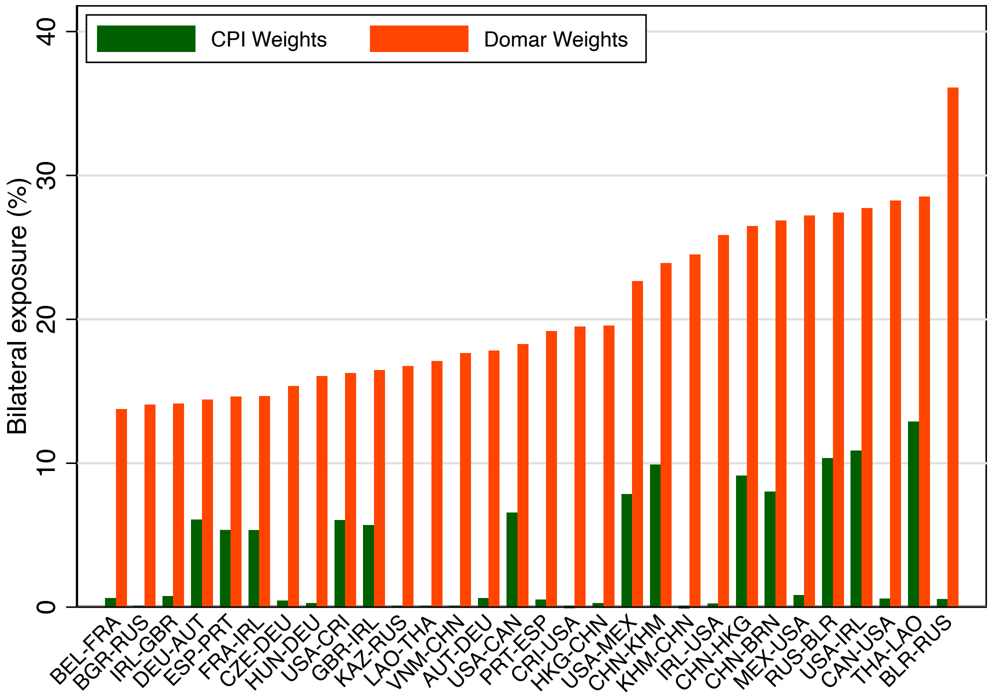
Notes: The figure compares the elasticity of real GDP to productivity shocks, in the full model ("Domar weights") and in a counterfactual without IO linkages ("CPI weights"). "CPI weights" is simply defined as the sum of b_{int} weights, across domestically produced goods (π_{nn}). Likewise, "Domar weights" is the sum of Domar weights λ_{in} across domestically produced goods ($\tilde{\pi}_{nn}$). Source: TiVA, 2018. The figure is restricted to the 20 largest economies in the world.

Figure 104 – Incidence of foreign shocks: Full model and counterfactual without IO amplification



Notes: The figure compares the elasticity of real GDP to uniform trade cost shocks, in the full model ("Domar weights") and in a counterfactual without IO linkages ("CPI weights"). "CPI weights" is simply defined as the sum of b_{int} weights, across foreign produced goods $(1-\pi_{nn})$. The "Domar weights" term is defined as $\sum_{\ell \neq n}(\pi_{\ell n} + \breve{\pi}_{\ell n,n})$. Source: TiVA, 2018. The figure is restricted to the 20 largest economies in the world.

Figure 105 – Incidence of bilateral shocks: 30 most dependent pairs



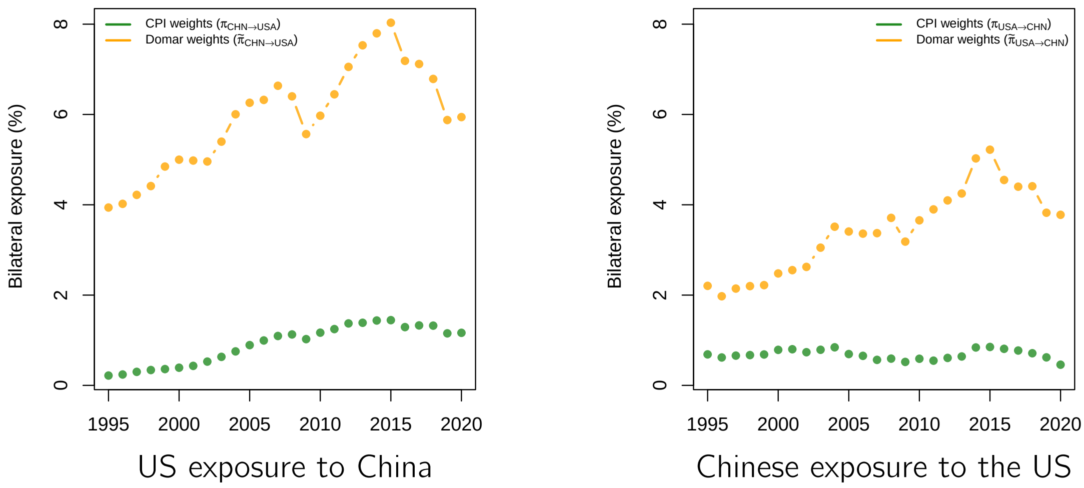
Notes: The figure shows the elasticity of real GDP to a bilateral trade cost shock, among the 30 most dependent country pairs in the data. Dependence is measured by bilateral Domar weights ("Domar weights", defined as $\pi_{mn} + \breve{\pi}_{mn}$) and in terms of "CPI weights" (π_{mn}. Source: TiVA, 2018.

As an illustration of the evolution of amplification forces, Figure 106(a) compares the US direct exposure to Chinese shocks (a 1% productivity increase) through final consumption (green dots) and the country's overall exposure, through direct and indirect trade (orange dots). Compared to a world without input-output linkages, the US exposure to Chinese shocks is more than three times higher in 2020. This multiplicative factor is also quite high and increasing over time in the other direction. Although trade in intermediates does not affect the qualitative relationship between trade and geoeconomic factors, accounting for the development of global value chains since the mid-1990s is quantitatively important.

11 Parametric assumptions of the simulated trade model

In this section, we parametrize the model in section 2.3 in a way that is amenable to calibration with global IO data. The world is composed of a set N of countries and J sectors. Countries are indexed by m and n, sectors by i and j. Each sector×country is composed of a representative firm that produces out of domestic value added and inputs. The sector×country pairs are thus the data counterpart of the producers $i \in G$ in the general model. Countries trade both intermediate and final goods. The notation follows the convention that the first subscript always denotes the exporting (source) country, and the second subscript the importing (destination) country. Finally, the set of factors is restricted to one factor per country, which we interpret as equipped labor. Labor is perfectly mobile across sectors and immobile across countries.

Figure 106 – Amplification of a 1% productivity shock along value chains



Notes: The figure compares the contribution of Chinese products to US final consumption ("CPI weights") and the overall exposure of the US to Chinese products, directly or indirectly through value chains ("Domar weights"). Source: TiVA.

Households. There is a household of size $\overline{L}_n$ in country n. The final consumption aggregate is a CES aggregator of goods j, with expenditure shares $\vartheta_{n,j}$:

$$C_n = \left[\sum_j \vartheta_{n,j}^{\frac{1}{\theta}} C_{n,j}^{\frac{\theta-1}{\theta}}\right]^{\frac{\theta}{\theta-1}},$$

where $C_{n,j}$ is final consumption of sector j. Therefore, the ideal consumption price index is:

$$P_n = \left[\sum_j \vartheta_{n,j} P_{n,j}^{1-\theta}\right]^{\frac{1}{1-\theta}}, \tag{1136}$$

where $P_{n,j}$ is the price index of sector j goods in country n.

Each sector's consumption is an Armington aggregate of origin-specific components:

$$C_{n,j} = \left[\sum_m \mu_{mn,j}^{\frac{1}{\sigma_j}} c_{mn,j}^{\frac{\sigma_j-1}{\sigma_j}}\right]^{\frac{\sigma_j}{\sigma_j-1}},$$

where $c_{mn,j}$ is final consumption in country n of sector j imports from country m. Then the price index for sector j consumption in country n is:

$$P_{n,j} = \left[\sum_m \mu_{mn,j} P_{mn,j}^{1-\sigma_j}\right]^{\frac{1}{1-\sigma_j}},$$

where $P_{mn,j}$ is the price index for exports from m to n in sector j, defined below.

The final expenditure in n on goods coming from country m sector j is:

$$
\begin{aligned}
P_{mn,j}c_{mn,j} &= \frac{\mu_{mn,j}P_{mn,j}^{1-\sigma_j}}{P_{n,j}^{1-\sigma_j}}\frac{\vartheta_{n,j}P_{n,j}^{1-\theta}}{P_n^{1-\theta}}w_n\overline{L}_n \\
&= \pi^c_{mn,j}\pi^c_{n,j}w_n\overline{L}_n
\end{aligned}
$$

where $\pi^c_{mn,j}$ denotes the share of country m in the consumption of sector j by consumers located in n and $\pi^c_{n,j}$ is the share of sector j in their overall (nominal) consumption. The product of $\pi^c_{n,j}$ and $\pi^c_{mn,j}$ corresponds to the CPI weight b_{jn} in the general model of section 2.3.

Firms. The representative firm in each sector faces downward-sloping demand and sets price equal to a constant markup over the marginal cost.[26] The representative firm in sector j located in m faces an iceberg cost $\tau_{mn,j}$ to export to n. $A_{m,j}$ denotes total factor productivity. The production functions involves a quantity $l_{m,j}$ of equipped labor and a bundle of inputs $X_{m,j}$:

$$
q_{m,j} = A_{m,j}\left[\alpha_{m,j}^{\frac{1}{\lambda}}l_{m,j}^{\frac{\lambda-1}{\lambda}} + (1-\alpha_{m,j})^{\frac{1}{\lambda}}X_{m,j}^{\frac{\lambda-1}{\lambda}}\right]^{\frac{\lambda}{\lambda-1}},
$$

where $\alpha_{m,j}$ is a parameter governing the firm's labor share. The intermediate input bundle writes:

$$
X_{m,j} = \left[\sum_i \gamma_{m,ij}^{\frac{1}{\omega}}X_{m,ij}^{\frac{\omega-1}{\omega}}\right]^{\frac{\omega}{\omega-1}},
$$

where $X_{m,ij}$ is the use of inputs from sector i by firm j in country m, and $\gamma_{m,ij}$ is the parameter governing the use of inputs sourced from sector i. $X_{m,ij}$ is again a CES aggregator of country-specific flows:

$$
X_{m,ij} = \left[\sum_n \beta_{nm,ij}^{\frac{1}{\sigma_j}}x_{nm,ij}^{\frac{\sigma_j-1}{\sigma_j}}\right]^{\frac{\sigma_j}{\sigma_j-1}}.
$$

Note that we assume that the sector-specific elasticity of substitution across countries is the same in intermediate and final consumption (σ_j). Sectoral elasticities are later calibrated with trade elasticities, that do not distinguish between final and intermediate good trade flows.

It follows that the cost of the input bundle is

$$
P^I_{m,j} = \left[\alpha_{m,j}w_m^{1-\lambda} + (1-\alpha_{m,j})\left(P^X_{m,j}\right)^{1-\lambda}\right]^{\frac{1}{1-\lambda}}, \tag{1137}
$$

[26] The general model presented in main text has marginal cost pricing. This is immaterial for the log changes that drive all equilibrium relationships in our theory.

and the sector-specific cost of intermediate inputs $P^X_{m,j}$ is given by:

$$P^X_{m,j} = \left[\sum_i \gamma_{m,ij}\, {P^X_{m,ij}}^{1-\omega}\right]^{\frac{1}{1-\omega}}.$$

where

$$P^X_{m,ij} = \left[\sum_n \beta_{nm,ij}\, {P_{nm,i}}^{1-\sigma_j}\right]^{\frac{1}{1-\sigma_j}}.$$

The equilibrium price set by the representative firm in sector j, country m is

$$P_{nm,j} = \frac{\sigma_j}{\sigma_j - 1}\frac{\tau_{nm,j}P^I_{n,j}}{A_{n,j}} \tag{1138}$$

Equilibrium. Market clearing for exports from m to n in sector j is:

$$\begin{aligned} y_{mn,j} = {} & \pi^c_{mn,j}\pi^c_{n,j}\left[w_n\overline{L}_n + \Pi_n\right] \\ & + \sum_i \frac{\sigma_i - 1}{\sigma_i}(1-\pi^l_{n,i})\pi^M_{mn,ij}\pi^M_{n,ij}\sum_k y_{nk,i}, \end{aligned} \tag{1139}$$

where $\pi^l_{n,i}$, $\pi^M_{n,ij}$ and $\pi^M_{mn,ij}$ are sectoral expenditure shares on labor and inputs, respectively:

$$\pi^l_{n,i} = \frac{\alpha_{n,i}w_n^{1-\lambda}}{\alpha_{n,i}w_n^{1-\lambda} + (1-\alpha_{n,i})\left(P^X_{n,i}\right)^{1-\lambda}}$$

$$\pi^X_{n,ij} = \frac{\gamma_{n,ij}\, {P^X_{n,ij}}^{1-\omega}}{\sum_i \gamma_{n,ij}\, {P^X_{n,ij}}^{1-\omega}},$$

$$\pi^X_{mn,ij} = \frac{\beta_{mn,ij}P^{1-\sigma_j}_{mn,i}}{\sum_m \beta_{mn,ij}P^{1-\sigma_j}_{mn,i}}.$$

In equation (1139), the first line is the final demand, and the second is the intermediate demand. Note that the intermediate demand is a summation of sectoral intermediate demands, and thus captures the notion that not all sectors will import inputs from a particular foreign sector-country with the same intensity. The factor shares map with the cost-based input-output matrix in section 2.3:

$$\Omega_{mn,ij} \equiv \pi^X_{n,ij} * \pi^X_{mn,ij} * (1-\pi^l_{n,i}), \quad \Omega^F_{n,i} \equiv \pi^l_{n,i}.$$

Finally, total labor compensation in the sector writes:

$$w_n L_{n,j} = \frac{\sigma_j - 1}{\sigma_j}\pi^l_{n,j}\sum_m y_{nm,j}$$

which implies the following labor market clearing condition:

$$w_n \overline{L}_n = \sum_j \frac{\sigma_j - 1}{\sigma_j} \pi^l_{n,j} \sum_m y_{nm,j}. \tag{1140}$$

The system of equations (1138), (1139), and (1140) defines equilibrium wages, prices, and expenditures.

12 Responses to shocks

We now turn to describe how this economy reacts to various types of shocks and how we implement those in practice in our numerical algorithm.

A A shock formulation of the model.

We start by re-writing the general equilibrium of the model in proportional change relative to pre-shock values, and denote that change with $\hat{x} = x/x_0$.

- The product market clearing equation (1139) can be written as:

$$y_{mn,j,0}\hat{y}_{mn,j} = \hat{\pi}^c_{mn,j}\hat{\pi}^c_{n,j}\left[\hat{w}_n\hat{\overline{L}}_n s^L_{n,0} + \hat{\Pi}_n s^{\Pi}_{n,0}\right]\pi^c_{mn,j,0}\pi^c_{n,j,0}P_{n,0}C_{n,0} + \sum_i \frac{\sigma_i - 1}{\sigma_i}\pi^M_{n,ji,0}\pi^M_{mn,ji,0}(1-\pi^l_{n,i,0}\hat{\pi}^l_{n,i})\hat{\pi}^M_{n,ji}\hat{\pi}^M_{mn,ji}\sum_k \hat{y}_{nk,i}y_{nk,i,0}, \tag{1241}$$

  where $s^L_{n,0}$ is the pre-shock share of labor (/ factor payments) in the total final consumption expenditure, and $s^{\Pi}_{n,0}$ is the share of profits.
- The labor market clearing equation (1140), once expressed in terms of proportional changes, becomes:

$$\sum_j \sum_k \frac{\sigma_j - 1}{\sigma_j}\frac{\pi^l_{n,j,0}y_{nk,j,0}}{w_{n,0}\overline{L}_{n,0}}\left[\widehat{\pi}^l_{n,j}\widehat{y}_{nk,j} - \widehat{w}_n\widehat{\overline{L}}_n\right] = 0. \tag{1242}$$

- Changes in prices are:

$$\widehat{P}_{mn,j} = \widehat{\tau}_{mn,j}\widehat{P}^{I}_{m,j}\widehat{A}^{-1}_{m,j}, \tag{1243}$$

$$\widehat{P}_{n,j} = \left[\sum_{m}\widehat{P}^{1-\sigma_j}_{mn,j}\pi^{c}_{mn,j,0}\right]^{\frac{1}{1-\sigma_j}}, \tag{1244}$$

$$\widehat{P}_{n} = \left[\sum_{j}\widehat{P}^{1-\theta}_{n,j}\pi^{c}_{n,j,0}\right]^{\frac{1}{1-\theta}}. \tag{1245}$$

$$\widehat{P}^{I}_{m,j} = \left[\pi^{l}_{m,j,0}\widehat{w}^{1-\lambda}_{m} + (1-\pi^{l}_{m,j,0})\left(\widehat{P}^{M}_{m,j}\right)^{1-\lambda}\right]^{\frac{1}{1-\lambda}}, \tag{1246}$$

$$\widehat{P}^{X}_{m,j} = \left[\sum_{i}\pi^{M}_{m,ij,0}\ \widehat{P}^{M}_{m,ij}{}^{1-\omega}\right]^{\frac{1}{1-\omega}}, \tag{1247}$$

$$\widehat{P}^{X}_{m,ij} = \left[\sum_{n}\pi^{M}_{nm,ij,0}\widehat{P}^{1-\sigma_j}_{nm,i}\right]^{\frac{1}{1-\sigma_j}}, \tag{1248}$$

- Finally, the equations above require knowing adjustements in trade shares (π's). These can be expressed as:

$$\hat{\pi}^{c}_{mn,j} = \frac{\widehat{P}^{1-\sigma_j}_{mn,j}}{\sum_m \widehat{P}^{1-\sigma_j}_{mn,j}\pi^{c}_{mn,j,0}}, \tag{1249}$$

$$\hat{\pi}^{c}_{n,j} = \frac{\widehat{P}^{1-\theta}_{n,j}}{\sum_j \widehat{P}^{1-\theta}_{n,j}\pi^{c}_{n,j,0}}, \tag{1250}$$

$$\hat{\pi}^{l}_{m,j} = \frac{\widehat{w}^{1-\lambda}_{m}}{\pi^{l}_{m,j,0}\widehat{w}^{1-\lambda}_{m} + (1-\pi^{l}_{m,j,0})\left(\widehat{P}^{X}_{f,m,j}\right)^{1-\lambda}}, \tag{1251}$$

$$\hat{\pi}^{X}_{m,ij} = \frac{\widehat{P}^{X}_{m,ij}{}^{1-\omega}}{\sum_i \pi^{X}_{m,ij,0}\ \widehat{P}^{X}_{m,ij}{}^{1-\omega}}. \tag{1252}$$

$$\hat{\pi}^{X}_{nm,ij} = \frac{\widehat{P}^{1-\sigma_j}_{nm,i}}{\sum_n \pi^{X}_{nm,ij,0}\widehat{P}^{1-\sigma_j}_{nm,i}}. \tag{1253}$$

B Definition of war damages

In our baseline experiment, a war involves the following damages:

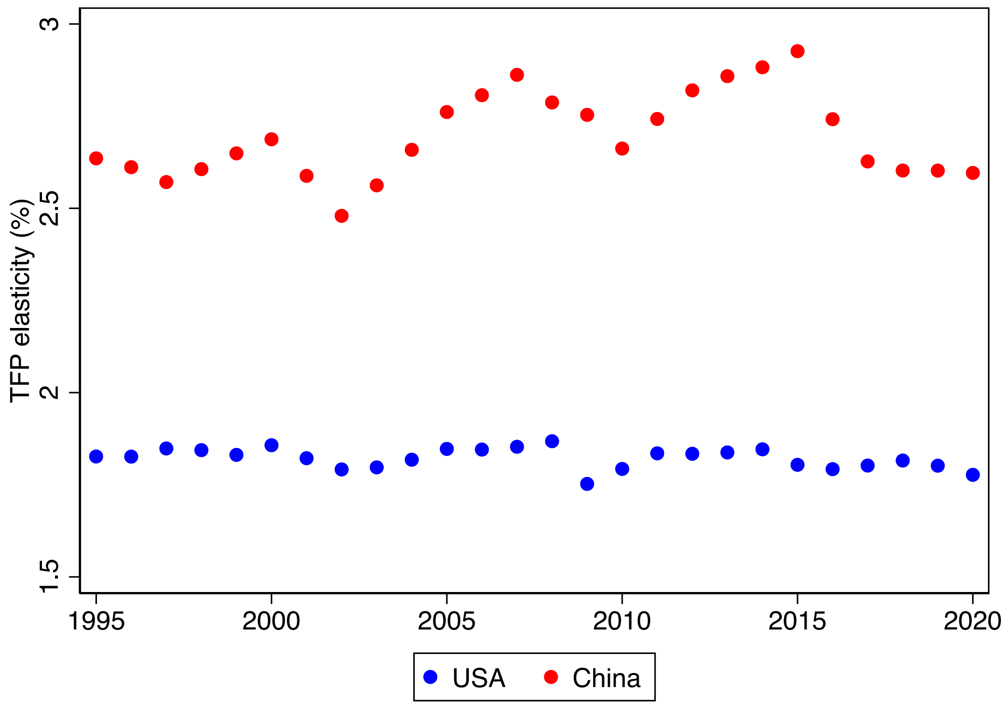
1. Economic damages: Economic damages are calibrated using estimates recovered by Federle et al. (2024) using 150 years of data on large interstate wars. Our target is a 13% contraction in real output, which corresponds to the discounted value of the dynamic adjustment recovered in their Figure 5. The average 13% real output contraction is implemented using country-specific TFP shocks, to take into account

the fact that TFP losses have heterogeneous consequences on countries that differ by their integration in world trade:

$$\alpha_\ell = \log \hat{A}_{\ell,j} = \frac{13}{\varepsilon_\ell^{TFP}}, \quad \forall j \quad \text{and} \quad \ell = m, n$$

where ε_ℓ^{TFP} measures the real GDP response of the ℓ economy to a uniform 1% shock to sectoral TFPs. Figure 127 illustrates the heterogeneity in TFP elasticities using the US and China as an example.

Figure 127 – Elasticity of real output to a 1% TFP loss: US and China over 1995-2020



2. Human damages: In the baseline calibration, human losses are neglected, i.e.

$$\Gamma = \log \widehat{\overline{L}}_\ell = 0, \quad \ell = m, n.$$

When the leader's utility function involves the (log of) real consumption, human losses have a one-to-one effect on the opportunity cost of wars, whatever the structure of world trade.

3. Trade disruptions: The trade disruption parameters are retrieved from Glick and Taylor (2010) who analyze a sample covering the two world wars. Their gravity estimates indicate that trade between belligerent countries declines by 85% compared to gravity-predicted trade, and by 12% with neutral countries. As a consequence, we simulate the following change in iceberg trade costs:

$$\tau_{\text{mul}} = \log \hat{\tau}_{m\ell,j} = \log \hat{\tau}_{\ell m,j} = \frac{1}{1-\sigma_j} * (-.12), \quad \forall j, \ \ell \notin \{m, n\}.$$

$$\tau_{\text{bil}} = \log \hat{\tau}_{mn,j} = \log \hat{\tau}_{nm,j} = \frac{1}{1-\sigma_j} * (-.85), \quad \forall j$$

This set of parameters is sufficient for estimating OCWs. However, in order to calculate the other geoeconomic factors, one needs to calibrate one additional parameter, η, that represents informational noise in diplomatic negotiations. This parameter is used as a free parameter, to target the probability of de-escalation in the baseline (factual) equilibrium. We compare results recovered from an increasingly insecure world, in which the probability of de-escalation in the baseline equilibrium varies from 1 to .6.

13 Additional results

Figure 138 – Evolution of Chinese imports by continent

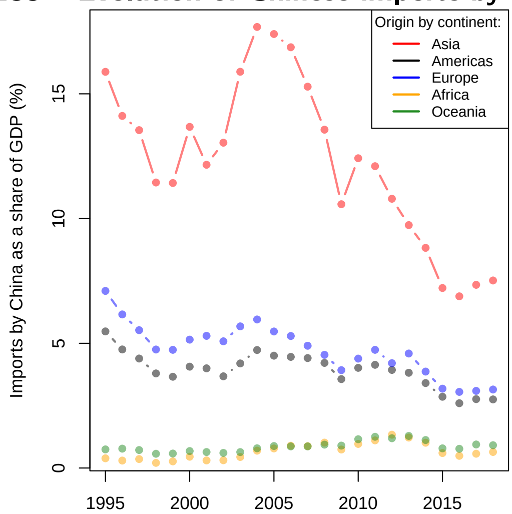


Table 131 – Expenditure shares, 2018 vs USA derisking (25%) wrt CHN

Exporter / Importer	USA	China	RoNafta	RoW
		Flows 2018		
USA	91.50	1.68	1.64	5.18
CHN	0.49	94.58	0.11	4.82
RoNAFTA	8.72	3.29	81.11	6.89
RoW	1.38	2.23	0.21	96.19
		Derisking counterfactual		
USA	91.84	0.57	1.75	5.84
CHN	0.41	95.09	0.10	4.40
RoNAFTA	8.39	3.73	80.72	7.16
RoW	1.27	2.43	0.20	96.10

Figure 139 – Evolution of US and Chinese wages: Unilateral US increase in tariffs ($s_{2018} = 1$)