The Fragmentation Paradox: De-risking Trade and Global Safety *

Thierry Mayer† Isabelle Méjean ‡ Mathias Thoenig§

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PRELIMINARY, INCOMPLETE, NOT FOR QUOTATION

Abstract

We develop a model of international trade and interstate war that integrates a quantitative model of trade with a diplomatic game of escalation to conflict. Bilateral disputes over a state-controlled public good arise exogenously and belligerent countries engage in diplomatic negotiations to attempt to resolve the disputes peacefully. In equilibrium, all the welfare-relevant geoeconomic factors—such as the costs of war, the cost of concessions required to avert war, and the probability of deescalation—depend on the opportunity cost of war, shaped by observed trade flows. We quantify these factors in a general model of trade calibrated to current data. The model is then applied to study the historical evolution of geoeconomic factors for USA and China, as well as under prospective "decoupling" scenarios. The analysis underscores the existence of a fundamental *security dilemma*: because trade dependencies influence bargaining power in negotiations, decoupling reduces the costs of diplomatic concessions needed to avoid war but can paradoxically increase the risk of escalation into armed conflict by weakening the incentives for disciplining negotiation. Overall, this quantitative framework provides insights for policymakers on determining the optimal level of decoupling.

Keywords: international trade, interstate conflict, geoeconomics, fragmentation, derisking

JEL Codes: F1, F5

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†Department of Economics, Sciences Po, Paris; CEPII; and CEPR.

‡Department of Economics, Sciences Po, Paris; and CEPR.

§Department of Economics, University of Lausanne; IMD and CEPR.

1 Introduction

Geopolitical tensions are on the rise at the global level. After decades of increasing integration through trade and financial flows, the war in Ukraine and rising tensions between China and Western countries have proven that trade dependencies not only do not insure peaceful international relations but can actually be used as weapons in geopolitical conflicts. In this context, a growing literature studies the possible economic cost of a form of "de-globalization" organized around geopolitical blocks (Goldberg and Reed, 2023; Alfaro and Chor, 2023; Baqaee et al., 2024). While the quantitative effect of rising international trade barriers are well-understood, less clear is the possible feedback from trade policy to geopolitical risk. How much do the recent trends in global markets contribute to explaining the current rise in geopolitical tensions? And to what extent can strategic trade policy be used to achieve geopolitical objectives? Our paper proposes a theoretical framework to address these questions both qualitatively and quantitatively.

We combine a quantitative model of trade with a diplomatic game between two economies integrated into global trade. A bilateral dispute over a state-controlled public good arises exogenously and escalates into interstate war if diplomacy fails. Although both countries' leaders recognize that peace Pareto-dominates war, negotiations may still fail because each leader's valuation of the public good is private information. To resolve the dispute peacefully, leaders must first agree on the format of the diplomatic protocol. The (second-)best protocol turns out to be one in which leaders simultaneously announce their utility cost of war. The leader reporting the higher cost is required to concede a transfer of geopolitical valence (i.e., a share of the public good) to the other party in order to avoid war. This creates an incentive for each leader to understate their announced cost to secure greater concessions. However, such strategic misreporting carries the risk of breaking down negotiations: if both leaders report implausibly low war costs relative to their joint surplus constraint, diplomacy breaks down and war ensues. The diplomatic game thus captures a "paradox of war", explaining why rational leaders are not always able to deescalate tensions, despite the substantial cost of war.

In this setting marked by a latent risk of war, welfare comprises two components. The first is the standard trade gains realized during peacetime. The second includes three geoeconomic factors, all of which can be expressed as functions of the belligerent countries'*opportunity cost of war*, defined as the unconditional expected impact of war on real consumption growth. Two of these factors–the probability of escalation and the true cost of war (i.e., conditional on escalation)—are increasing in the joint opportunity cost of war. In contrast, the transfer conditional on peace, referred to as the *peace-keeping cost*, depends on the asymmetry in opportunity costs: the country incurring the larger wartime utility loss ends up compensating the other belligerent.

In the next step, we show how to characterize the opportunity cost of war, and, by extension, the geoeconomic factors, as an equilibrium outcome of a general trade model calibrated to match international consumption and production patterns observed in the data. In this model, the opportunity cost of war decomposes into three components, along with a general equilibrium adjustment term. First, human and capital losses affect real consumption in proportion to their share in aggregate revenues. Second, economic damages, which we model as TFP losses, affect real consumption

in proportion to the Domar weights of the corresponding sectors. Third, war-related trade disruptions reduce consumption in proportion to the direct and indirect impact of the associated trade frictions on consumer prices. Finally, these shocks generate general-equilibrium effects through the reallocation of final and intermediate consumption across countries and sectors.

The analysis highlights the ambiguous impact of external trade dependence on the opportunity cost of war. On the one hand, trade enables risk sharing against wartime productive disruptions. As economic and factor losses raise the relative price of domestic goods, more open economies benefit from substituting toward cheaper foreign products. On the other hand, such economies are mechanically more exposed to trade-related disruptions. The net effect depends on the relative magnitudes of economic and trade-related disruptions, as well as the geography of consumption and input sourcing. In particular, the strength of bilateral versus multilateral dependence shapes the extent of risk sharing forces. While similar insights were discussed in Martin et al. (2008), we show that they remain valid in a more general trade model with arbitrary input-output linkages. Moreover, our framework allows us to quantify the role of bilateral and multilateral trade dependencies in a setting that captures the full geographic structure of global value chains: Trade in inputs matters quantitatively because value chains tend to spatially concentrated, a feature that amplifies the opportunity cost of war among the most integrated country pairs. Finally, a novel insight from our analysis concerns the welfare relevance of *asymmetries* in bilateral trade dependencies in the shadow of conflict. Intuitively, countries that are more reliant on foreign value added have a stronger interest in avoiding war, which weakens their bargaining position in diplomatic negotiations and may compel them to concede more to geopolitical rivals in peacetime.

Armed with this model, we can examine the time series of geoeconomic factors through a range of factual 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, the U.S. significantly increased its bilateral trade deficit with China, becoming increasingly dependent on Chinese intermediate and final goods. While the economic consequences of this "China shock" have been widely studied in the trade literature, its geopolitical implications remain less understood.[1]

We first use the observed evolution of trade over the 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 trade flows altered the relative diplomatic bargaining power between the two sides, shifting it in China's favor. In our calibration, 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 essentially zero, as it is in most years, the peace-keeping costs can still be substantial. This finding underscores that the welfare impact of conflict is not confined to actual war outbreaks; its diplomatic containment entails significant costs.

[1]The economic impact of the US-China trade relationship has been widely studied in the context of the "China shock" (See Autor et al., 2013; Pierce and Schott, 2016; Jaravel and Sager, 2019, among many others), and the 2018 US-China trade war (e.g. Fajgelbaum et al., 2020; Amiti et al., 2019; Cavallo et al., 2021; Khandelwal and Fajgelbaum, 2022).

The spirit of the next exercise is to assess whether the protectionist trade policies enacted by President Trump in 2018, and subsequently maintained by President Biden, can be rationalized as an effective strategy for regaining diplomatic bargaining power. To this end, we run a series of simulations in which we "decouple" the U.S. by increasing its import costs on Chinese products, and compare the geoeconomic factors between the real and counterfactual worlds. The analysis reveals a fundamental security dilemma. While decreasing import dependence on its geopolitical rival lowers the opportunity cost of war for the U.S.–and may thereby reduce its diplomatic costs of maintaining peace–this strategy can backfire. By weakening incentives to show restraint during negotiations, decoupling may increase the risk of an armed conflict. Our quantitative estimates help navigate this tradeoff and identify potential positive feedback loops between decoupling and conflict risk, what we refer to as the fragmentation paradox.

Recent related literature. Our paper contributes to the rapidly expanding field of geoeconomics, recently surveyed in Mohr and Trebesch (2024). Within this literature, a growing body of recent work investigates how geopolitical tensions reshape trade architecture and policy.

Clayton et al. (2023) develop a theoretical framework for analyzing how hegemonic nations exert macroeconomic power through trade and financial interdependencies in global production networks. In Clayton et al. (2025), they provide a method to quantify geoeconomic power. Both 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 approach, Becko and O'Connor (2024) build a dynamic trade model showing how peacetime trade and industrial policy can be used strategically to manipulate an adversary's terms of trade in anticipation of future conflict. This complements our framework by conceptualizing trade as a commitment device in strategic competition. 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 the incentives in diplomatic bargaining. Compared to these theoretical contributions, our approach offers a tightly integrated and portable method for connecting theory with data.

Among the more data-oriented papers, Alekseev and Lin (2024) is closest to ours. Like us, they 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. Finally, 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.

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., 2021, for early contributions). While these studies stake 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 first use the calibrated model to illustrate how the evolution of globalization affects geoeconomic factors in a number of regions. We then subject the model to trade policy counterfactuals to study how "decoupling" affects these results. Finally, Section 4 concludes.

2 A model of trade and wars

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. This model generalizes the approach of Martin et al. (2008). In particular, the trade part of the model is enriched with an input-output structure and we conduct a full welfare analysis of trade policy, including geoeconomic factors.

2.1 The global setup

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

Two countries, labeled n and m, are assumed to face a geopolitical dispute, which can potentially escalate into a full-blow military conflict. The dispute is about a state-controlled public good such as a territory, a natural resource, or a water body. The dispute escalates into a war if diplomatic negotiations between their leaders fail. The remaining third countries, denoted as $\ell \neq n, m$, are considered neutral and do not interfere with the negotiation process, so as to avoid the complexity of modeling third-party intervention. 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) dispute arises; (1) leaders of countries n and m choose an optimal negotiation 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 the contested state-controlled public good. A purely economic interpretation of v is as a divisible material public good that can be transferred between countries. 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. This assumption ensures that utility is transferable between countries in the diplomatic game.

Specifically, consider one of the two potential belligerent countries $k \in \{n, m\}$. At stage 2 (after information is revealed but before diplomatic negotiations start), utilities in peace and war are given by

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

where real consumption C_k is 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 in peace and war respectively. We refer to the random variable $\tilde{u}_k$ as the war shock, which can take positive or negative values depending on whether the country loses or wins part of the contested good as a result of military operations. The war shock captures the uncertainty surrounding both the success of military operations and the material costs of war, reflecting the inherent fog of war that characterizes military operations. The war shock $\tilde{u}_k$ is privately observed by the leader of country k. Given that real consumption is represented in logarithmic form and utility is additively separable, the metrics of geopolitical valence v_k and war shock $\tilde{u}_k$ are expressed in percentage points of real consumption.[2]

A key factor influencing the belligerents' 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 peace and war:

$$\texttt{OCW}_k \equiv \log C_k(\text{peace}) - \log C_k(\text{war}). \tag{3}$$

We also define the utility cost of war as $\widetilde{\texttt{UCW}}_k \equiv U_k(\text{peace}) - \tilde{U}_k(\text{war})$. Combining (1) and (3) yields

$$\widetilde{\texttt{UCW}}_k = \texttt{OCW}_k + \tilde{u}_k. \tag{4}$$

Finally, we assume that peace Pareto dominates war in the sense that the joint value of belligerents'

[2]Most of the analysis focuses on the belligerent countries n and m due to their active role in the negotiation process. Nevertheless, for completeness, we specify the utility of third countries ℓ as well. In their case, a war shock is not modeled, and their utility is contingent upon the occurrence of peace or war between countries n and m

$$U_\ell(\text{peace}) = \log C_\ell(\text{peace}) \qquad \text{and} \qquad U_\ell(\text{war}) = \log C_\ell(\text{war}). \tag{2}$$

Note that war directly impacts the belligerent countries, but it also has the potential to indirectly affect the consumption of all countries, including neutral ones, through the reconfiguration of the global trade matrix.

joint surplus in peace is larger that their joint surplus in war:[3]

$$\tilde{U}_n(\text{war}) + \tilde{U}_m(\text{war}) < U_n(\text{peace}) + U_m(\text{peace}). \tag{5}$$

Using the definition of $\widetilde{\texttt{UCW}}$ instead, this relation can be rewritten as[4]

$$0 < \widetilde{\texttt{UCW}}_n + \widetilde{\texttt{UCW}}_m. \tag{6}$$

2.2 A game of diplomatic negotiation

The avoidance of war hinges on a diplomatic agreement. The leaders of countries n and m must reach a consensus on a sharing rule for their joint surplus under peace (right-hand side of Equation 6), which they implement through a bilateral transfer of geopolitical valence denoted as T.

Modeling diplomacy. We consider a bargaining game under asymmetric information that builds upon the setup developed by Myerson and Satterthwaite (1983). In order to align the framework with the reality of diplomatic interstate negotiations, we follow Martin et al. (2008) and introduce three additional features:

- Veto rights: Leaders can always choose to unilaterally quit the negotiation table and enter into conflict, regardless of any attempts to prevent them.

- Unconstrained diplomacy: Leaders have the freedom to choose any type of *non-binding* protocol for conducting their negotiations. This includes options such as an ultimatum (i.e., a unilateral take-or-leave offer), a one-shot conference to settle peace, or a sequence of meetings with offers and counter-offers, among others. Rational leaders will ultimately select the protocol that is ex-ante efficient in maximizing their utility before observing their private information. This assumption of unconstrained diplomacy adds realism to the model and, methodologically, allows for theoretical results that are robust to specific modeling choices regarding the diplomatic institutional setting.

- Disagreement payoffs, which represent the utilities in war, are negatively correlated. This is reasonable because losses experienced by one country may partially correspond to gains for the other. Therefore, when leaders observe their own private information, they can update their beliefs regarding the disagreement payoff of the other country. To capture this idea, $\tilde{u}_n$ and $\tilde{u}_n$ are assumed to be jointly uniformly distributed over a triangle in $\mathbb{R}^2$ with a shape that implies a negative correlation between the two variables (see Appendix). The domain of

[3] This condition is not essential for the overall validity of the approach, but it is included for the sake of realism, as war leads to destruction. Intuitively, it states that (i) both countries are worse off in war compared to peace, or (ii) while one country may be better off in war than in peace, the gains of this "winning" country are strictly lower than the losses of the defeated country. It is worth noting that the setup allows for such a possibility, but it does not impose a requirement for a clear winner or loser in a war. This flexibility aligns well with many military conflicts.

[4] Under our parametric assumptions, this implies that $\texttt{OCW}_n + \texttt{OCW}_m > 3\eta/4$.

variations of $\tilde{u}_n$ and $\tilde{u}_m$ is $[-3\eta/4, 0]$ where η is a positive parameter measuring the extent of informational asymmetry.[5]

Solving the game. Solving for the diplomatic game equilibrium follows the approach of Compte and Jehiel (2009) who apply mechanism design to the case of veto constraints and correlated types. We report hereafter the main relationships and relegate all the computational details to Appendix A.

The second-best protocol—the one that is optimally adopted by the two countries under imperfect information—is a Nash bargaining that takes the following form:

1. Leader of country $k \in \{n, m\}$ announces a utility cost of war $\widetilde{\mathtt{UCW}}_k^a$.
2. Country leaders check whether the two announcements are compatible with the aggregate resource constraint as given by (6). This compatibility condition can be expressed as:

$$0 < \widetilde{\mathtt{UCW}}_n^a + \widetilde{\mathtt{UCW}}_m^a. \tag{7}$$

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

$$\widetilde{T}_{nm} = \frac{\widetilde{\mathtt{UCW}}_n^a - \widetilde{\mathtt{UCW}}_m^a}{2}. \tag{8}$$

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. Hence, the preceding equation highlights the incentive for each leader to announce the smallest possible utility cost of war. This allows them to extract more concessions and receive a larger transfer. However, there is a trade-off because this increases the risk of violating the compatibility condition and breaking the negotiations.

Optimal announcement: It is optimal for leader n to announce

$$\widetilde{\mathtt{UCW}}_n^a = \frac{3}{4}\mathtt{OCW}_n - \frac{1}{4}\mathtt{OCW}_m + \frac{2}{3}\tilde{u}_n, \tag{9}$$

where only the war shock is privately observed while the other two components are public information. The announcement of leader m is symmetrical. Hence, the announcement ultimately depends on the realization of the underlying war shock. Moreover, comparing the previous relation

[5] Setting the bounds of the domain of variations of the war shocks is a matter of normalization in all formulas and has no consequence on the theoretical analysis.

with equation (4) reveals that the leader strategically misreports her true $\widetilde{\texttt{UCW}}_n$. Hence, negotiations tend to fail more when the realization of $\tilde{u}_n$ is small: in this configuration, leaders are indeed unable to distinguish between strategic misreporting and truthful reporting, leading to a violation of the compatibility constraint, a breakdown in negotiations and an escalation into war.

Probability of peaceful outcome: We denote with s_{nm} the probability of a successful negotiation. 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 (9) 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 term 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 OCWs 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, one country has to concede some utility transfer to the other. Using (8) and (9), 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*:

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

In expectation, country n has to concede a positive transfer whenever the differential between $\widetilde{\texttt{UCW}}_n$ and $\widetilde{\texttt{UCW}}_m$ 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.

True Cost of War: The discussion above shows that a peaceful settlement is reached whenever the realization of $\widetilde{\texttt{UCW}}$ is large. It is only for the bottom of the distribution that disputes escalate into war. In other words, even when they fail to settle peace, diplomatic negotiations have the virtue of avoiding the most destructive forms of wars. This translates into the property that the average

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

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

Note that this object is defined only when war has a non-zero probability of occurrence, namely for $s_{nm} < 1$ in Equation (11).[6]

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

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

The equation simplifies into:

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

where $\mathcal{L}_n$ interprets as the *geoeconomic loss*. In this equation, the variables $\{s_{nm}, \texttt{PKC}_n, \texttt{TCW}_n\}$ can be all derived from $\texttt{OCW}_n$ 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 quantify their relative strength. The relation also highlights the multi-faceted welfare impact for country n of increasing $\texttt{OCW}_n$, namely its opportunity cost of war with m. First, it reduces welfare simply because the costs are larger in wartime.[7] Second, it diminishes country n's diplomatic negotiation power, and the country is compelled to make more concessions to maintain peace. This peace-keeping channel (a rise in $\texttt{PKC}_n$) also reduces welfare. Third, it raises the probability of a peaceful settlement (s_{nm}), thereby enhancing welfare.

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. Setting $s_{nm} = 1$ in equation (16) and applying (13), we obtain:

$$U_n^* = U_n(\text{peace}) - \texttt{PKC}_n, \quad \text{with} \quad \texttt{PKC}_n = \frac{\texttt{OCW}_n - \texttt{OCW}_m}{2}. \tag{17}$$

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

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

[7] Computations show that $\texttt{TCW}_n$ is an increasing function of $\texttt{OCW}_n$.

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.

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, while we detail the parametric assumptions used in our simulations in Appendix C.

The economy is composed of a set N of countries, a set C of producers, and a set F of factors. The sets of producers and factors from country n are denoted C_n and F_n, respectively. The supply of factors is exogenous and immobile across countries.[8] 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:

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

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.[9]

The representative household in country n has homothetic preferences:

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

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

$$\sum_{i \in C} \tau_{in} p_i c_{in} = \sum_{f \in F_n} w_f L_f,$$

where $\tau_{in} p_i$ is the price of good i, inclusive of trade costs τ_{in}. w_f and L_f respectively denote the price and quantity of factor f.

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

[8] 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.

[9] 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.

of consumption under the budget constraint, and iii) the markets for all goods and factors clear:

$$L_f = \sum_{i \in C_n} l_{fi}, \quad \forall f \in F \tag{18}$$

$$q_i = \sum_{n \in N} c_{in} + \sum_{j \in C} x_{ij}, \quad \forall i \in C \tag{19}$$

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 (3) 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.[10] In this section, we use first-order approximations to recover insights about the magnitude and heterogeneity of the effect of war shocks (Appendix C contains the details on how we parametrize and solve the model).

War damages. Essential to the analysis is the modeling of how war affects the economy, and there are various degrees of freedom in doing so. To strike a balance between simplicity and realism, we adopt the following parameterization for war damages. First, we allow for human and capital losses, $\Gamma_f \equiv \Delta \log L_f < 0$ where the losses are restricted to $f \in F_m \bigcup F_n$, with m and n the belligerent countries. Second, we allow for economic damages, which we model as productivity losses in belligerent countries, $\alpha_\ell \equiv \Delta \log A_i < 0$, for $i \in C_\ell$, $\ell = n, m$. Finally, in line with empirical evidence (Glick and Taylor, 2010), we assume that trade frictions increase between belligerents and with the rest of the world. More specifically, we denote $\tau^{bil} \equiv \Delta \log \tau_{ij} = \Delta \log \tau_{ji} > 0$, $i \in C_n$, $j \in C_m$ the shock to bilateral trade costs and $\tau^{mul} \equiv \Delta \log \tau_{ij} = \Delta \log \tau_{ji} > 0$, $i \in C_n \bigcup C_m$, $j \notin C_n \bigcup C_m$ the shock to multilateral trade costs of the belligerents with the rest of the world. Frictions between third countries are assumed to be unaffected: $\Delta \log \tau_{ij} = 0$, $\forall i \notin C_n \bigcup C_m$, $j \notin C_n \bigcup C_m$. 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 cost-based input-output network as the C by C matrix Ω with ijth element:

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

[10] 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.

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 C matrix Ω^F which fjth element measures the contribution of factor f to j's costs:

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

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 C by C matrix, $\Psi \equiv (I - \Omega')^{-1}$. Elements of Ψ' are denoted Ψ_{ij} and measure the *full* (direct and indirect) incidence of good i on j's production costs:

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

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

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

where $b_{jn} \equiv \frac{\tau_{jn} p_j c_{jn}}{\sum_{i \in C} \tau_{in} p_i c_{in}}$ 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 primary object of interest is the opportunity cost of war. Indeed, with $\texttt{OCW}_n$ at hand, we can derive the other geoeconomic factors using Equations (11), (13), and (14). The opportunity cost of war is equal to minus the change in real consumption in country n between peacetime and wartime:

$$\texttt{OCW}_n = -\Delta \log C_n \equiv \Delta \log P_n^{CPI} - \Delta \log \sum_{i \in C} \tau_{in} p_i c_{in},$$

where P_n^{CPI} is the final consumption price aggregator, which we define as the sales-weighted change in the price of goods:

$$\Delta \log P_n^{CPI} = \sum_{i \in C} b_{in} \Delta \log \tau_{in} p_i.$$

From the production function, the vector of FOB prices changes can be written as:

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

where $\mathbf{A}$ denotes the vector of sector productivities, $\mathbf{w}$ the vector of external factor prices, and $\boldsymbol{\tau}^{rep}$ is the matrix of trade costs. Here ^{rep} refers to the fact the matrix has *repeated* vectors of trade costs.[11]

[11] The trade cost matrix is originally (C, N) with an entry τ_{in} being the trade cost on imports by country n of good i

$Diag(.)$ is the matrix-to-vector diagonal operator, i.e. we keep the diagonal terms of the $\Omega' \Delta \log \boldsymbol{\tau}^{rep}$ matrix. Solving out for FOB prices implies:

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

and thus CIF prices:

$$\Delta \log \tilde{\mathbf{p}} \equiv \Delta \log \boldsymbol{\tau} + \left\{ \Psi \left[-\Delta \log \mathbf{A} + Diag \left(\Omega' \Delta \log \boldsymbol{\tau}^{rep} \right) + \Omega^{F'} \Delta \log \mathbf{w} \right] \right\} \mathbb{1}',$$

where $\boldsymbol{\tau}$ is the (C, N) matrix of tariffs and $\mathbb{1}$ is a $(N, 1)$ vector of ones.

From this, we can solve out for the change in the CPI:

$$\Delta \log P_n^{CPI} = -\sum_{i \in C} \lambda_{in} \Delta \log A_i + \sum_{f \in F} \Lambda_{fn} \Delta \log w_f + \sum_{i \in C} b_{in} \Delta \log \tau_{in} + \sum_{i \in C} \lambda_{in} \sum_{l \in C} \Omega_{li} \Delta \log \tau_{ln(i)},$$

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

Combining this with the change in nominal consumption under the budget constraint finally implies:

$$\begin{aligned} \texttt{OCW}_n \quad = \quad & \underbrace{-\sum_{i \in C} \lambda_{in} \Delta \log A_i}_{Economic\ damages} + \underbrace{\left[\sum_{i \in C} b_{in} \Delta \log \tau_{in} + \sum_{i \in C} \lambda_{in} \sum_{l \in C} \Omega_{li} \Delta \log \tau_{ln(i)} \right]}_{trade\ frictions} \\ & - \underbrace{\sum_{f \in F_n} \tilde{\Lambda}_{fn} \Delta \log L_f}_{factor\ losses} - \underbrace{\sum_{f \in F_n} \tilde{\Lambda}_{fn} \Delta \log w_f + \sum_{f \in F} \Lambda_{fn} \Delta \log w_f}_{wage\ adjustments} \end{aligned} \tag{20}$$

where $\tilde{\Lambda}_{fn} \equiv \frac{w_f L_f}{\sum_{i \in C} \tau_{in} p_i c_{in}}$ is the contribution of factor f to income in country n.

Equation (20) 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 belligerent 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. Wage adjustments themselves decompose into two terms. First, demand and supply-side adjustments in domestic factor markets directly affect nominal GDP. Second, the reconfiguration of global production networks affects the demand of factors, thus equilibrium prices in all factor markets.

Bilateral trade dependence: In Appendix B, we dig further into the impact of external trade dependence on OCW and resulting geoeconomic factors of the belligerent countries n and m. As already discussed in Martin et al. (2008), the geography of import sourcing of the country-pair is key to understanding the two-way relationship between trade and conflict risk. This can be sim-

(equal to 1 whenever i is produced in n). The "repeated" matrix is instead (C, C).

ply illustrated in a version of our model without production linkages, where the probability of appeasement–as given by equation (11)–takes the following form:

$$s_{nm}^{\text{noIO}} = \min\left\{1; \frac{1}{\eta^2}\left[2(\Gamma-\alpha)+\tau^{bil}(\pi_{mn}+\pi_{nm})+(\tau^{mul}-\alpha)\left(\sum_{\ell\neq m,n}(\pi_{\ell n}+\pi_{\ell m})\right)\right]^2\right\} \tag{21}$$

This relation shows that the contributions of bilateral and multilateral imports to peacetime expenditures and sourcing shape the balance between two opposing forces. On the one hand, multilateral trade dependence provides a consumption insurance against trade-related domestic damages. The decrease in wartime productivity pushes the relative price of domestically-produced goods up, which effect is attenuated through substitution away from domestic consumption. On the other hand, bilateral and multilateral trade integration increases the country's exposure to war-related trade disruptions, thus the cost of war. While the latter force increases countries' incentives to settle geopolitical disputes through diplomacy, the former may instead increase the probability of conflict.

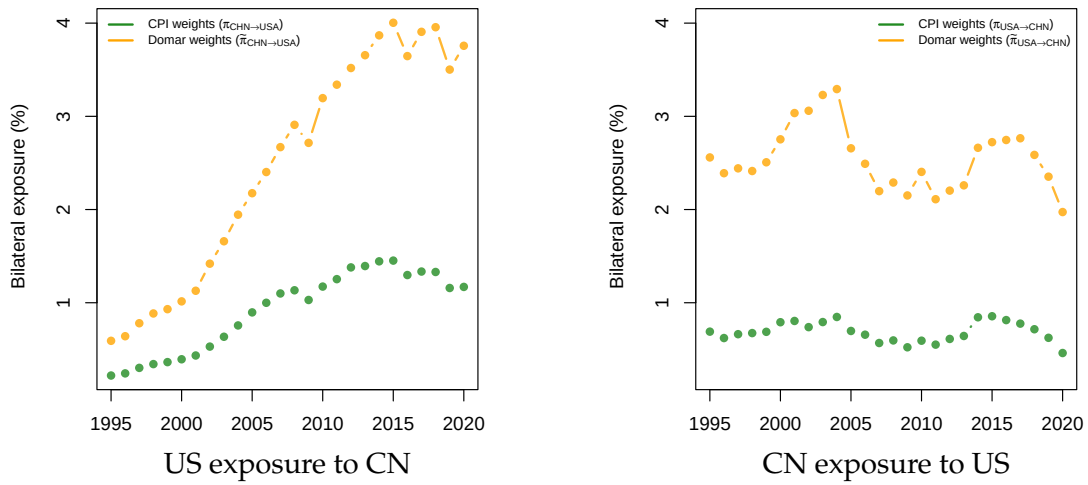
In Appendix B, we show that the logic underpinning the previous equation generalizes to the broader class of trade models considered in this paper, where goods are traded for both intermediate and final consumption. In these models, the sufficient statistics governing the geoeconomic consequences of trade can be recovered from (bilateral and multilateral) Domar weights. As the opportunity cost of war unambiguously increases in bilateral trade dependencies, 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. As an illustration of the amplification, Figure 1(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 in the other direction, around 2, but more stable over time). 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.

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 (see Appendix B), where diplomatic concessions are given by:

$$\texttt{PKC}_n^{\text{noIO}} = \frac{1}{2}\left[\tau^{bil}(\pi_{mn}-\pi_{nm})+(\tau^{mul}-\alpha)\left(\sum_{\ell\neq m,n}(\pi_{\ell n}-\pi_{\ell m})\right)\right] \tag{22}$$

This expression shows that *asymmetries in bilateral trade dependencies*, as captured by the term $(\pi_{mn} - \pi_{nm})$, lead to transfers from the more to the less trade dependent country. Specifically, $\texttt{PKC}_n$ in-

Figure 1: 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.

creases 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.

3 The geoconomics of decoupling

3.1 Quantification of geoeconomic factors.

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 in Section 2.1.

The model is solved in general equilibrium using exact hat algebra, following Dekle et al. (2008).[12] As explained in Appendix D, 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.

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, consump-

[12] 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.

Table 1: Calibrated parameters

Parameter	Value	Source	Interpretation
ω	.35	Baqaee and Farhi (2024)	CES between sectors (inter. consumption)
θ	.5	Baqaee and Farhi (2024)	CES between sectors (final consumption)
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

tion 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) but we will run robustness vis-à-vis these values. 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 2023) constructed by the OECD. The general model has multiple factors, and allows for aggregate expenditures to include factor revenues, residual profits and aggregate trade imbalances. In the absence of reliable data on the relative contribution of these different Gross National Expenditure components, the baseline calibration assumes that aggregate revenues only consist of labor revenues.

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 postponed in appendix D.2. 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. In order to calculate the geoeconomic factors, one needs to calibrate a crucial parameter, η, that represents informational noise in diplomatic negotiations. This is largely unobservable, but we can use equation (11), which states that, conditional on a dispute, the probability of appeasement depends on the sum of opportunity cost of wars. The calibration of η hence 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 then vary η to simulate a range of insecurity scenarios where the baseline probability varies from 1 to 0.6.

3.2 Decoupling in the shadow of war: theory

A trade policy decision margin is added at the outset of the sequence described on page 5. 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 export subsisidies) 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:

$$\mathbb{E}[U'_n] - \mathbb{E}[U_n] = \log\left(\frac{C'_n(\text{peace})}{C_n(\text{peace})}\right) - \Delta\mathcal{L}_n, \tag{23}$$

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 losses that arise under peacetime conditions–an object commonly measured in the existing literature which typically assumes away geopolitical risk when conducting policy evaluation. The second term, $-\Delta\mathcal{L}_n$, which we refer to as the *geoeconomic welfare gains*, can 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 full resolution of this question requires quantitative evaluation, we outline the key underlying mechanisms below:

1. Decoupling reduces the bilateral import 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 benefitial to n's welfare. First, in the event that negotiations fail and war breaks out, the true cost of war decreases, $\Delta\texttt{TCW}_n < 0$ (see footnote 7). Second, it improves country n's diplomatic bargaining power, leading n to make less concessions in order to maintain peace: $\Delta\texttt{PKC}_n < 0$.

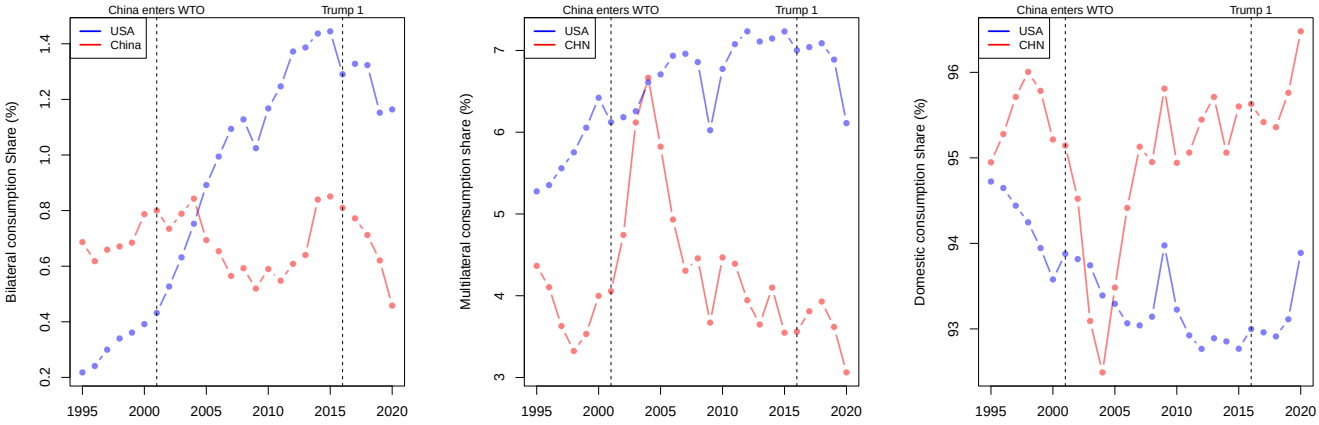
3. Under decoupling, a lower $\texttt{OCW}$ reduces leaders' incentives to exercise discipline during diplomatic negotiations, thereby decreasing the probability of de-escalation: $\Delta s_{nm} < 0$. This is detrimental to country n's welfare.

4. Apart from those two effects on $\mathcal{L}_n$, raising trade barriers also afefcts (peacetime) real consumption $C_n(\text{peace})$ through the standard channels discussed in the literature (such as price effects, market access, terms of trade).

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

3.3 Application to the US-China diplomatic relationship

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



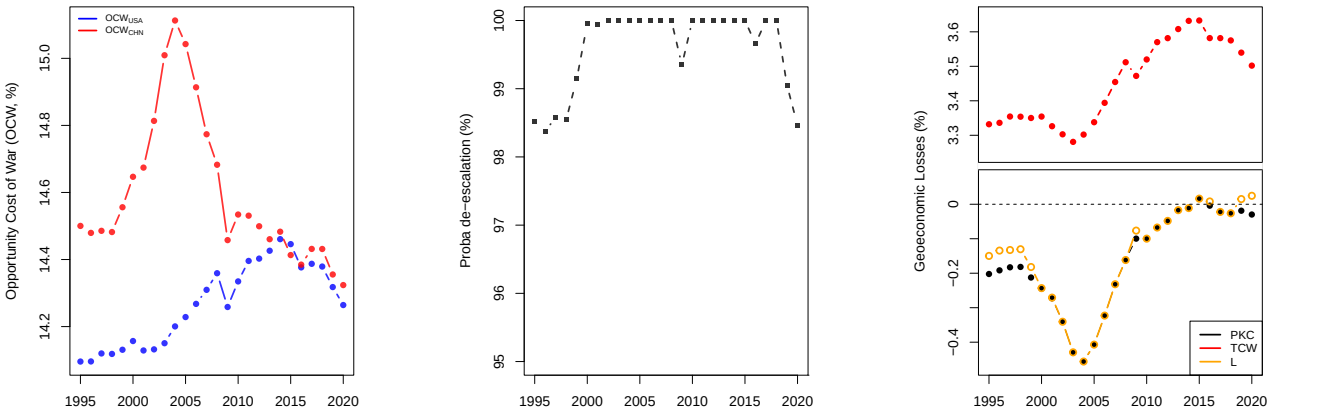
(a) Bilateral (b) Multilateral (c) Domestic

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

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 that the increased share of US imports originating from China raised the opportunity cost of a bilateral war for the USA while the same cost is slightly lower in 2020 compared to 1995 for China.[13] Those opportunity costs of war have a

[13]The spike observed in the beginning of the 2000s might seem surprising since Chinese imports from the US did not really increase in that period. This is because the US-China war would also have hurt trade with the rest of the world

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



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

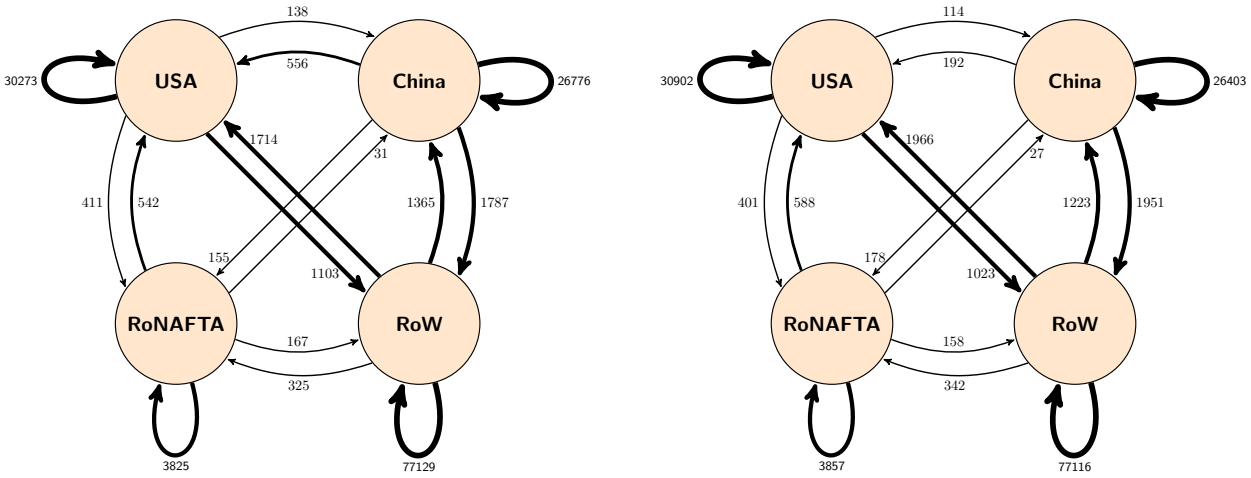
magnitude of around 14.5% of total consumption , which means that the TFP shock (α) calibrated to reduce output by 13% does most of the damage, leaving a still substantial loss around 1.5% due to trade interdependencies. Panel (b) gives the evolution of the probability of deescalation. Recall that we 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 Costs for the US. These costs were negative until 2015, indicating that, on average, China had to make concessions to maintain peace. However, those concessions were rapidly reduced after the 2004 peak of Chinese multilateral openness and `OCW`, to reach essentially 0 in the recent period. 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.

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 year 2018, we assume that the US increases its tariffs on imports from China with the intent

(12% drop in our calibration), and in particular the spike in imports from Asia that happened in those years (see panel (b) of Figure 2 for the aggregate increase in imports and appendix Figure E6 which provides origins by continent).

and effect of altering its bilateral import dependence (there are also tariff revenues taken into account in the outcomes). The simulations are performed with changes in tariffs such that overall trade costs increase (with respect to their factual level) by a range of $(0\%, +50\%)$. 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.

Figure 4: Observed trade flows vs USA derisking (25%) wrt CHN



(a) Observed in 2018

(b) Counterfactual

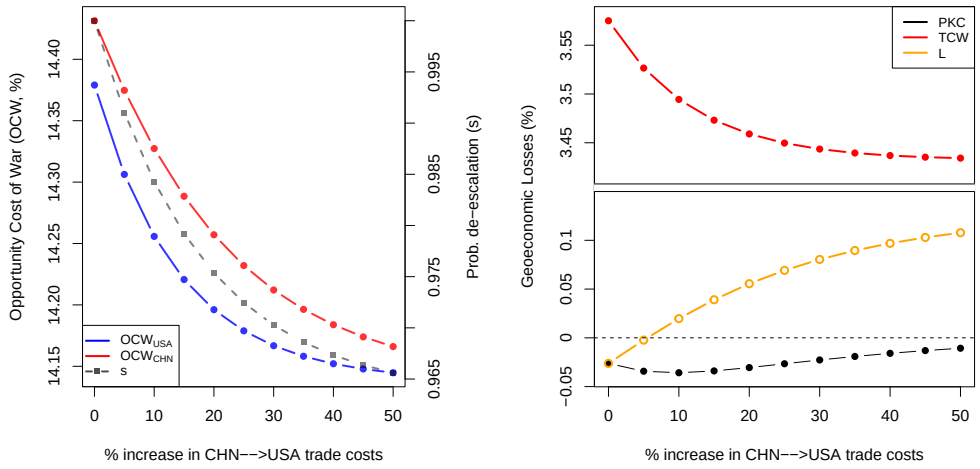
The changes in trade patterns are illustrated in figure 4, where panel (a) reports real trade flows from the 2018 TiVA dataset aggregated to four regions: The United States, China, the Rest of Nafta and the Rest of World. Panel (b) reports the same flows after a 25% increase in trade costs imposed on China by the United States. Table E1 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 (see Appendix Table E1). The United States also import more from alternative sources, while the reallocation of Chinese expenditure is mostly towards self-trade.

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, accompanied with the fall in s, the appeasement probability. 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 a more indirect effect. The cut in exported values to the USA exerts downward pressures on factoral markets in China, leading to a drop in relative wages. Wage adjustments make Chinese products more attractive on all markets, including China itself. Since by the same logic, US exports are made more expensive by a rise in factor demand, China reduces drastically its imports from the US, favoring its own varieties (even without any retaliation), which 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 the same panel with the dotted line (with magnitude on the right-sided y-axis). 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) OCW and s (b) $\mathcal{L}_{\text{USA}}$



In terms of the geo-economic factors for the United States, panel (b) 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*.

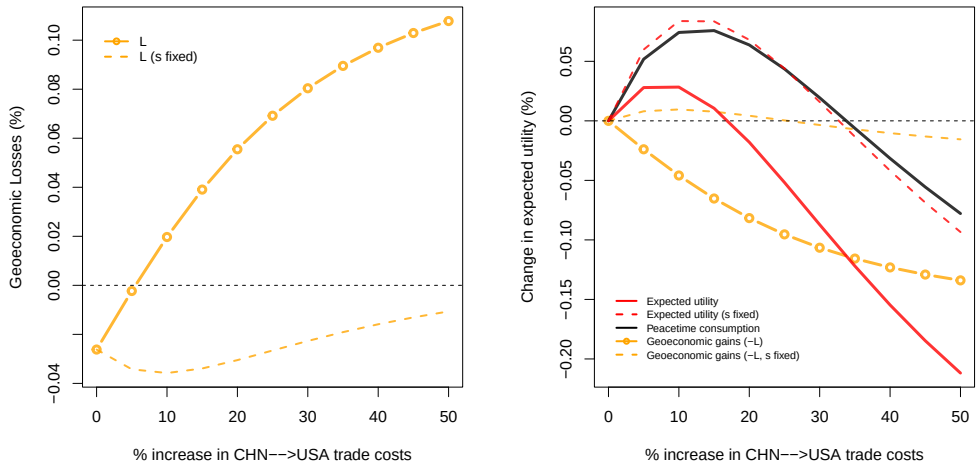
Full welfare implications are reported in figure 6. In panel (a), we compute $\mathcal{L}$ under different configurations; the plain line is the full version, the dashed one keeps s fixed at its initial calibrated value, here $s_{2018} = 1$. Hence, the dashed line is actually the same as PKC in this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

In panel (b), we report the peacetime real consumption fall 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 (23), 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.

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

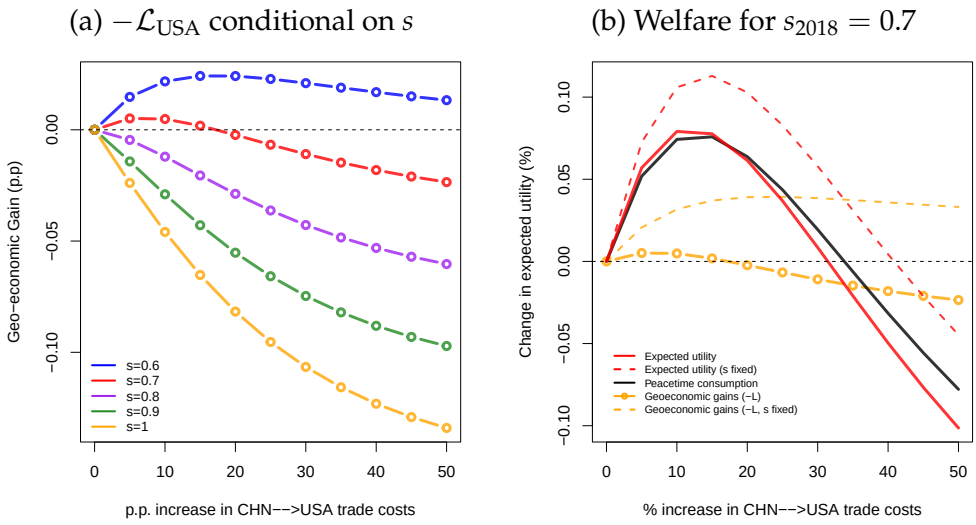
(a) $\Delta\mathcal{L}_{\text{USA}}$ with and w/o Δs (b) Decomposing $\Delta\mathbb{E}[\tilde{U}_{\text{USA}}]$



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.

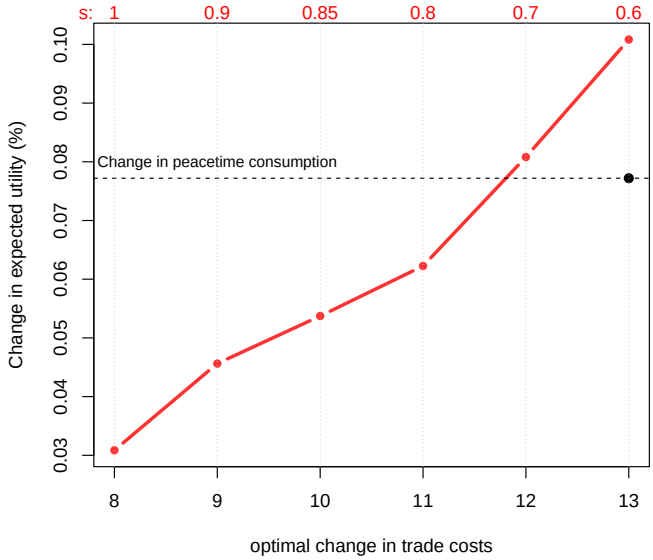
Figure 7 displays the response of US geoeconomic *gains*, $-\mathcal{L}_{\text{USA}}$, to rising trade costs, under different calibrations of the model-predicted baseline probability of de-escalation in 2018. Panel (a) uses the same orange curve as in figure 6 for the case $s_{2018} = 1$, showing negative 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

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



decoupling for small increases of trade costs. If those increase get over 20% however, the geoeconomic gains become negative again, lowering overall welfare gains.

Figure 8: Optimal derisking



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-descalation falls, the optimal tariff becomes larger, as does the expected gain from decoupling. The reason is that decoupling then delivers less negative, and eventually positive, geoeconomic consequences, which add to the economic gain in peacetime.

4 Conclusion

This paper provides a quantitative framework that integrates a model of trade with a diplomatic game of escalation to war. By linking trade dependencies to the incentives for peace, we can quantify how the opportunity cost of war shapes both diplomatic concessions 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 an armed conflict, thereby fostering peaceful dispute resolution. However, growing *asymmetries* in their trade dependence, reflected in the increasing U.S. bilateral trade deficit with China, shifted bargaining power toward China. As a result, China's diplomatic concession, equivalent to 0.2% of U.S. real consumption in the 1990s, had effectively disappeared by 2015. Simulations of decoupling scenarios reveal a core security dilemma: reducing import dependence with a geopolitical rival lowers the cost of peace concessions but may raise the risk of conflict by undermining bargaining discipline. This tension underscores what we term the fragmentation paradox. In this respect, our quantitative estimates offer guidance for policymakers seeking to determine the optimal degree of decoupling.

Ultimately, the approach brings diplomacy and latent endogenous conflict risk into the toolkit of trade policy evaluation. By quantifying security dilemmas, it offers a flexible and portable framework that can be readily adapted to other geopolitical contexts, such as the evolving EU–Ukraine–Russia nexus. The path ahead is rich with possibilities. Future extensions could explore *block derisking*, where trade costs are strategically adjusted across and within geopolitical alliances, or *smart derisking*, leveraging sector-level heterogeneity in trade dependencies. The framework could also be extended to study financial sanctions as an instrument of geoeconomic statecraft. In an era where economic interdependence and security are inseparable, this agenda offers powerful tools to inform policy in an increasingly fragmented world.

References

Ahmad, S. and S. Schreiber (2024). *Estimating Elasticities for Tradable Services in Policy Simulations*. US International Trade Commission.

Alekseev, M. and X. Lin (2024). Trade policy in the shadow of conflict: the case of dual-use goods. Technical report, Technical Report.

Alfaro, L. and D. Chor (2023, September). Global supply chains: The looming "great reallocation". Technical Report w31661, National Bureau of Economic Research.

Amiti, M., S. J. Redding, and D. E. Weinstein (2019, Fall). The Impact of the 2018 Tariffs on Prices and Welfare. *Journal of Economic Perspectives 33*(4), 187–210.

Antras, P., T. C. Fort, and F. Tintelnot (2017, September). The margins of global sourcing: Theory and evidence from us firms. *American Economic Review 107*(9), 2514–64.

Autor, D. H., D. Dorn, and G. H. Hanson (2013, October). The China Syndrome: Local Labor Market Effects of Import Competition in the United States. *American Economic Review 103*(6), 2121–2168.

Baqaee, D. and E. Farhi (2024). Networks, Barriers, and Trade. *Econometrica*.

Baqaee, D., J. Hinz, M. Schularick, F. Teti, J. Wanner, and S. Yang (2024). What if? the effects of a hard decoupling from china on the german economy. In *"How Europe should de-risk: Economic security in an age of interdependence"*. CEPR.

Becko, J. S. and D. O'Connor (2024). Strategic (dis) integration. Technical report, Working Paper.

Bonadio, B., Z. Huo, E. Kang, A. A. Levchenko, N. Pandalai-Nayar, H. Toma, and P. Topalova (2024). Playing with blocs: Quantifying decoupling. Technical report, EMPCT Working Paper Series 2024/07, University of Texas.

Bonadio, B., Z. Huo, A. A. Levchenko, and N. Pandalai-Nayar (2021). Global supply chains in the pandemic. *Journal of International Economics 133*, 103534.

Cavallo, A., G. Gopinath, B. Neiman, and J. Tang (2021, March). Tariff Pass-Through at the Border and at the Store: Evidence from US Trade Policy. *American Economic Review: Insights 3*(1), 19–34.

Clayton, C., M. Maggiori, and J. Schreger (2023). A framework for geopolitics and economics. Technical report, Working paper.

Clayton, C., M. Maggiori, and J. Schreger (2025). The political economy of geoeconomic power. Technical report, National Bureau of Economic Research.

Compte, O. and P. Jehiel (2009, February). Veto constraint in mechanism design: Inefficiency with correlated types. *American Economic Journal: Microeconomics 1*(1), 182–206.

Costinot, A. and A. Rodríguez-Clare (2014). Trade theory with numbers: Quantifying the consequences of globalization. In *Handbook of International Economics*, Volume 4, pp. 197–261. Elsevier.

Dekle, R., J. Eaton, and S. S. Kortum (2008, March). Global Rebalancing with Gravity: Measuring the Burden of Adjustment.

Fajgelbaum, P. D., P. K. Goldberg, P. J. Kennedy, and A. K. Khandelwal (2020). The Return to Protectionism. *The Quarterly Journal of Economics 135*(1), 1–55.

Federle, J., A. Meier, G. Muller, and M. Schularick (2024, February). The Price of War. CEPR Discussion Papers 18834, C.E.P.R. Discussion Papers.

Glick, R. and A. M. Taylor (2010, February). Collateral Damage: Trade Disruption and the Economic Impact of War. *The Review of Economics and Statistics 92*(1), 102–127.

Goldberg, P. and T. Reed (2023). Is the global economy deglobalizing? and if so, why? and what is next? Technical Report w31115, National Bureau of Economic Research.

Grossman, G. M. and E. Helpman (1994). Protection for Sale. *The American Economic Review 84*(4), 833–850. Publisher: American Economic Association.

Grossman, G. M., E. Helpman, and H. Lhuillier (2021, September). Supply Chain Resilience: Should Policy Promote Diversification or Reshoring? Working Papers 2021-8, Princeton University. Economics Department.

Hertel, T., D. Hummels, M. Ivanic, and R. Keeney (2007). How confident can we be of cge-based assessments of free trade agreements? *Economic Modelling 24*(4), 611–635.

Jaravel, X. and E. Sager (2019, August). What are the Price Effects of Trade? Evidence from the U.S. and Implications for Quantitative Trade Models. CEPR Discussion Papers 13902, C.E.P.R. Discussion Papers.

Khandelwal, A. K. and P. D. Fajgelbaum (2022, August). The Economic Impacts of the US–China Trade War. *Annual Review of Economics 14*(1), 205–228.

Kooi, O. (2024). Power and resilience: An economic approach to national security policy. Technical report, Technical Report.

Martin, P., T. Mayer, and M. Thoenig (2008, July). Make Trade Not War? *The Review of Economic Studies 75*(3), 865–900.

Mohr, C. and C. Trebesch (2024). Geoeconomics. Technical report, CESifo Working Paper.

Myerson, R. B. and M. A. Satterthwaite (1983, April). Efficient mechanisms for bilateral trading. *Journal of Economic Theory 29*(2), 265–281.

Pierce, J. R. and P. K. Schott (2016, July). The Surprisingly Swift Decline of US Manufacturing Employment. *American Economic Review 106*(7), 1632–1662.

Thoenig, M. (2024). Trade policy in the shadow of war: Quantitative tools for geoeconomics. In *Handbook of the Economics of Conflict*, Volume 1. Elsevier.

Appendix

A 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 the Appendix A of Martin et al. (2008), which will be referred to as MMT henceforth, which extends the setup covered in the claims B and C of Compte and Jehiel (2009).[14] 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 the 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:

$$\widetilde{\texttt{UCW}}_n^a \equiv U_n(\text{peace}) - a(\tilde{U}_n^W), \tag{A1}$$

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

$$\begin{aligned} a(\tilde{U}_n^W) = \min \tilde{U}_n(\text{war}) &+ \frac{1}{4}\left(U_n(\text{peace}) + U_m(\text{peace}) - \min \tilde{U}_n(\text{war}) - \min \tilde{U}_m(\text{war})\right) \\ &+ \frac{2}{3}\left(\tilde{U}_n(\text{war}) - \min \tilde{U}_n(\text{war})\right). \end{aligned} \tag{A2}$$

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

$$\widetilde{\texttt{UCW}}_n^a = \frac{2}{3}\widetilde{\texttt{UCW}}_n + \frac{1}{12}\max \widetilde{\texttt{UCW}}_n - \frac{1}{4}\max \widetilde{\texttt{UCW}}_m. \tag{A3}$$

Under the parametric assumption $\tilde{u}_n \in [-3\eta/4, 0]$, equation (4) implies $\max \widetilde{\texttt{UCW}}_n = \texttt{OCW}_n$. Equation (A3) thus becomes:

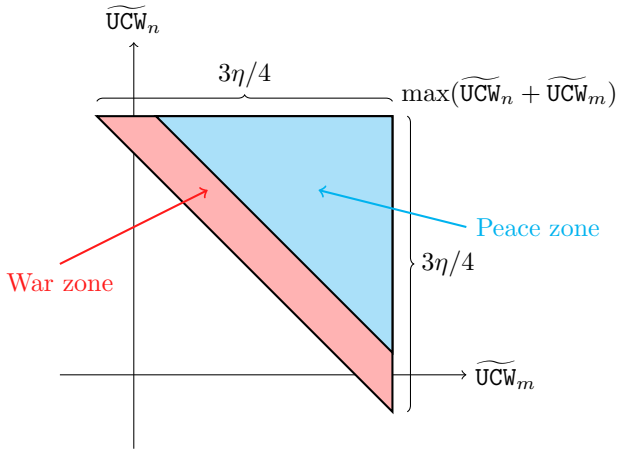
$$\widetilde{\texttt{UCW}}_n^a = \frac{3}{4}\texttt{OCW}_n - \frac{1}{4}\texttt{OCW}_m + \frac{2}{3}\tilde{u}_n, \tag{A4}$$

which corresponds to equation (9) 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 over the black triangle represented in Figure A1; its shape implies that the two variables are negatively correlated; note that this triangle is the translation to our setting of the Figure 3 in MMT. 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 $(x, y) \in \Gamma$ and $\phi(x, y) = 0$ otherwise.

[14] 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

Figure A1: Probability of de-escalation as a function of the realization of war shocks



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

Probability of de-escalation:

In the Nash bargaining protocol, reaching an agreement requires the announcements of players n and m to be compatible with (6):

$$0 < \widetilde{\texttt{UCW}}_n^a + \widetilde{\texttt{UCW}}_m^a. \tag{A5}$$

Inserting (A4) into the previous relation characterizes the war shocks which are conducive to a peace-preserving agreement:

$$0 < \frac{3}{4}(\texttt{OCW}_n + \texttt{OCW}_m) + \tilde{u}_n + \tilde{u}_m. \tag{A6}$$

This condition can be compactly rewritten as $x + y < \bar{x}$. In figure A1, a peace-preserving agreement happens for all realizations of (x, y) that are located in the blue triangle. The probability of peace is therefore given by the ratio of the surface of the blue over that of the black triangle:

$$s_{nm} = \texttt{Pr}\left(x + y < \bar{x}\right) = \int\int_{x+y<\bar{x}} \phi(x,y)dxdy = \begin{cases} \frac{\bar{x}^2}{\bar{u}^2} = \frac{(\texttt{OCW}_n + \texttt{OCW}_m)^2}{\eta^2} & \text{if} \quad \texttt{OCW}_n + \texttt{OCW}_m \leq \eta \\ 1 & \text{otherwise.} \end{cases} \tag{A7}$$

This relation corresponds to equation (11) in the main text.

options to vary within a range $[\underline{v}_n + \underline{v}_m, \bar{v}_n + \bar{v}_m]$.

Peace-Keeping Cost:

The post-transfer utility level in the case of a succesful agreement is obtained from Appendix A.1 in MMT:

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

Using (A1) and rearranging the terms yields the peace-preserving utility transfer from n to m as a function of the announcements:

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

This relation corresponds to Equation (8) in the main text. In turn, we combine it with (A4) to get:

$$\widetilde{T}_{nm} = \frac{\texttt{OCW}_n - \texttt{OCW}_m}{2} + \frac{\tilde{u}_n - \tilde{u}_m}{3} = \frac{\texttt{OCW}_n - \texttt{OCW}_m}{2} - \frac{x-y}{3}. \tag{A8}$$

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 A1 this boils down to averaging $\widetilde{T}_{nm}$ over all realizations (x, y) that are located in the blue triangle. Importantly, this triangle is symmetrical around the 45° line and the two random variables are assumed to be uniformly distributed. 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):

$$\mathbb{E}\left[\widetilde{T}_{nm}|\text{peace}\right] \equiv \texttt{PKC}_n = \frac{\texttt{OCW}_n - \texttt{OCW}_m}{2}. \tag{A9}$$

True Cost of War:

The True Cost of War is equal to:

$$\texttt{TCW}_n = \mathbb{E}\left[\widetilde{\texttt{UCW}}_n|\text{war}\right] = \texttt{OCW}_n + \mathbb{E}\left[\tilde{u}_n|\text{war}\right] = \texttt{OCW}_n - \mathbb{E}\left[x|\text{war}\right] \tag{A10}$$

As depicted in Figure A1, war happens whenever the joint realization of (x, y) is located in the red trapezoid Θ. Hence, their joint pdf conditional on war, denoted $\psi(x, y)$, is a constant term ψ equal to the inverse of the surface of Θ, itself equal to the difference in the surfaces of Γ and Ω. 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 (A10) and substituting $(\bar{u}, \bar{x})$ with their underlying values, we obtain:

$$\texttt{TCW}_n = \mathbb{E}\left[\widetilde{\texttt{UCW}}_n|\text{war}\right] = \texttt{OCW}_n - \frac{1}{4}\times\frac{\eta^3 - \left(\texttt{OCW}_n + \texttt{OCW}_m\right)^3}{\eta^2 - \left(\texttt{OCW}_n + \texttt{OCW}_m\right)^2} \tag{A11}$$

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

$$\mathbb{E}\left[\widetilde{\texttt{UCW}}_n\right] = \texttt{OCW}_n + \mathbb{E}\left[\tilde{u}_n\right] = \texttt{OCW}_n - \mathbb{E}\left[x\right], \tag{A12}$$

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

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

Plugging (A12) into (A11) and using the preceding relation yields:

$$\texttt{TCW}_n = \mathbb{E}\left[\widetilde{\texttt{UCW}}_n|\text{war}\right] = \underbrace{\texttt{OCW}_n - \frac{\eta}{4}}_{=\mathbb{E}\left[\widetilde{\texttt{UCW}}_n\right]} - \frac{1}{4}\frac{\left[\texttt{OCW}_n + \texttt{OCW}_m\right]^2}{\left[\eta + \texttt{OCW}_n + \texttt{OCW}_m\right]}, \tag{A13}$$

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

B OCW and the Geography of Import Sourcing

Under the assumptions on war damages detailed in Section 2.4 and neglecting general equilibrium effects, equation (20) simplifies into:

$$\begin{aligned}\texttt{OCW}_n &= -\alpha_n\tilde{\pi}_{nn} - \alpha_m\tilde{\pi}_{mn} + \tau^{bil}\left(\pi_{mn} + \breve{\pi}_{mn}\right)\\ &+ \tau^{mul}\left[\sum_{\ell\neq n,m}\left(\pi_{\ell n} + \breve{\pi}_{\ell n}\right)\right] + \sum_{f\in F_n}\tilde{\Lambda}_{fn}\Gamma_f,\end{aligned} \tag{B14}$$

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

GIS in the absence of IO linkages. To build intuition, it is useful to compare the formula with a simpler world without production linkages. In such a world, the Leontief inverse is the identity matrix. We further assume that economic and factor damages are symmetric ($\alpha_n = \alpha_m$ and $\Gamma_f = \Gamma$).[15] Under these assumptions, we have:

$$\texttt{OCW}_n^{\text{noIO}} = (\Gamma-\alpha) + \tau^{bil}\pi_{mn} - (\alpha-\tau^{mul})\left(\sum_{\ell\neq m,n}\pi_{\ell n}\right) \tag{B15}$$

$$s_{nm}^{\text{noIO}} = \min\left\{1; \frac{1}{\eta^2}\left[2(\Gamma-\alpha) + \tau^{bil}(\pi_{mn}+\pi_{nm}) - (\alpha-\tau^{mul})\left(\sum_{\ell\neq m,n}(\pi_{\ell n}+\pi_{\ell m})\right)\right]^2\right\} \tag{B16}$$

$$\texttt{PKC}_n^{\text{noIO}} = \frac{1}{2}\left[\tau^{bil}(\pi_{mn}-\pi_{nm}) - (\alpha-\tau^{mul})\left(\sum_{\ell\neq m,n}(\pi_{\ell n}-\pi_{\ell m})\right)\right] \tag{B17}$$

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

Those three equations 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 $\sum_{\ell \neq m,n} \pi_{\ell n}$). 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 ($\alpha > \tau^{mul}$).[16] 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. Finally, asymmetric trade dependencies lead to transfer from the most to the least trade dependent country, i.e. $\texttt{PKC}_n^{\text{noIO}}$ 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 $\texttt{OCW}_n^{\text{noIO}}$ and $\texttt{OCW}_n$ 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.

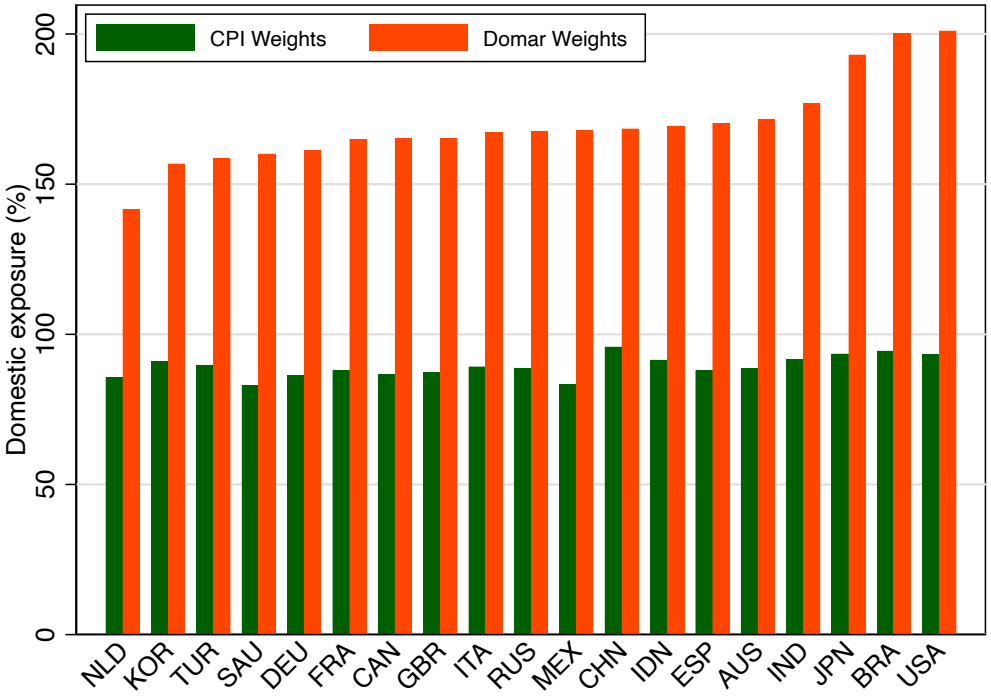
To provide an idea for the magnitude of the size of the amplification through IO networks, Figure B2 compares the sum of Domar weights for domestically-produced goods for the 20 largest economies int he world, in the full model and in the counterfactual world without any IO amplification (i.e. $\tilde{\pi}_{nn}$ against π_{nn}).[17] As emphasized by the comparison of $\texttt{OCW}_n$ and $\texttt{OCW}_n^{\text{noIO}}$, these shares interpret as the elasticity of $\texttt{OCW}$ 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 .83 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 1.42 and 2.01.

Likewise, Figure B3 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

[16] 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).

[17] 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 D.

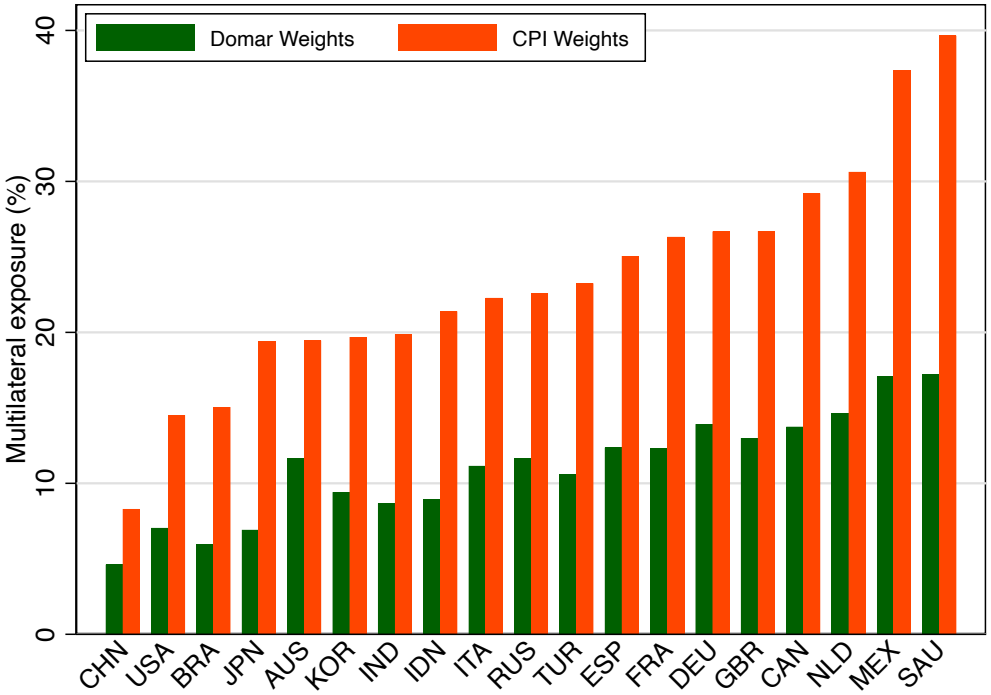
Figure B2: Incidence of domestic productivity shocks: Full model and counterfactual without IO amplification



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_{int} across domestically produced goods ($\tilde{\pi}_{nn}$). Source: TiVA, 2018. The figure is restricted to the 20 largest economies in the world.

(including domestic prices), captured by $\check{\pi}_{mn} + \check{\pi}_{RoWn}$. Quantitatively, the amplification represents between one and two thirds 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 B3 which varies between .08 for China to .40% for Saud Arabia.

Figure B3: Incidence of foreign shocks: Full model and counterfactual without IO amplification



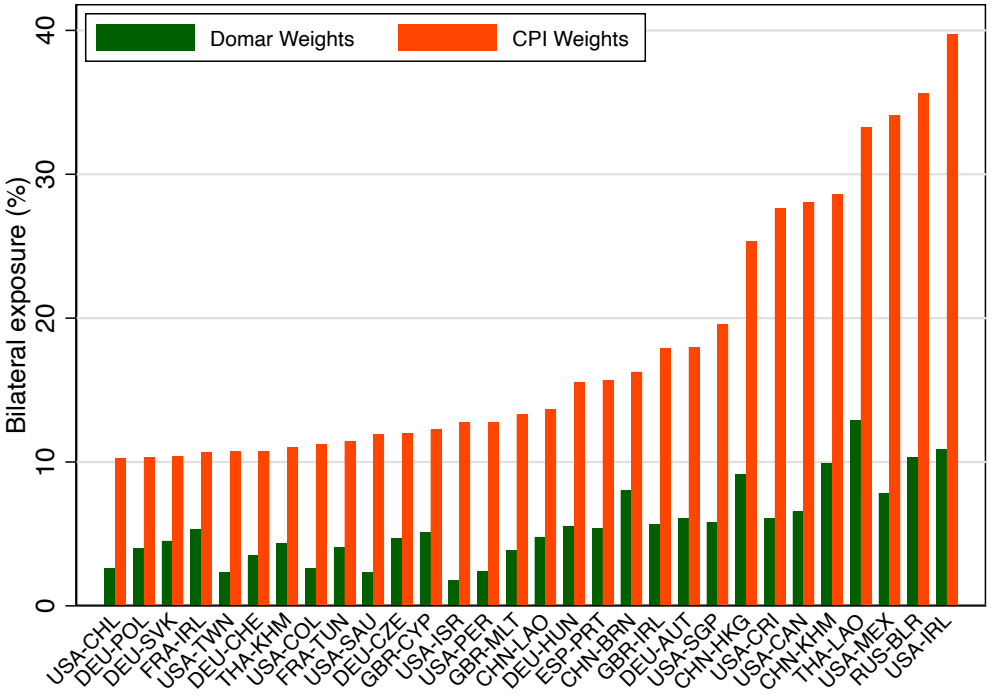
Notes: The figure compares the elasticity of real GDP to uniform trade cost shocks, in the full model ("Domar weights") and in a counterfactual without IO linkages ("CPI weights"). "CPI weights" is simply defined as the sum of b_{int} weights, across foreign produced goods $(1 - \pi_{nn} - \pi_{mn})$.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

Finally, Figure B4 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", $\tilde{\pi}_{mn}$) 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.

C 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$\times$country is composed of a representative firm

Figure B4: 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") and in terms of "CPI weights". Source: TiVA, 2018.

that produces out of domestic value added and inputs. The sector×country pairs are thus the data counterpart of the producers $i \in C$ 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.

Households. There is a household of size $\bar{L}_n$ 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:

$$P_n = \left[\sum_j \vartheta_{n,j} P_{n,j}^{1-\theta} \right]^{\frac{1}{1-\theta}}, \tag{C18}$$

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.

Denote by Π_n the aggregate profits of firms owned by households in n, and by D_n any trade imbalance. Then the final expenditure in n on goods coming from country m sector j is:

$$\begin{aligned} P_{mn,j} c_{mn,j} &= \frac{\mu_{mn,j} P_{mn,j}^{1-\sigma_j}}{P_{n,j}^{1-\sigma_j}} \frac{\vartheta_{n,j} P_{n,j}^{1-\theta}}{P_n^{1-\theta}} \left[w_n \bar{L}_n + \Pi_n + D_n \right] \\ &= \pi^c_{mn,j} \pi^c_{n,j} \left[w_n \bar{L}_n + \Pi_n + D_n \right]. \end{aligned}$$

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.[18] The representative firm in sector j located in

[18] 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.

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

$$P_{m,j}^I = \left[\alpha_{m,j} w_m^{1-\lambda} + (1-\alpha_{m,j})\left(P_{m,j}^X\right)^{1-\lambda}\right]^{\frac{1}{1-\lambda}}, \tag{C19}$$

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

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

where

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

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

$$P_{nm,j} = \frac{\sigma_j}{\sigma_j - 1}\frac{\tau_{np,j} P_{n,j}^I}{A_{n,j}} \tag{C20}$$

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

$$\begin{aligned} y_{mn,j} = {} & \pi_{mn,j}^c \pi_{n,j}^c \left[w_n \overline{L}_n + \Pi_n + D_n\right] \\ & + \sum_i \frac{\sigma_i - 1}{\sigma_i}(1-\pi_{n,i}^l)\pi_{mn,ij}^M \pi_{n,ij}^M \sum_k y_{nk,i}, \end{aligned} \tag{C21}$$

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 (C21), 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:

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

which implies the following labor market clearing condition:

$$w_n \overline{L}_n = \sum_j \frac{\sigma_j - 1}{\sigma_j} \pi^l_{n,j} \sum_m y_{nm,j}. \tag{C22}$$

The system of equations (C20), (C21), and (C22) defines equilibrium wages, prices, and expenditures.

D 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.

D.1 A shock formulation of the model.

We start by re-expressing 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 (C21) can be written as:

$$\begin{aligned} y_{mn,j,0} \hat{y}_{mn,j} = {} & \hat{\pi}^c_{mn,j} \hat{\pi}^c_{n,j} \left[\hat{w}_n \hat{\bar{L}}_n s^L_{n,0} + \hat{\Pi}_n s^{\Pi}_{n,0} + \hat{D}_n s^D_{n,0} \right] \pi^c_{mn,j,0} \pi^c_{n,j,0} P_{n,0} C_{n,0} \\ & + \sum_i \frac{\sigma_i - 1}{\sigma_i} \pi^M_{n,ji,0} \pi^M_{mn,ji,0} (1 - \pi^l_{n,i,0} \hat{\pi}^l_{n,i}) \hat{\pi}^M_{n,ji} \hat{\pi}^M_{mn,ji} \sum_k \hat{y}_{nk,i} y_{nk,i,0}, \end{aligned} \tag{D23}$$

where $s^L_{n,0}$ is the pre-shock share of labor (/ factor payments) in the total final consumption expenditure, $s^\Pi_{n,0}$ is the share of profits and $s^D_{n,0}$ is the share of net imports.

- The labor market clearing equation (C22), once expressed in terms of proportional changes, becomes:

$$\sum_j \sum_k \frac{\sigma_j - 1}{\sigma_j} \pi^l_{n,j,0} y_{nk,j,0} \left[\widehat{\pi}^l_{n,j} \widehat{y}_{nk,j} - \widehat{w}_n \widehat{\overline{L}}_n \right] = 0. \tag{D24}$$

- Changes in prices are:

$$\widehat{P}_{mn,j} = \widehat{\tau}_{mn,j} \widehat{P}^I_{m,j} \widehat{A}^{-1}_{m,j}, \tag{D25}$$

$$\widehat{P}_{n,j} = \left[\sum_m \widehat{P}^{1-\sigma_j}_{mn,j} \pi^c_{mn,j,0} \right]^{\frac{1}{1-\sigma_j}}, \tag{D26}$$

$$\widehat{P}_n = \left[\sum_j \widehat{P}^{1-\theta}_{n,j} \pi^c_{n,j,0} \right]^{\frac{1}{1-\theta}}. \tag{D27}$$

$$\widehat{P}^I_{m,j} = \left[\pi^l_{m,j,0} \widehat{w}^{1-\lambda}_m + (1 - \pi^l_{m,j,0}) \left(\widehat{P}^M_{m,j} \right)^{1-\lambda} \right]^{\frac{1}{1-\lambda}}, \tag{D28}$$

$$\widehat{P}^X_{m,j} = \left[\sum_i \pi^M_{m,ij,0} \left(\widehat{P}^M_{m,ij} \right)^{1-\omega} \right]^{\frac{1}{1-\omega}}, \tag{D29}$$

$$\widehat{P}^X_{m,ij} = \left[\sum_n \pi^M_{nm,ij,0} \widehat{P}^{1-\sigma_j}_{nm,i} \right]^{\frac{1}{1-\sigma_j}}, \tag{D30}$$

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

$$\hat{\pi}^c_{mn,j} = \frac{\widehat{P}^{1-\sigma_j}_{mn,j}}{\sum_m \widehat{P}^{1-\sigma_j}_{mn,j} \pi^c_{mn,j,0}}, \tag{D31}$$

$$\hat{\pi}^c_{n,j} = \frac{\widehat{P}^{1-\theta}_{n,j}}{\sum_j \widehat{P}^{1-\theta}_{n,j} \pi^c_{n,j,0}}, \tag{D32}$$

$$\hat{\pi}^l_{m,j} = \frac{\widehat{w}^{1-\lambda}_m}{\pi^l_{m,j,0} \widehat{w}^{1-\lambda}_m + (1 - \pi^l_{m,j,0}) \left(\widehat{P}^X_{f,m,j} \right)^{1-\lambda}}, \tag{D33}$$

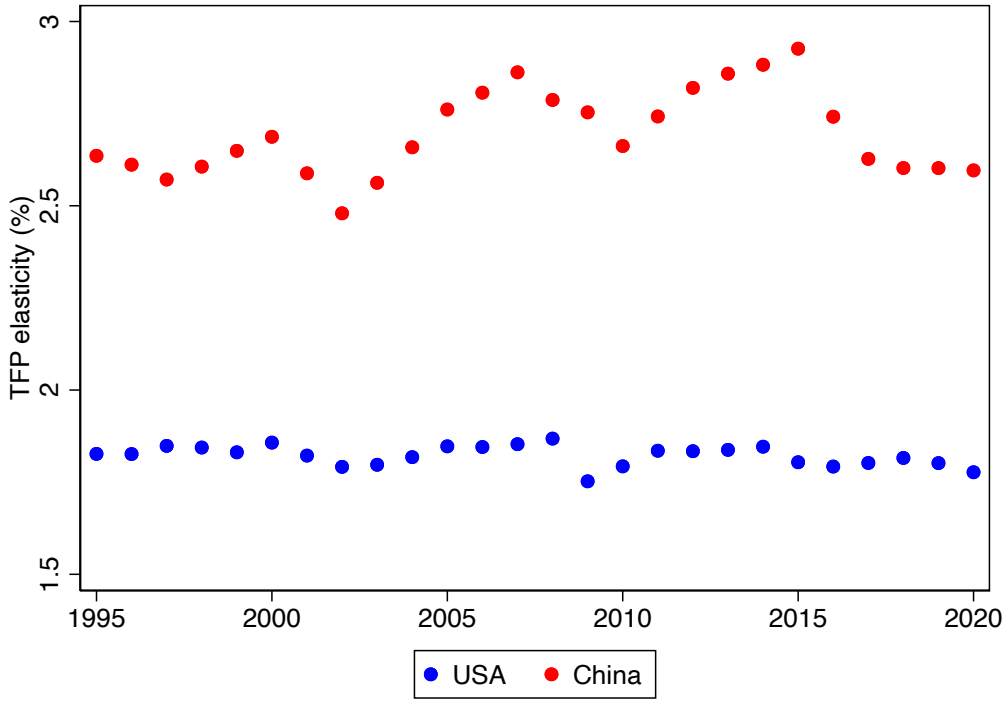
$$\hat{\pi}^X_{m,ij} = \frac{\left(\widehat{P}^X_{m,ij} \right)^{1-\omega}}{\sum_i \pi^X_{m,ij,0} \left(\widehat{P}^X_{m,ij} \right)^{1-\omega}}. \tag{D34}$$

$$\hat{\pi}^X_{nm,ij} = \frac{\widehat{P}^{1-\sigma_j}_{nm,i}}{\sum_n \pi^X_{nm,ij,0} \widehat{P}^{1-\sigma_j}_{nm,i}}. \tag{D35}$$

D.2 Definition of war damages

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

Figure D5: Elasticity of real output to a 1% TFP loss: US and China over 1995-2020



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 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 D5 illustrates the heterogeneity in TFP elasticities using the US and China as an example.

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 indi-

cate 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.

E Additional results

Figure E6: Evolution of Chinese imports by continent

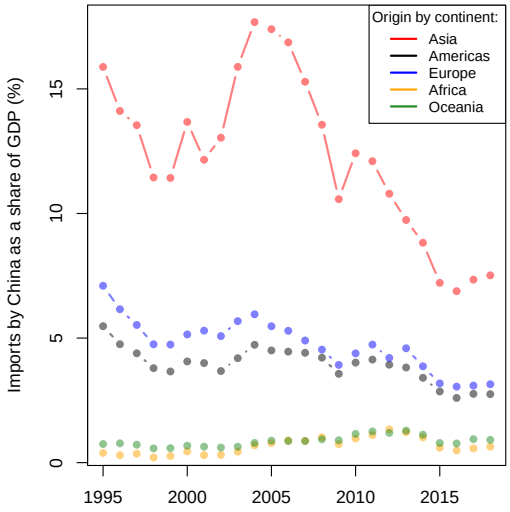


Table E1: Expenditure shares, 2018 vs USA derisking (25%) wrt CHN

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