Sanction Spillover and Trade Diversification*

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Abstract

How do sanctions affect third-party states? While much research has focused on the direct impact of sanctions on the countries imposing and receiving them, less is known about their effects on the broader trade network. We propose a theory that states respond to the systemic risks caused by sanctions by diversifying their trade portfolios. We test this theory in two ways: First, we examine how sanctions affect the global trade system, where states learn about trade uncertainty through sanctions on their trading partners. Using trade concentration and sanction data from 1990 to 2020, we find that states diversify their trading partners when sanctions disrupt their networks. Second, we analyze the 2018 announcement by President Trump under Section 232, which imposed unilateral tariffs on steel and aluminum imports based on national security concerns. Through a difference-in-differences approach, we study monthly data on steel and aluminum trade and find that countries with strong trade ties to the U.S. have limited flexibility, while others reduce their reliance on the U.S. by expanding their trade partnerships. These findings highlight the spillover effects of sanctions and the dynamics of trade interdependence.

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1 Introduction

The growing use of economic sanctions as a tool of foreign policy has drawn the attention of scholars and policymakers to their impact. In addition to the economic costs for senders and targets, sanctions have broader implications for the international system. They can reinforce or undermine confidence in a rule-based order, influencing perceptions of market stability. The globalization of supply chains extends their impact beyond direct targets to a wider range of products and countries. Trade diversion reshapes global trade patterns, and as sanctions become more prevalent, actors may begin anticipating future rounds. Sanctions fit within the long-standing debate on whether economic interdependence fosters conflict or stability. Realist theories view interdependence as a source of rivalry and vulnerability, where commerce serves as a tool of power (e.g. Gilpin, 1981; Lake, 2009; Farrell and Newman, 2019). In contrast, the liberal perspective argues that mutual economic benefits act as a constraint on conflict (e.g. Oneal and Russett, 1999; Gartzke, 2007). As sanction use grows, will states come to fear interdependence and take actions to lower their exposure to risk? At the systemic level, the disruptive effect of sanctions may trigger trade reallocation, which is distinct from their effects on trade and policy within the group of states sending and receiving sanctions. To explore these spillover effects, we ask how states react to sanctions imposed on their trade partners.

Our attention to third parties recognizes that sanctions often serve multiple purposes beyond changing the behavior of a target state. Research highlights their symbolic role, signaling resolve, and taking a moral stance (Lindsay, 1986; Li, 2024). Sanctions can also boost domestic political support, as seen in increased U.S. presidential approval (Whang, 2011), and build a reputation that encourages future sanction cooperation (Walentek, 2022). By branding the target as a pariah, sanction senders aim to deter others from engaging with it or repeating its actions. Our study on the third-party shift of trade flows supports this perspective that sanctions have a large audience. Other states that do not formally join the sanction coalition or that continue to express support for the target state, could nonetheless adjust their behavior in response. Such adjustments could give rise to a dynamic that generates diminishing leverage for sanctions because each case of sanctions leads countries to de-risk by spreading trade out across more partners.

Sanctions constitute a source of uncertainty in the global economy. The growing attention to geopolitical risks by firms is evident in news headlines and board meeting statements. Although the expanding scope of multilateral rules for trade and finance enhances the stability of the global economy, sanctions highlight the ongoing potential for governments to intervene at any time. We adopt a broad definition of sanctions as economic restrictions intended to influence another state on foreign policy or other political issues.[1] This accounts for how states invoke a wide array of reasons and impose different types of penalties. The ambiguous nature of the declared goals and the multiple instruments available add to the uncertainty. Each sanction episode raises fears about the next target.

The use of national security clauses to justify tariff increases against trade partners has further blurred the line between sanctions and trade policy. In February, the Trump administration linked the inflow of illegal migrants and drugs to an international emergency with Canada and Mexico to threaten a dramatic increase of tariffs against the two largest free-trade partners. Then in March, a national emergency for economic competitiveness and economic security was cited as the basis for a sweeping increase of tariffs against all trade partners. Both measures rested on the International Emergency Economic Powers Act of 1977 (IEEPA), more traditionally used to impose financial restrictions on foreign adversary assets as part of Cold War strategies and later to combat terrorist organizations. Other actions have used Section 232 of the Trade Expansion Act of 1962 to restrict imports of select items deemed to threaten national security, with steel and aluminum and recently auto industries selected for protection. When tariffs raise barriers around the US market as part of a demand on foreign governments to make changes to reduce the posited threat to U.S. national security, the tariffs start to resemble a sanction policy. Continued expansion of such actions by the United States and other governments would broaden the scope of sanctions and increase their potential impact on the global trade regime.

We examine whether sanctions prompt actors to expand their network of trading partners or concentrate trade with a smaller group of reliable partners. Diversification preserves access to global markets while mitigating dependence on any single trade source. In contrast, concentration offers

[1] This definition is adapted from Jentleson (2022).

safety by limiting the nodes susceptible to disruption. Governments and firms must weigh the two strategies, and their collective decisions reshape market patterns. Governments can influence trade through tools such as subsidies, tariffs, and informal guidance, while firms may independently adjust their strategies based on perceived risks and opportunities. In this paper, we analyze state-level trade flows without distinguishing between firm-driven and government-driven actions.

We use dyadic trade with a sanctioned state to identify states that may be affected by trade sanction spillover. Although all may observe the sanction, trade ties transmit the sanction shock to other parties. Through supply chains, sanctions could directly impact those who trade with the target state (Barry and Kleinberg, 2015). Trade partners of the target state must consider the possibility of secondary sanctions, which threaten to impose penalties on those trading with the sanction target (Early and Peterson, 2024).[2] Information flows will amplify the salience of the sanction for those who are partners in business with the target.

Sanctions are not imposed randomly. The strategic selection of sanction targets and the endogenous relationship between trade and cooperation have long challenged research on sanction policies. States may hesitate to sanction major trading partners due to the potential economic harm to their own economies. Even after sanctions are lifted, trade suppression can persist as protectionist lobbies gain influence in target states (Pond, 2017). However, this paper focuses on third-party states outside the sanction dyad. These states are less affected by the endogenous relationship between trade and sanctions. Additionally, if strategic selection leads third parties to trade less with sanctioned states, it would bias our results against finding any evidence of trade adjustments following sanctions.

We take two approaches to studying the spillover effects of sanctions on trade patterns. First, we conduct an aggregate analysis to examine the impact of the traditional form of targeted trade sanctions. This allows us to include a wide range of countries and products with variation over time in the sender, target, and third parties that have exposure to sanction events. Second, we focus on one episode of the U.S. national security tariffs that closely resembles a uniform system shock applied equally to all trade partners. The narrow scope with one sender and industry enables more precision

[2]The United States has imposed secondary sanctions in a small number of cases such as against Iran and North Korea.

to estimate the effect on trade flows.

Our empirical analysis uncovers two core findings: first, systemic politicization created by sanctions consistently pushes states to diversify: partner-concentration falls and the median country adds several new trade links within five years of a sanctions spike. Second, when the Section 232 tariffs singled out the United States, exporters indirectly exposed to the shock reacted directionally,[3] trimming the U.S. share of their steel-and-aluminum trade by 1.5-2% within 12 months while holding overall volumes constant. Moreover, these results carry broader implications. Trade diversification means that sanctions' coercive leverage erodes over time, as more and more countries rewire their trade network to mitigate their risk exposure to sanctions. Consequently, expanding sanctions have not yet reversed trade globalization. Rather than the wholesale fragmentation, where sanctions are expected to cleave the world into rival blocs, trade networks have thickened through rewiring, not retreat (Mohr and Trebesch, 2025). In sum, the world is becoming more resilient, and still resolutely interconnected, even as economic coercion spreads.

The next section develops our hypotheses about the impact of sanctions on trade diversification. We then introduce our data from the Global Sanctions dataset and explain our measurement of trade concentration. In the aggregate sanction analysis section, we begin by demonstrating that states with more sanctioned trade partners tend to reduce their trade concentration between partners. To address concerns about selection effects in trading patterns, we turn to a specific case: U.S. tariffs on aluminum and steel, which were imposed on national security grounds. These tariffs align with the broader definition of sanctions due to their non-economic justification. We contrast them with an earlier round of steel tariffs imposed as part of ordinary trade politics.[4] Since these tariffs affected all steel and aluminum, they are not subject to strategic targeting or evasion by means of transshipment. We examine how different groups of steel and aluminum exporters adjust their reliance on the U.S. steel market in response to the tariffs. Finally, in the conclusion section, we discuss the broader implications of trade spillovers for sanctions policy.

[3] We provide the theoretical definition of indirect exposure and its operationalization in Section 4.

[4] Trade embargoes and tariff measures are among the tools listed by Baldwin (1985) as negative sanctions. Bradley and Goldsmith (2024, p. 1789) cite the Section 232 steel and aluminum tariffs imposed by President Trump as an example of the longstanding delegation of trade sanctions authority to the executive.

2 Trading with the Target – Why Partners Diversify Trade

Increased attention to economic security highlights trade-offs between geopolitical risk and economic interdependence. Efficiency gains motivated the eagerness with which firms and governments sought deep engagement. Multinational firms could source and assemble products across borders through complex supply chains. Governments facilitated the expansion of commercial ties through trade and investment agreements that were viewed as opportunities for economic growth. However, the gains from interdependence give rise to vulnerability (Keohane and Nye, 1977). Excessive reliance on one source creates a choke point and dependence on global markets exposes the domestic economy to a weaponized world economy (Farrell and Newman, 2019; Beaumier and Cartwright, 2024).

Economic sanctions pose an important source of geopolitical risk. Each event restricts trade between the sender-target pair. Often the sanctions also call on more states to restrict their trade with the target and heighten economic punishment through multilateral sanctioning. The political and economic interests of third parties will shape whether they join the sanctions (Jentleson, 2022, p. 17). In addition, the sanction episode represents a signal to other actors. The goal of a sanction may include not only changing the behavior of the target state but also deterring others from similar actions. This implicit threat makes the sanction event destabilizing for the target, as well as future targets.

Our study on sanction spillover builds on extensive research into how economic statecraft influences state behavior. The effectiveness of sanctions in changing target state behavior remains debated, with evidence suggesting that both sanction goals and design shape their success.[5] Recent studies reveal the negative impact of sanctions on targeted firms and the the decline of trade between the sender and target (Ahn and Ludema, 2020; Afesorgbor, 2019). Particularly relevant to our work is research showing that broad international participation strengthens sanctions by isolating the target from alternative trade sources, thereby increasing both costs and credibility (Martin, 1992; Drezner, 2000). McLean and Whang (2010) highlight that sanctions are more effective when a target's trade partners

[5] See Drezner (2024) and Jentleson (2022).

cut ties. At the same time, there are many reasons for others to be reluctant to cut ties and play the role of sanction-busters (Early, 2009). (Barry and Kleinberg, 2015) warn that firms in the sanctioning state can undermine sanction effectiveness when they move investments into third-party states with a record of sanction-busting to create a back-door into the sanction target (Barry and Kleinberg, 2015). This aligns with our focus on third-party reactions to sanctions, but wehre prior work largely examines direct third-party cooperation with targets, we investigate how third parties redirect trade beyond the sanction dyad.

We ask about how sanctions impact bystander states that are neither directly targeted nor part of the sanctioning coalition. Third parties can respond to the spillover effects of sanctions through multiple channels. Trade diversion occurs when the target routes goods through third parties to offset lost commerce. Opportunism allows a third party to replace the target by "moving into markets the sender state leaves" (Jentleson, 2022, p. 17). In this paper, we propose that third parties also respond to the systemic risks posed by sanctions, adjusting their trade patterns in response to growing uncertainty about future economic cooperation.

Sanction events generate two distinct types of risks for third parties. First, they pose material risks by threatening third parties' economic gains from trade. Sanctions can disrupt established linkages with both the sender and the target, as well as broader global value chains (Early and Peterson, 2024). Second, sanctions introduce uncertainty risks by destabilizing expectations about trade relationships. Observers may interpret a sanction event as a signal that their trade partner is less committed to long-term cooperation, or that their own country could eventually become targets. When a sender uses trade coercion to pursue broader policy goals, it conveys a willingness to impose costs on its own economy and others, thereby raising the perceived likelihood of future sanction episodes.

The politicization of commerce can deepen third-party distrust, especially when there appears to be a tenuous link between a sanction event and the sender's stated policy objectives (Whang and Kim, 2015). For example, the Trump administration faced widespread criticism after invoking the fentanyl crisis to justify increasing tariffs, with the Chinese ambassador accusing the U.S. of "using fentanyl as an 'excuse' to hike tariffs" and warning of increased friction (Reuters, March 27, 2025). Such ac-

tions not only impose immediate material costs but also raise concerns about the potential for future escalations, prompting third parties to reassess and adjust their trade relationships. When material disruptions interact with expectations of further coercion, the resulting uncertainty can trigger an economic security dilemma, in which states preemptively act to reduce their vulnerability (Copeland, 1996, 2024). Similar dynamics can be seen in the past: in the 1930s, such concerns contributed to Germany expanding its trade network in Eastern Europe and Japan invading China, both moves aimed at securing alternative access to critical resources and markets (Hirschman, [1945] 1980; Mulder, 2022). In sum, we argue that third parties observe both the immediate fallout and broader strategic implications of sanction episodes, updating their expectations about the reliability of trade and their own risk of becoming targets.

This paper looks at how the disruption of trade and the increase in geopolitical risk from sanctions could motivate changes in the structure of trade flows across many countries beyond just the sender and the target. Volatility adds costs for businesses. Sudden restriction can lead to stalled production, shortages, and eventually impact jobs and growth. An extensive literature examines how firms adjust complex supply chains in response to disruption (e.g. Tang, 2006; Holweg, Reichhart and Hong, 2011; Katsaliaki, 2022). There is variation in the performance of a supply chain in the resilience dimension, which allows a return to normal business after a shock, and robustness, which reduces the impact of the shock on performance (Brandon-Jones et al., 2014). The scope of events causing disruption includes natural disasters and our focus in this paper – sanctions. The research by Antràs, Fort and Tintelnot (2017) demonstrates that foreign sourcing decisions of multinational firms are interdependent across markets. The clustering of firm-level sourcing, moreover, gives rise to the product-level observable implication of diversification.[6] Our work turns from fixed country features like size to consider political interventions in markets. The actors impacted by sanction-induced trade shocks go

[6]For example, in their recent paper, Iyoha et al. (2024) used product-level trade data to flag every China-to-Vietnam-to-U.S. shipment within the same HS code as potential trade diversion, following the US-China trade war since 2018. This measure captures both real evasion and legitimate production and thus inflates the counts and serves as a *upper* bound. In comparison, their firm-level metrics, which require the same Vietnamese firm to import and re-export the identical product, filter out most bona-fide processing and giving a conservative *lower* bound. In our paper, we measure trade diversification using product and state-level trade, and test our findings against the upper-bound measurement of trade diversion. More details can be found in Section 3.5

beyond multinational firms, and the costs to adjustment are felt widely. Powerful stakeholders such as farmers, unions, and industry associations can voice discontent when caught in the cross-fire of sanction spillover. Critical products from semiconductors to food are necessary for national security and consumer interest. In this context, actors will seek to reduce the risk of trade disruption.

Sanctions generate greater risk to trade than ordinary protection because they are less regulated by international rules. Decades of rule-making in the international trade regime have developed rules to manage government intervention in markets. Safeguard and remedy policies offer a rule-consistent form of protection for industries that face a flood of imports or unfair competition (Rosendorff and Milner, 2001; Pelc, 2016). Violations are handled in a legal dispute forum that restricts retaliatory responses by directing injured parties to a legal venue (Rosendorff, 2005; Davis, 2012). But these international rules apply differently for sanctions. In order to preserve sovereign authority, the WTO offers waivers for policies taken in the name of public morality and values (Article XX) and national security (Article XI). Although states disagree on how much leeway is afforded by this waiver, the deference to state intervention is much higher under this standard (Heath, 2020; Mavroidis, Hoekman and Nelson, 2023). As a result, a tariff on imports of cotton or steel in the name of human rights or national security, which would be considered a sanction, would have less restraint under international trade law than the same tariff imposed to protect a domestic industry from competition. The former relies on the self-judgment of the imposing government, while the latter is subject to multilateral rules that promote transparency, limit the duration of trade restrictions, and provide for dispute settlement. The unlimited nature of sanctions makes them prone to escalation. The sanctioning state could broaden the range of targets, the target could retaliate, and the wider trade system may weaken under the growing reliance on waivers. Therefore, we expect governments and firms to view sanctions as a distinct and more destabilizing threat to global commerce than traditional trade restrictions.

Risk mitigation could occur through diversification or concentration of trade partners. The pursuit of a wide range of economic partners helps reduce vulnerability to hold-up by one partner. A network with multiple suppliers offers the assurance that some trade will continue. Alternatively,

greater caution regarding whom to rely on might lead to a concentration of trade partners. By deepening dependence on those who are reliable, a state removes the likelihood that arbitrary moves could shut off critical trade flows. This latter strategy has become known as 'friend-shoring' because it involves moving trade and investment toward friendly countries. In this paper, we make the case that diversification is the more prevalent choice. Moreover, we identify two sources of trade diversification: partner diversification and product diversification, and discuss their advantages in turn.

The partner diversification strategy offers several advantages. In a period of uncertain alliances, it can be unclear who represents a reliable partner. Rather than narrowing trade to a small group of close allies, diversification will leave open more options, which can accommodate the fluidity of changing political relations. From an economic perspective, a wider range of partners adds flexibility. Analysis of supply chains has shown that scale contingencies based on the number of providers correspond to greater resilience and robustness to shocks (Brandon-Jones et al., 2014). Letting firms optimize across their own choice of partners will require less government intervention in subsidies and trade restrictions. To pursue friend-shoring through concentration of trade, governments must restrict firm activity and/or allocate resources for incentives that encourage firms to alter their strategies. Not only are such interventions costly, they could actually reduce supply chain resilience by forcing firms into a limited range of markets (Thakur-Weigold and Miroudot, 2024). Diversifying trade partners represents a prudent commercial strategy amid geopolitical risk.

Another response to geopolitical risk could focus on reducing exposure at the product level. Here, too, one could observe risk mitigation through either concentration or diversification. Through expanding the number of traded goods, states have opened their economies to more links with the global economy and multiplied the points of disruption. Reducing the range of trade products would help ameliorate this risk. Governments and firms could limit the spread of global supply chains across so many product lines by increasing the number of products produced at home. Rather than relying on global markets for critical goods, governments and firms can opt to produce more goods at home. In contrast, diversification of products can secure trade revenue from product-based disruptions. The high concentration of trade within one product magnifies the risk of holdup and empowers those

engaged in economic coercion. Similarly to how a diverse portfolio smooths the volatility of market swings, firms and governments can pursue a strategy of diversification of traded products.

We evaluate these different potential reactions to the risk of sanctions with the following hypotheses:

Hypothesis 1

- H_{1a}: Countries that trade with sanctioned countries are more likely to reduce their concentration of trade *partners.*
- H_{1b}: Countries that trade with sanctioned countries are more likely to reduce their concentration of traded *goods.*

Generally, we expect countries to react to sanctions with steps to diversify their trade and reduce concentration among trade partners. We look at an unusual episode to test this question at the micro level. After the Trump Administration came into office, it launched aggressive trade policy moves. We take up the initiation of tariffs on steel and aluminum under the authorization of Section 232 of the Trade Expansion Act of 1962, which we consider as an event that provoked geopolitical risk similar to a sanction event because of the national security justification for the tariff increase.[7] While the rhetoric focused on the threat of steel imports from China, fear of trade diversion through other markets led to the imposition of a universal hike in tariffs (later relaxed with waivers for some states). At the outset, the tariff increase had a much wider scope than targeted sanctions, as it applied to all countries with few exceptions. This offers an opportunity to examine the reaction of many countries in a situation that did not include strategic targeting or opportunities for diversion. The targets included China and U.S. allies. None could hope to pass trade through a third party back into the U.S. market because all trade faced the tariff. To the extent that we observe diversification of partners and goods in response, it is likely to represent a spillover from the sanctions.

[7] Increasingly the range of export control measures and tariff policies of the United States reflect protectionism of the domestic market and rivalry with China. The sanctions against Huawei and ZTE represented a move to reduce the vulnerability posed by communications infrastructure from a company close to the Chinese government (Jentleson, 2022, p.102).

Following an investigation initiated in April 2017 by the Department of Commerce, President Trump made a surprise announcement in early March that he would impose a 10 percent tariff on aluminum and a 25 percent tariff on steel. The move seems to have caught markets by surprise, as the announcement brought a day of sharp declines across stock markets in Asia, Europe, and the United States.[8] The tariffs were imposed on March 23, 2018. The news coverage of the investigation was sparse, and spiked in March around the imposition of tariffs.[9] Economic advisers acknowledged the tariffs would raise prices but reinforced the message that national security benefits outweighed these potential costs.[10]

Using this broad and sudden tariff to simulate an exogenous sanction shock, we evaluate the response of partners during the first year. In particular, we consider the top trade partners exporting steel and aluminum to the United States as targets of these sanctions and then focus on how others trading with them, but less dependent on the US directly, move to diversify trade. This approximates our broader interest in the spillover impact of sanctions. Not only did US steel and aluminum tariffs impact those trading with the United States, but they also shifted trade patterns of others through spillover to the partners of U.S. trade partners. We expect them to react with diversification moves at both the level of trade partners and products.

Hypothesis 2

- H_{2a}: Countries that are indirectly exposed to the Section 232 tariffs reduce their trade dependency with the US via extensive margin adjustment.

- H_{2b}: Countries that are indirectly exposed to the Section 232 tariffs reduce their trade dependency with the US via intensive margin adjustment.

[8] "Wall St, Rattled by Fears of Trade War, Has Rocky Open Before Gaining Ground," *New York Times* 2 March 2018.

[9] A search of all news coverage in the Proquest database between March 2017 and April 2018 finds that the number of articles with reference to the keywords (Tariffs, Section 232, aluminum, and steel) rose from zero in March 2017 to 4 a month in April and May with low-level attention continuing until an increase to 23 articles with a reference in February 2018 and 102 in March 2018. A search of the leading Japanese economic news source, Nikkei Shimbun, using Japanese language keywords found no article references for the three months at the start of the investigation March - May 2017 with a few articles in February 2018 followed by a peak of 35 articles in March 2018 and 16 in April. We also include the Google trend of the term "section 232" in the Appendix which shows a sharp spike around March 2018.

[10] "White House Economic Adviser Says Benefits of Tariffs Would Outweigh Costs," *Wall Street Journal,* 7 March 2018.

3 Global Reactions Towards Sanction Spillovers (Hypothesis 1)

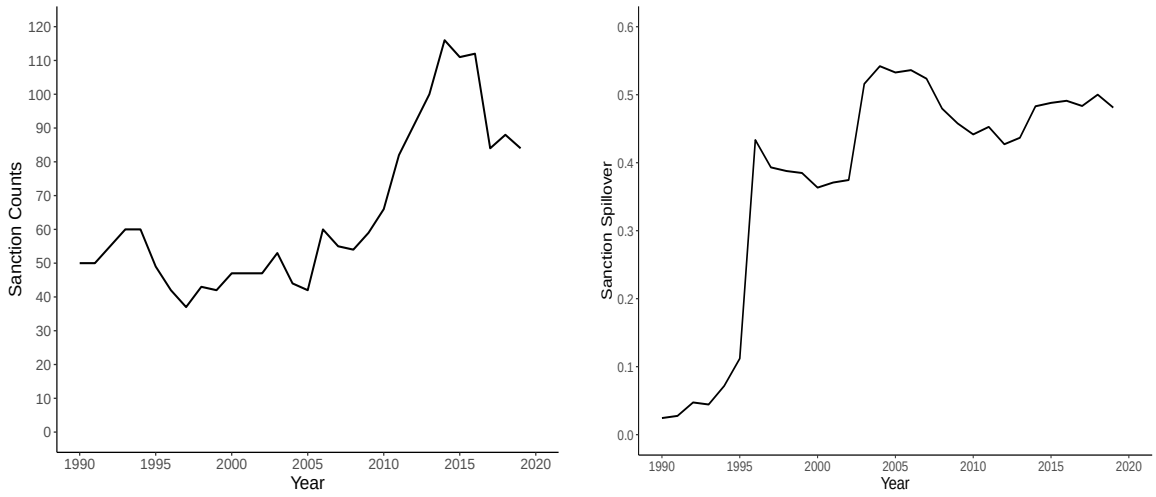
In order to test the first hypothesis, we evaluate the relative exposure of a country to sanctions as a third party. The key independent variable is the share of trade with other states subject to sanctions, which we refer to as sanction spillover. We assess how changes in the share of trade with sanctioned states correlate with changes in the concentration of trade in subsequent years. This involves constructing measures at the country-year level that aggregate across trade partners for both the exposure to sanctions and the response to change the structure of trade.

3.1 Measuring Sanction Spillovers

We utilize the Global Sanction Database (GSDB) to identify the senders and receivers of sanctions (Felbermayr et al., 2020). The GSDB documents over 1,100 incidents of unilateral and multilateral sanctions since the 1950s. The database is the most comprehensive in the scope of sanctions and time period covered.[11] We restrict our attention to the post-Cold War era. The period from 1990-2020 is more appropriate for testing our theoretical arguments for two reasons. First, most sanctions during the Cold War were issued between the two ideological camps thus creating little shocks to the international trade regime. The bipolar structure of the international system during this period encouraged a separation of trade to favor trade with allies over adversaries (Gowa, 1994). Second, the development of communication and transportation technology, as well as the founding of the WTO in 1995, supported the expansion of trade and global value chains. Since 1990 most states are engaged in the world economy. We examine the subset of sanctions that restrict trade; the measures impose partial or complete bans on the import or export of goods with the target countries. This results in a total of 14,010 country dyads that are involved in 734 trade sanctions. In Figure 1, panel (a) shows the trend of trade sanctions since 1990.[12] The use of trade sanctions gradually increased during the

[11] In comparison, the Threat and Impositions of Sanctions (TIES) dataset, which is another commonly used source of sanction events, was last updated till 2012.

[12] A multilateral sanction event will count as one sanction, corresponding to a unique sanction ID in the Global Sanction Database. Each year that a sanction continues to be in place will count toward the total sanction count. Targeted sanctions (i.e. US sanctions against Chinese semiconductor firms) are counted at the inter-state level.



(a) Number of Sanctions in Place (b) Global Average of Sanction Spillover

Figure 1: Panel (a) plots the total number of sanctions put in place each year between 1990-2020. Panel (b) plots the overtime trend of sanction spillover. The values in panel (b) are the mean value across all countries' exposure to sanction spillover, i.e., the percentage of their trade that occurs with countries subjected to trade sanction.

Cold War period. Since then, the number of active sanctions declined during the decade from 1995 to 2005 before rapidly rising to historic levels in recent years.

Each sanction event creates potential spillover to third parties. We focus on those connected to the sanctions through their trade with the target. Specifically, we measure sanction spillover as the ratio between that party's total trade volume and the amount of trade it engages with other countries that are under direct sanctions. For example, 28% of trade Belarus conducted in 2013 is with countries under active sanctions. In 2014, the number soared to 87%, following the sanctions imposed on Russia after the annexation of Crimea. More formally, our calculation of countries' exposure to sanction spillovers each year is stated in Equation 1:

$$\text{SANCTION SPILLOVERS}_{i,t} = \frac{\sum_{i' \neq i}^{C} \mathbf{1}(i'_t \in \mathcal{A}_t) \times d_{ii',t}}{\sum_{i' \neq i}^{C} d_{ii',t}} \tag{1}$$

, where d denotes the bilateral exports and imports between i and i', C is the full set of countries in the dataset, and $\mathcal{A}$ is the set of sanctioned countries. Panel (b) in Figure 1 plots the global average

of sanction spillover over the period of 1990-2020.[13] It shows the global trend for the amount of trade directly impacted by sanctions and affected by sanction spillovers. While the amount of directly impacted trade takes up a small percentage of global trade and remains stable over time, the amount of trade affected by sanction spillovers is significantly larger and increasing. In recent years, around half of global trade occurs with countries that are subject to some form of trade sanction.

3.2 Measuring Trade Concentration

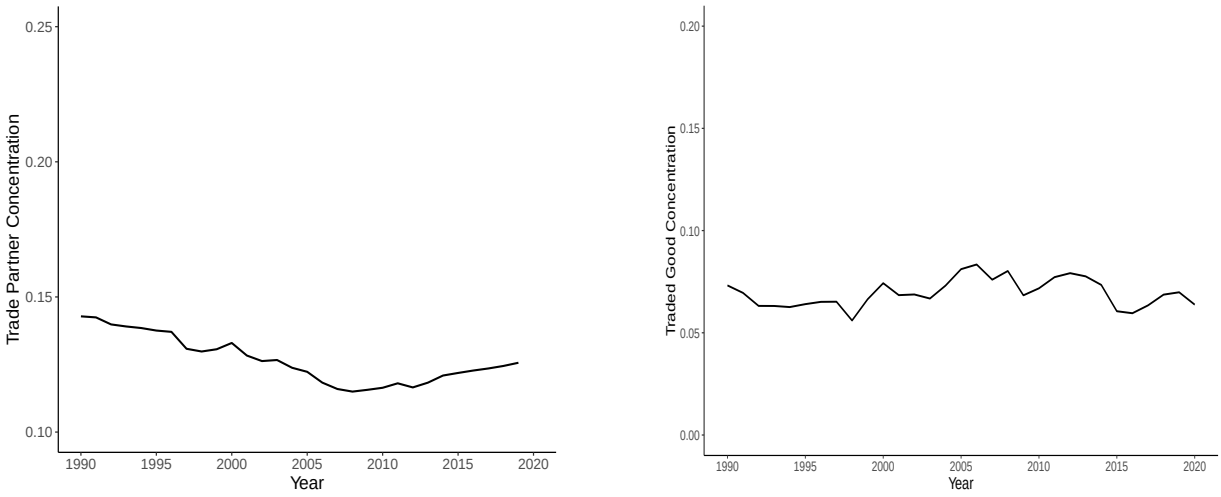
We evaluate the impact of trade with sanction targets on broader trade with the rest of the world. Our key quantities of interest are the degree of concentration in trade partners and traded goods. The Atlas of Economic Complexity dataset contains the annual flows of traded goods recorded at the 4-digit level between 1990 and 2020. Using this information, we measure trade concentration by constructing two sets of Herfindahl–Hirschman index (HHI), which is commonly used to capture market, trade, and production concentration (Rhoades, 1993; Mulwa and Visser, 2020; Roberts, 2021). The following formula represents the measure of trade concentration with one based on partner countries and one based on sector:

$$pHHI_{i,t} = \sum_{i':i' \neq i}^{\mathcal{I}} p_{i',i,t}^2 \quad , \quad gHHI_{i,t} = \sum_{g=0}^{\mathcal{G}} s_{i,g,t}^2 \tag{2}$$

, where $pHHI$ computes the HHI for country i based on its trade flows with other non-sanctioned trade partners, and $gHHI$ computes the HHI for country i based on its trade flows in each sector (based on SITC Rev.4 classification scheme). $\mathcal{I}$ indicates the complete set of countries, and $\mathcal{G}$ denotes the complete set of sectors, aggregated to the 4-digit level. $p_{i',t} = \frac{d_{ii',t}}{\sum_{i' \neq i}^{I} d_{ii',t}}$ denotes the share of i''s trade flow with i. Lastly, $s_{i,k} = \frac{d_{i,g,t}}{\sum_K d_{i,g,t}}$ denotes the share of good g in the total trade flow of country i.

Globally, the average level of trade partner concentration declined between the end of the Cold War and the 2010s and increased in the recent decade. The concentration of traded goods has been

[13] The spike in sanction spillover's value around 1996 can be attributed to Canada's ban on the EU's beef export. Removing this sanction event does not change the patterns of downstream empirical findings.



(a) Global Average of Trade Partner Concentration (b) Global Average of Traded Good Concentration

Figure 2: Overtime Trends for Trade Partner Concentration (panel a) and Traded Good Concentration (panel b) between 1990-2020. The values for each year are the mean value across all countries' concentration index.

more stable, although it experienced a decline in the past decade. These trends are visually represented in Figure 2. To further probe the face validity of our measurements, Figure 3 plots the temporal trends of trade partner concentration of selected countries over a longer period of time annotated with bench-marking events. Many factors can influence the shift in trade concentration for a country. The descriptive trends validate our measurement of trade partner concentration both in the relative levels and in the timing of expected turning points based on known events relevant to trade relations. The US has the largest number of trade partners and does not have a high dependence on any single country, which is evident in its low concentration indices over the observed period. In contrast, Mexico has a much higher concentration given its dependency on the US. Mexico sees a decline in concentration of its trade a few years after ratifying NAFTA and the OECD in 1994, which broadened its trade with Canada and other countries. China's trade partners have increased since accession to the WTO in 2001, which is evident in the downward trend of its concentration index. Lastly, Vietnam had one of the highest trade partner concentrations on record after the end of the Vietnam War in 1975 (>2 s.d. above the mean level), with more 70% of its recorded trade directed toward Japan. The concentration quickly went down after the country restored post-war trade rela-

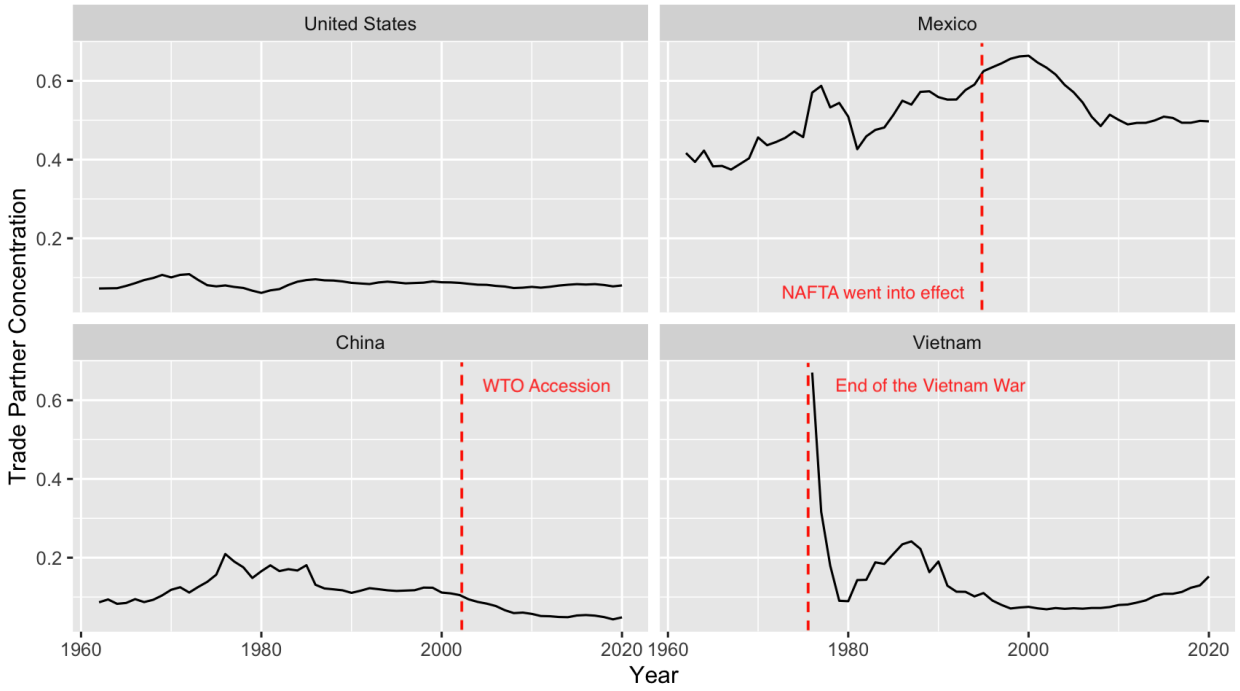


Figure 3: Trade partner concentration for the US, Mexico, China, and Vietnam, 1960-2020

tions with a wider range of countries and then further broadened with normalization of ties with the US in 2001 and accession to WTO in 2007. Similarly, fig. 4 plots the corresponding trends for traded goods concentration. A country like Qatar, whose trade is heavily dependent on oil products, has a much higher concentration of traded goods than other countries.

3.3 Empirical Results

We evaluate H_{1a} and H_{1b} with OLS regression models estimated with two-way fixed effects for country and year. In two separate models, we analyze the impact of sanction spillover on trade partner concentration (`pHHI`) and traded goods concentration (`gHHI`) with the following specification:

- $H_{1a} : pHHI_{i,t+f} = \beta_0 + \beta_1 S_{i,t} + \sum_{k=2}^{n} \beta_k X_{k,i,t} + \beta_{k+1} pHHI_{i,t} + \alpha_i + \gamma_t + \epsilon_{it}$
- $H_{1b} : gHHI_{i,t+f} = \beta_0 + \beta_1 S_{i,t} + \sum_{k=2}^{n} \beta_k X_{k,i,t} + \beta_{k+1} gHHI_{i,t} + \alpha_i + \gamma_t + \epsilon_{it}$

On the left-hand side of the equations, we lead the outcome variables by $f = \{1, 2, 3, 4, 5\}$ years to examine whether the sanction shock creates temporary or persistent adjustments to a country's

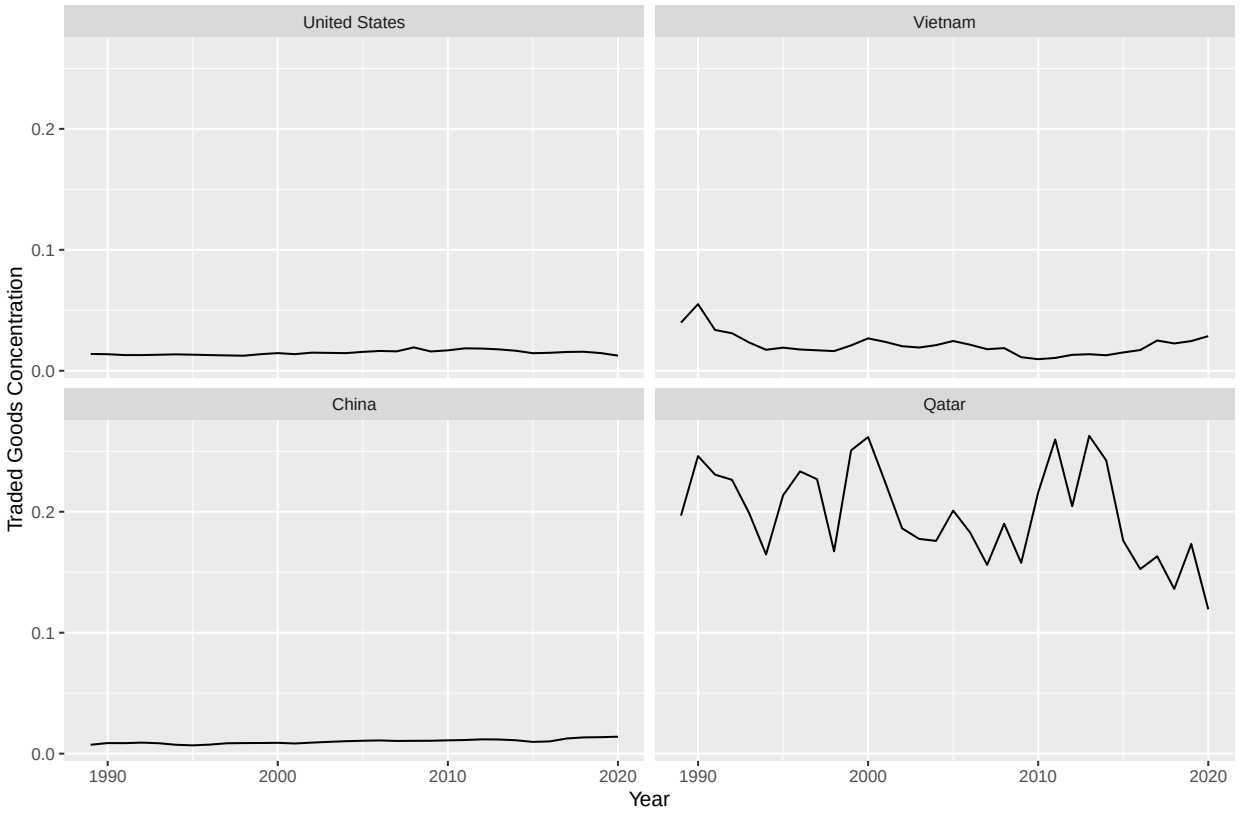


Figure 4: Traded goods concentration for the US, China, Vietnam, and Qatar, 1960-2020

trade network. In each leading year f, we fit a separate linear model to estimate the effect of trade shock after f year(s). On the right-hand side of the equations, we first include a set of covariates, X_k, to account for factors that the literature highlights as important predictors of trade. We measure the level of development and dependence on trade using GDP per capita and total trade volume. Then, to account for the impact of conflicts on trade flows, we also constructed a binary variable equal to one if country i engages in one or more fatal militarized interstate disputes (MIDs) in year t (Palmer et al., 2022). Next, we include the electoral democracy index from the Variety of Democracy Project (V-Dem) as a measure of democratic institutions to control for regime type (Coppedge et al., 2024). The index is derived from experts' evaluations of the quality of electoral democracy across countries and ranges from 0 to 1. Membership status in international organizations such as the GATT/WTO, the EU, and the OECD may correlate with the breadth of trade and political relationships, and so we add separate indicators for membership in these three organizations (Davis and Pratt, 2021). Fi-

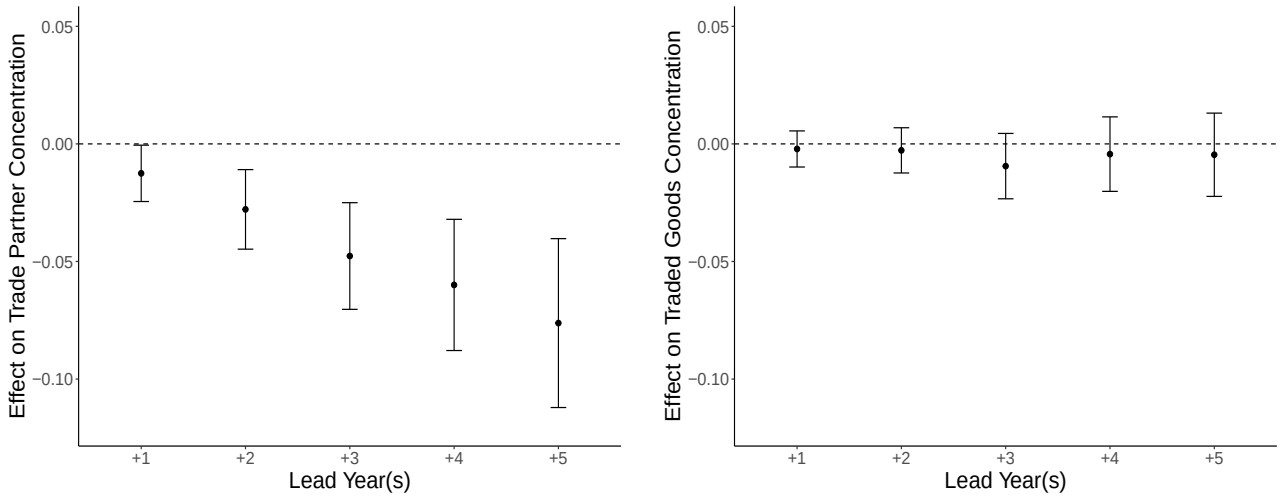
nally, to differentiate sanction spillovers from the impact of direct sanctions, we include a dummy variable equal to one if country i is the specific target of a trade sanction in year t. In addition to the control variable, we also account for potential temporal dependencies by including for the outcome variable at its value in year t as an additional control in each model. Furthermore, to capture unobserved country-specific and latent time trends, α_i and γ_t are included as the country and year fixed effects respectively. Summary statistics for the variables involved in our analysis can be found in the Appendix A.

The main results are visualized in Figure 5.[14] Panel (a) shows that in the first year, the effect of sanction spillover on trade partner concentration is estimated at -0.05 with the 95% confidence interval ranges between [-0.07, -0.01]. Over five years, the negative correlation between sanction spillover and trade partner concentration becomes stronger with lower estimates and shorter confidence intervals. Averaging over the next five years, the substantive effect size roughly corresponds to the decrease in trade partner concentration 5 years before and after China joined the WTO in 2001; Or, the difference between trade partner concentration in the US and Oman in 2020. This provides strong empirical support that sanctions events create spillover shocks to third-party countries that prompt them to pursue a more diverse trade partner portfolio. In contrast, panel (b) shows that sanction spillover has little effect on a country's traded goods concentration: while the point estimates are in the expected negative direction, the effects are substantively close to zero and are statistically insignificant under the conventional threshold of $p = 0.05$. Overall, we find support for hypothesis 1a for the impact of sanction spillover on trade partner concentration impact but not for hypothesis 1b about trade product concentration.

3.4 Robustness and Sensitivity

Our analysis shows that trade diversification occurs primarily through the expansion of trading relationships, rather than through changes in the range of goods traded. Specifically, we find that states

[14] Complete tables of regression results can be find in appendix section B. Furthermore, we conduct Benjamini-Hochberg (BH) procedures in our main model specifications to ensure that the false discovery rate remains below 0.05 (Benjamini and Hochberg, 1995). A brief description of the BH procedure and adjusted p-values can be found in Appendix section B.1.



(a) Spillovers reduce partner concentration

(b) Spillovers do not affect goods concentration

Figure 5: The effects of sanction spillover on trade partner concentration (panel a) and traded goods concentration (panel b). The X-axis plots five separate models in which the outcome variable is lagged by $f = \{1, 2, 3, 4, 5\}$ years. We use robust standard errors clustered at the country level. The error bars denote 95% confidence intervals calculated based on clustered robust standard errors.

tend to increase both the number of their trade partners and the volume of trade with existing partners, but we do not observe a significant shift in the composition of traded products. One explanation for this null result is that trade adjustment could be sector-specific. Because most of the sanctions imposed during the period we study target specific products or industries, rather than entire economies, firms trading in unaffected sectors may not perceive these sanctions as relevant to their own commercial activities. Consequently, any adjustment in goods trade may be too narrow to register in aggregate-level analysis. Such sector-specific changes are most likely to occur among partners with highly concentrated product portfolios. To assess whether heterogeneity in product-level trade patterns between different partners influences our main results, we conduct an additional analysis that measures each country's trade partner concentration separately for each traded product. As reported in Appendix C.1, our findings for H_{1a} remain robust after accounting for variation at the product level.

In addition, our main findings are robust to a range of alternative model specifications. First, we fit an autoregressive distributed lag model to further account for potential temporal dependencies in

the independent variable. Second, since about 20% of sanctions between 1990 and 2020 were issued to prevent or end wars (Global Sanction Database), we exclude those cases to ensure that observed changes in trade partner concentration reflect sanctions rather than conflict dynamics. Third, we assess whether the results are driven by sanctions issued by smaller economies, and confirm robustness when limiting the analysis to sanctions from countries with GDPs in the top quartile. Fourth, we investigate whether our results are driven by the United States as an outlier that is both the largest economy and most frequent source of sanctions. While omitting U.S.-led sanctions weakens statistical significance, the direction of the effects remains consistent. Lastly, we exclude UN sanctions, which represent about 10% of the total. These sanctions could be distinctive because they call for every UN member to suspend trade with the target, although compliance is often incomplete. Across all tests, the results align closely with those of our main analysis (see Appendix C).

We also conduct a set of sensitivity analyses to address concerns about unobserved confounders. We adopt an omitted variable bias framework proposed by Cinelli and Hazlett (2020) and use countries' V-Dem score regarding their electoral democracy as a benchmark to test how robust our results are to omitted variables. We select this benchmark because political regime is another source of uncertainty, and it represents a covariate that has also been theorized to correspond with broad trade preferences (Rickard, 2015). The results in Appendix B.2 indicate that the effect of sanction spillover on trade diversification remains negative and statistically significant at the 5% level after accounting for unobserved confounders that are up to 30 times stronger than the effect of democratic institutions.

Additionally, we extend our analysis by applying our framework to a more disaggregated data structure. Specifically, we estimate a gravity model of bilateral trade flows using dyadic trade data, allowing us to capture detailed patterns in how sanctions influence third-party behavior. This approach moves from aggregate trends at the country level to examine how sanction spillovers reshape trading relationships between individual country pairs. We find that countries facing higher levels of sanction spillovers tend to scale back their average import volume with each trade partner, which is consistent with efforts to diversify trade across more trade relationships. This supports our broader thesis that sanction episodes have ripple effects even among countries not directly targeted. Full

model specifications, estimation techniques, and detailed results are provided in Appendix E.

3.5 Patterns of Diversification

Our argument suggests that governments and firms exposed to sanctions will engage in diversification as part of risk mitigation. The above analysis supports the expected empirical pattern. But we are unable to observe their decision process for a direct test of the mechanism. Here we further explore how diversification redirects trade to shed light on potential mechanisms.

Our theory suggests that states and firms mitigate geopolitical risk through a strategic reduction of dependence on any one partner. But diversification would also arise when an opportunistic trader expands trade ties to fill markets closed by sanctions on a trade partner. This could occur through substitution or as a conduit for the sanction target to redirect trade through trade partners.

The trade diversion logic forms one mechanism in which sanctioned countries circumvent sanction restrictions with the cooperation of third parties that reallocate export destinations. Stories abound of increased trade flows by Russia's neighbors after sanctions restricted its access to markets – a surge of smartphone exports from Armenia to Russia and shadow shipping arrangements that facilitate the movement of Russian oil are among these examples.[15] Myanmar allegedly buys its aviation fuel from firms registered in Singapore and Thailand.[16] Such evasion would give rise to new trade flows for the intermediary countries, but follows a different logic from our argument about risk.

While some level of sanction evasion undoubtedly occurs, illicit trade flows are difficult to measure directly. Recent research has also questioned the overall scale of such evasion (Gutmann, Neuenkirch and Neumeier, 2024), and documented a significant gap between product-level diversion and firm-level diversion (Iyoha et al., 2024).[17] Our more focused objective is to assess whether sanction evasion helps explain the trade diversification patterns we observe. Specifically, we examine the emergence

[15] Swanson, Ana "Russia Sidesteps Western Punishments, With Help From Friends" *New York Times,* 31 January 2023.

[16] Paddock, Richard. "Bombs Rain Down in Myanmar as Junta Evades Sanctions to Buy Jet Fuel," *New York Times,* 3 August 2024.

[17] In their recent study, Iyoha et al. (2024) find that by 2021, the US tariff on Chinese exports between 2018-2019 led to a 5.9 percentage point rise in product-level rerouting, while firm-level rerouting only increased by 0.2 percentage point.

of new product-level trade flows, which could suggest diversion by sanctioned states. If sanctioned countries are redirecting trade, we would expect to see products they had not previously traded with new partners form a new trade flow. To test this, we construct alternative dependent variables capturing the number of newly exported, imported, or traded goods at the 4-digit level, using count-based models (negative binomial and Poisson regressions). Full details on variable construction and statistical results are provided in Appendix section D.1. Across all model specifications, we find no significant correlation between sanction spillovers and the number of newly traded goods. These results cast doubt on trade diversion as the main driver of the observed reduction of trade partner concentration.

Furthermore, we examine whether the pattern of diversification across trade partners varies based on product characteristics. Although we do not observe systematic spikes in newly traded goods when countries experience higher levels of spillover of sanctions, it is likely that some goods are easier to diversify to more trade partners than others, based on their relative positions in the value chain. Based on the Broad Economic Categories (Rev. 5) classified by the UN Trade Statistics, we subset the traded goods into intermediate and final goods and calculate two measures of trade partner concentration based on each subset.[18] We then fit the concentration measures for final and intermediate goods with the same model specifications as H_{1a}. Full statistical results and visualizations are provided in Appendix D.4. These findings show that, in line with our theoretical expectation, final goods are diversified across trade partners at a higher level than intermediate goods, as they are less constrained by the physical placement of value chains.[19]

Next, we discuss which actors promote trade diversification. Our theory highlights the agency of third-party states in shaping their trade portfolio. However, it is possible that the trade adjustment we observed stems not from third-party states' incentive to manage systemic risks and uncertainties in economic cooperation, but from pressures imposed by the sanction-sending states, particularly when they are economically and politically powerful. To assess whether the leverage of sanction-

[18]The BEC classification also designate some goods as "capital goods", which are machinery or equipment used to produce other goods, we exclude capital goods from our analysis for conceptual clarity.

[19]Similarly, recent research on wartime trade has found similar patterns in trade diversion, in which trade adjustments took longer time for final goods than for intermediate goods and raw materials. See Grinberg (2021).

sending countries over third-party states drives our main results, we construct an alternative measure of sanction spillover. Instead of calculating the ratio between a country's total trade and its trade with sanctioned countries (as in our main specification), this alternative measure captures the ratio of a country's total trade to its trade with countries that are *sending* sanctions. Theoretically, if pressure from sanction-senders influences third-party states' decisions to diversify trade, then this measure should negatively correlate with trade concentration—since greater exposure would reflect greater economic dependence on sanction-sending states. However, our empirical analysis shows that this effect is substantively small and statistically insignificant (see Appendix section D.3). We therefore conclude that external pressure from sanction-senders is unlikely to account for the observed trade diversification among third-party states.

Finally, we investigate the destinations of trade diversification. In particular, we are interested in whether diversification in trade partners is a result of friends-shoring. This occurs when diversification represents the redirection of trade to higher concentration with a pool of "friendly" states.

We proxy 'friends' using two forms of international cooperation. First, we define "friends" as countries that share formal ties with defense alliances, based on data from Leeds et al. (2002). Such alliances reflect commitments to security cooperation, and the relationship between geopolitical alignment and economic exchange has been widely examined in international relations research (Gowa, 1994; Davis and Pratt, 2021; Kinne and Peinhardt, 2024). To assess friend-shoring, we calculate the share of a country's total trade conducted with its defense alliance partners. We then regress this ally trade ratio on the level of sanction spillover each state experiences. The coefficient for sanction spillover becomes statistically significant and positive beginning in the second year after exposure to heightened sanction shocks. Additional details on variable coding and statistical results are provided in Appendix D.4. These findings suggest that, rather than expanding trade indiscriminately, states engage in more cooperative behaviors with geopolitically aligned states and shift trade toward them when diversifying in response to geopolitical risk.

We also examine friend-shoring toward trade agreement partners, as distinct from defense treaty allies. We look at two separate outcomes: the number of a country's trade agreement partners, and the

ratio of trade conducted with trade agreement partners. We find that exposures to sanction spillovers significantly increase both the number of trade partners with which countries sign trade agreements, as well as the ratio of trade with trade agreement partners (Appendix D.4). Both results from allies and from trade agreement partners suggest that when faced with risks from sanction spillovers, countries do not simply retrench into pre-existing trade-blocs, but instead expand the pool of "friends" with whom their domestic firms can establish trade relations at a lower cost. Negotiating new free trade agreements is a government-led dimension for trade diversification.

The next section addresses these questions using a different research design. To distinguish among the patterns discussed above, we analyze a specific sanction event and track how trade flows adjust in response. We focus on the tariffs imposed by the United States in 2018, enabling a product-level analysis of trade responses. This approach allows us to examine whether trade in sanctioned goods becomes more or less concentrated and to identify where trade flows are redirected.

4 National Security Tariff (Hypothesis 2)

When states impose sanctions, they can restrict trade by requiring export licenses or banning imports. Raising tariffs is a partial measure that increases the cost of trade without fully cutting it off. When implemented as part of broader economic policy, tariff changes are not classified as sanctions. But when implemented to pursue noneconomic goals, they can become a sanction.

In 2018, President Trump announced tariffs of 10 % on aluminum imports and 25% on steel imports. What made these tariffs unusual was the use of Section 232 of the Trade Expansion Act of 1962, a rarely invoked provision that allows the president to restrict trade for national security reasons[20]

At the time, China had become the world's largest steel producer and was widely accused of flooding global markets, lowering prices, and damaging steel industries in other countries. Over the years, the U.S. had imposed various trade barriers against Chinese steel. However, the new tariffs were framed as a national security measure, highlighting concerns that dependence on global markets for critical metals could weaken U.S. military strength. Despite rhetoric emphasizing China's role in

[20]This legal provision requires an investigation, which the Commerce Department initiated in 2017 to assess whether steel and aluminum imports posed a national security threat (Fefer, Jones and Platzer, 2021).

overproduction, tariffs were imposed on all countries.

This tariff hike in the name of national security connects to both risks that we have discussed as sanction spillover. It had a direct impact on steel exporters, who faced higher costs and uncertainty about market access in the United States. It also raised concerns that geopolitical tensions could further weaponize trade. In response to WTO challenges from multiple countries, the United States invoked the national security exception, asserting that WTO rules permit trade restrictions during an international emergency and that each member state has the right to define what constitutes such an emergency. By invoking this rationale, the U.S. positioned the tariffs outside the usual constraints of both domestic and international trade law.

This episode provides a clear and isolated shock to the global trading system. The announcement was unexpected and applied equally to all trade partners, making it a valuable case for analyzing how countries reallocate trade in response to sudden policy changes.

4.1 Modeling spillover for steel and aluminum exporters

Drawing on product-level monthly trade data, we decompose the channels through which diversification occurs. Specifically, we examine whether reductions in trade partner concentration result from adjustments along the intensive margin, by reducing trade with the United States, or along the extensive margin, by expanding trade to additional partners. Parallel to our analysis of sanction spillover, we highlight the impact on those who are indirectly impacted by the tariffs through trading with countries highly dependent on the U.S. market. This analysis provides insight into how states respond to risk and uncertainty in the international trading system.

To test the second set of hypotheses (H_2), we leverage the exogenous shock of the US imposition of the Section 232 tariff to examine variation in responses across different groups of countries. For more precise estimation, we extracted the product codes listed in the tariff schedule released by the US Department of Commerce[21] We then matched the sanctioned steel and aluminum products to their 6-digit Harmonized System code and collected corresponding monthly trade data from UN Comtrade.

[21]For steel products: 720610 through 721650, 721699 through 730110, 730210, 730240 through 730290, and 730410 through 730690; For aluminum products: 760110 through 760990.

Our analysis includes all countries trading in steel and aluminum, with a focus on differences in tariff exposure based on their pre-tariff trade volumes with the United States.

We divide countries into three groups. The first group consists of countries for which the United States is among the top three steel and aluminum export destinations; we label these countries as *directly* impacted by the tariffs. The second group comprises countries that have substantial trade with those in the first group—that is, any first-group country is among their top five export destinations for steel and aluminum. These countries are considered *indirectly* impacted through the spillover effects of the tariff. The third group includes all remaining countries trading in these products and serves as the baseline control group. These groupings are designed to produce three sets of roughly equal size. A complete list of countries and their classification is provided in section G. We also conduct additional analyses using alternative thresholds to confirm robustness.

To empirically evaluate hypothesis 2, we use a difference-in-difference (DiD) estimation with matching covariates (Imai, Kim and Wang, 2021). This approach improves the validity of our inferences about the impact of the tariffs by selecting appropriate control units for comparison in our monthly time-series cross-sectional trade data. For each treated state, we first select a set of matched control states with identical treatment histories up to L months prior to the enactment of Section 232 tariffs. We then construct the matching set M using covariates and lagged outcomes, ensuring comparability of the covariate and outcome history between the treated and controlled countries. For each matched set M_{it}, we compute the difference-in-difference estimate for each treated country and then average it across all matched sets to estimate the causal effect. Formally, the estimator we apply can be expressed as:

$$\hat{\tau}(F,L) = \underbrace{\frac{1}{\sum_{i=1}^{N}\sum_{t=L+1}^{T-F} D_{it}} \sum_{i=1}^{N}\sum_{t=L+1}^{T-F} D_{it}}_{\text{Average over all countries}} \underbrace{\{\left(Y_{i,t+F} - Y_{i,t-1}\right) - \sum_{i' \in M_{it}} \left(Y_{i',t+F} - Y_{i',t-1}\right)\}}_{\text{country-specific estimate}} \tag{3}$$

, where D is the exposure to tariffs, measured by an indicator for belonging to directly or indirectly impacted groups of steel traders. We focus on March 2018 as the time of treatment because President Trump made his surprise announcement on March 1st and imposed the measures on March 23rd. F

and L are the numbers of lead and lag months relative to the time of treatment (March 2018). Y is the outcome of interest. For H_{2a}, where we are interested in evaluating the extensive margin, Y_i denotes the number of steel and aluminum trade partners of country i. For H_{2b}, where we are interested in evaluating the intensive margin, Y_i denotes the ratio of country i's steel and aluminum trade to the US and its total trade volume of steel and aluminum. The set of control variables used in H_1 are used here as the matching covariates. Specifically, we use the covariate-balancing propensity score matching method (Imai and Ratkovic, 2014) to find 10-15 control countries for each treated country such that both covariate balance and the conditional probability of treatment assignment between treated and controlled units are maximized.[22]

4.2 Empirical Results

We apply the difference-in-differences (DiD) estimator to evaluate two quantities of interest: the effect of Section 232 tariff enforcement on (1) the share of steel and aluminum exports directed to the United States and (2) the number of export destinations for these products. We choose to use these outcome variables because Section 232 tariff is a US-only policy shock. Thus, changes in the US share directly capture the hypothesized reallocation away from the source of uncertainty.[23] Focusing on temporal variation within countries that trade steel and aluminum, we assess whether post-tariff trends diverge from pre-tariff patterns. Additionally, we examine whether these effects differ by countries' level of trade exposure to the United States. To do so, we conduct two separate comparisons: (1) between the directly impacted group and the control group, and (2) between the indirectly impacted group and the control group. This design yields two sets of estimates corresponding to the hypotheses outlined in section 2.

We apply the DiD estimator to evaluate two quantities of interest: the effect of Section 232 tariff enforcement on (1) the share of steel and aluminum exports directed to the US, and (2) the number of export destinations for these products. Focusing on the temporal variation within countries that

[22] The matching covariates are well-balanced, with standard mean differences between -0.25 and 0.25.

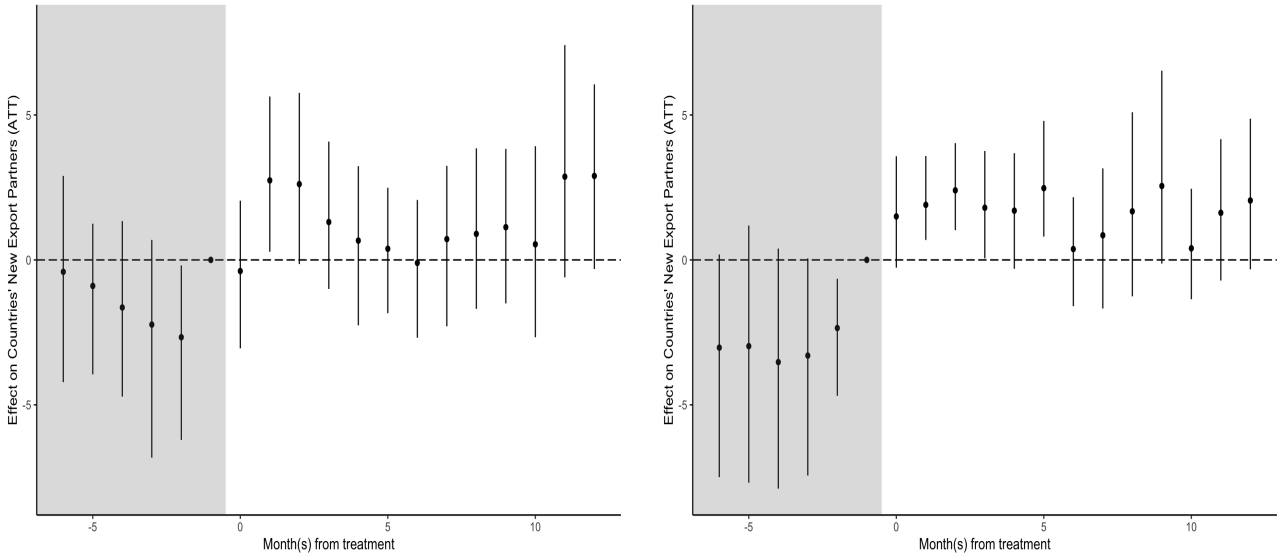
[23] In contrast, a partner-level HHI aggregates movements across all partners and can change little – even when exposure to the US falls – if flows concentrate in one alternative partner.

trade steel and aluminum, we assess whether there is a difference in the trend before and after the tariff. We examine whether these effects differ by countries' level of trade exposure to the United States. To do so, we conduct two separate comparisons: (1) between the directly impacted group and the control group, and (2) between the indirectly impacted group and the control group. This design yields two sets of estimates corresponding to the hypotheses outlined in section 2.

First, we examine the impact on the extensive margin measured by changes in the number of trade partners. We expect the tariffs to have a positive effect, because adding more partners brings diversification to the trade profile of a country. We compare the number of trade partners during the treatment period among the directly impacted and indirectly impacted countries relative to the control groups. As a test of (H_{2a}), fig. 6 plots the estimated impact of the tariff imposition on the number of steel and aluminum export destinations other than the US. $t = 0$ indicates the first month when Section 232 tariffs were enacted (March 2018). We measure the effects from the onset of the tariffs, leveraging their sudden announcement and enforcement. In both panels in fig. 6, we plot the contemporaneous effects at $t = 0$ and the persistent effects after the tariff enforcement for 12 months (from $t = 1$ to $t = 12$). The shaded regions for periods prior to the imposition of the tariffs aim to detect anticipation effects and pre-trends. We use $t = -1$ as the reference group and plot the estimated effects for up to six months before the enactment of Section 232 tariffs ($t = -2$ to $t = -6$).

As shown in panel (a), estimates are mostly insignificant for the directly impacted group, aside from an increase in the second and third month. In contrast, there is a more consistent trend in panel (b) that Section 232 tariffs affect the number of export destinations for those who trade with the top steel exporters to the United States – the indirectly impacted countries on average add 2.1 more new trade partners. This effect lasts for about six months after the enactment of Section 232 tariffs (from $t = 0$ through $t = 5$) and tapers off starting from $t = 6$. fig. 6 and fig. 7 provide empirical support for hypothesis 2, that countries indirectly exposed to the 232 tariffs reduce their trade dependency with regards to steel and aluminum through adjustments on both the extensive margin.

Next, we examine the impact of tariffs on the intensive margin. We compare the share of steel and aluminum exported to the US among the directly impacted and indirectly impacted countries against

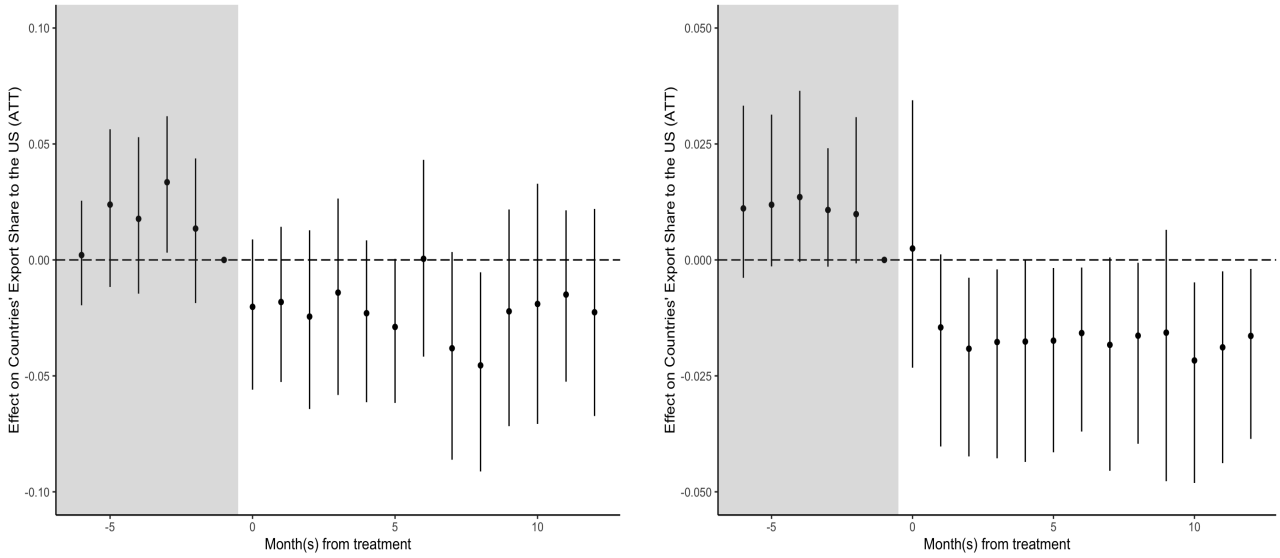


(a) Directly Impacted vs. Control Group (b) Indirectly Impacted vs. Control Group

Figure 6: Effect of Section 232 tariff enforcement on countries' extensive margin adjustment: the plots show estimates of the ATT (average treated effects on the treated units) on the number of steel and aluminum export destinations for countries in each of the respective groups of countries (directly or indirectly impacted). The error bars denote 95% confidence intervals derived from bootstrapping.

the control groups. Here we expect a negative impact – lowering the share of steel sent to the United States forms one type of diversification as more exports are allocated to other partners. Figure 7 shows the estimated treatment effects among treated units (ATT) on the share of steel and aluminum exports to the US with 95% confidence intervals (H_{2b}). In panel (a), we compare the trend of export share between the directly impacted and control groups. While we find the point estimates for the treatment effect tend to be negative after the enactment of Section 232 tariffs, most of the confidence intervals cover zero. We cannot reject the null hypothesis that exports to the United States did not change for those countries for whom the U.S. market was a top destination.

In panel (b), we observe a stronger effect when comparing the trend of export share between the indirectly impacted and control groups. Recall that the indirectly impacted countries are those with high steel exports to the directly impacted countries with the greatest dependence on the US market for their steel exports. We find that Section 232 tariffs lead to a reduction between 1.5% to 2.2% in the steel and aluminum export shares to the US in indirectly impacted countries relative to



(a) Directly Impacted vs. Control Group (b) Indirectly Impacted vs. Control Group

Figure 7: Effect of Section 232 tariff enforcement on countries' intensive margin adjustment: The plot shows the ATT (average treated effects on the treated units) of Section 232 tariff enforcement on the share of steel and aluminum exports to the US. The model uses covariate balance propensity score matching and estimates 95% confidence intervals based on 1,000 bootstrapped simulations.

the control group countries. Although the point estimates for how indirectly impacted countries are about half the magnitude of estimates for the directly impacted countries, the relative effect size is still substantial. In particular, the average level of US trade share for the indirectly impacted countries hovers around 2.5-3% at the time of tariff enactment. These effects are mostly significant at the 95% level for the 12 months after the initial enactment of the tariffs. Those with moderate trade with United States are either squeezed out or scared away as they reduce the share of their steel exported to the United States.

One unexpected finding is the absence of a stronger effect from the Section 232 tariffs on directly impacted countries. A likely explanation lies in the hierarchical structure of the U.S.-centered trade network and imperfect competition in specialized markets. These countries are highly dependent on the U.S. as a top market for their steel and aluminum exports, making diversification costly. heir U.S. customers may rely on products tailored to meet specific product standards such that alternative suppliers are not readily available. Moreover, Some importing firms were granted waivers, as were

some allied countries such as Australia. Early evidence from the USITC report shows mixed outcomes in the U.S. market, with expected declines in imports and increases in production and prices, but also volatility. The report notes that some importers maintained purchases due to long-term contracts.[24] In contrast, the countries of the control group are relatively disconnected from US trade and have little reason to adjust their behavior. It is the indirectly affected countries, those moderately exposed to US trade and to partners affected by the tariffs, that meet the 'Goldilocks condition' for spillover effects. These countries show the most significant changes in both the volume of trade and the pattern of destination.

4.3 A Tale of Two Tariffs: Bush's 2002 Safeguard Measures

For another comparison, we analyze an episode of 'normal' protection to contrast with the Section 232 national security tariff episode. We posit that sanctions have spillover impact on the trading system through the high uncertainty triggered by politicization of trade. We consider the Section 232 tariffs as equivalent to a sanction because they were invoked as a national security measure. In this section, we turn to an earlier decision to raise tariffs on steel as part of a safeguards measure justified in terms of protecting jobs and based on Section 201 of the Trade Act of 1974. Following a year-long investigation, on March 5, 2002, President Bush said "Today I am announcing my decision to impose temporary safeguards to help give America's steel industry and its workers the chance to adapt to the large influx of foreign steel. This relief will help steel workers, communities that depend on steel, and the steel industry adjust without harming our economy."[25] The legal steps under Section 201 of the 1974 Trade Act called for the International Trade Court to investigate and report on the level of injury to the U.S. industry, but in contrast to Section 232 investigation, there was no requirement to investigate the harm of steel imports for national security. Therefore we expect that the Bush safeguard measure would be relevant to the directly affected states without causing wider uncertainty. Indeed, the safeguard measures proceeded through the normal channels to have

[24] See USITC, "The Economic Impact of Section 232 and Section 301 Tariffs on U.S. Industries," (Publication number 5405, May 2023) available at https://www.usitc.gov/publications/332/pub5405.pdf.

[25] Statement available at https://georgewbush-whitehouse.archives.gov/news/releases/2002/03/20020305-6.htmlaccessed15January2025.

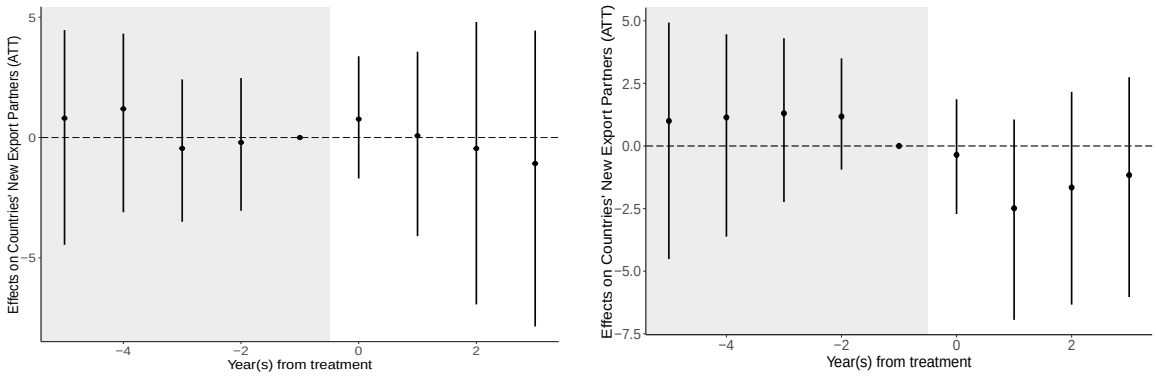
a challenge in WTO dispute settlement proceedings that led to a negative ruling and decision by the Bush administration to revoke the safeguard one year after it had been imposed. In contrast, the Trump administration Section 232 tariffs remain in place many years after they were imposed. The United States has rejected the WTO ruling against the tariffs with a defense that Article XXI allows governments to impose measures for national security.

To examine whether countries reacted differently to the Bush safeguard measures compared to Trump's Section 232 tariffs, we adopt a parallel treatment assignment process. Based on countries' relative positions within the US-centric steel trade network in 2001, we categorize them into target, spillover, and control groups of roughly equal sizes. In particular, a country is classified into the target group if the US is among the top 3 of their steel export destinations. Next, a country is classified into the spillover group if any of the countries in the target group is among the top 3 of their steel export destinations.[26] The rest of steel-trading countries are placed in the control group. We removed US free trade partners at the time (Canada, Mexico, Jordan, and Israel) from the analysis because they were exempted from the safeguard measures. Lastly, we utilize annual trade data of steel products at the 4-digit level, due to a lack of monthly US trade data before 2002.

First, Figure 8 shows the estimated impact of the tariff imposition on the number of steel and aluminum export destinations other than the US. $t = 0$ indicates the year 2002, when the safeguard measures were enacted. In both panels, we plot the contemporaneous effects at $t = 0$ and the persistent effects after tariff enforcement for 3 years (from $t = 1$ to $t = 3$). The shaded regions for periods prior to the imposition of the tariffs aim to detect anticipation effects and pre-trends. We use $t = -1$ as the reference group and plot the estimated effects for up to five years before the implementation of steel safeguards ($t = -2$ to $t = -5$). Across countries directly and indirectly impacted by the Bush tariff, we find little evidence that increased exposure to the tariff causes countries to find new export partners.

Next, Figure 9 plots the estimated impact of the tariff imposition on the share of steel and alu-

[26] Notice that this cutoff is different than the top 5 cutoff used in the Section 232 analysis, as the steel trade network was more concentrated in early 2000s than in late 2010s. Using the top five cutoff, therefore, would leave few countries in the control group.



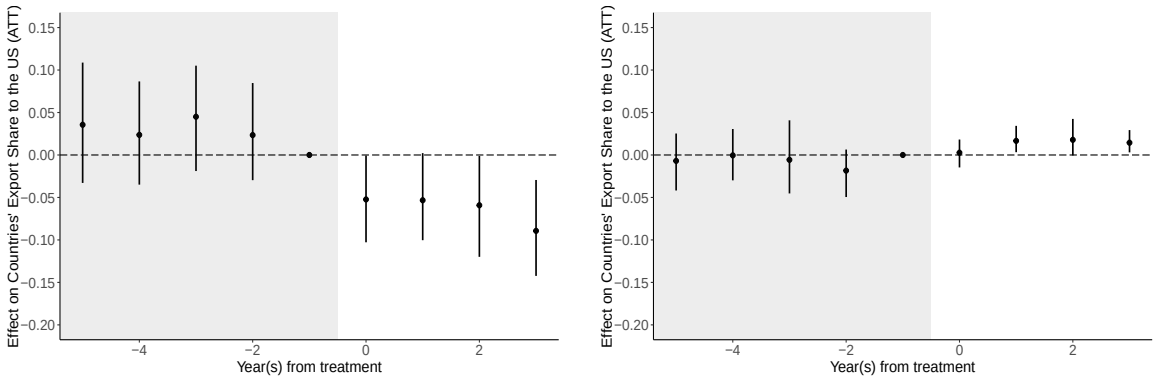
(a) Directly Impacted vs. Control Group (b) Indirectly Impacted vs. Control Group

Figure 8: Effect of Bush's safeguard measures on steel products on countries' extensive margin adjustment: the plots show estimates of the ATT (average treated effects on the treated units) on the number of steel and aluminum export destinations for countries in each of the respective groups of countries (directly or indirectly impacted). The error bars denote 95% confidence intervals derived from bootstrapping.

minum exports countries export to the US compared to the rest of the world. As shown in panel (a), estimates are significant and negative for the directly impacted group: countries that are highly dependent on exporting steel products to the US market reduced US exports in their market share by about 5% following the imposition of safeguard measures, an effect that persisted after the US government revoked the safeguard following the WTO ruling at the end of 2003. In contrast, there is little evidence in panel (b) that the safeguard measures reduced the export ratio to the US for the spillover group of indirectly impacted countries. They show a small uptick in trade after the tariffs, possibly acting to fill some of the market left as the larger exporters retreat. Thus, in contrast to Trump's Section 232 tariffs, the effects of Bush's safeguard measures follow a typical economic reaction to tariffs: countries that were more affected by the protectionist measures were more likely to make adjustments to their trade portfolios.

5 Conclusion

Economic sanctions reach far beyond the targets. We highlight spillover to other countries transmitted through the trade network. Our findings present two broad patterns. First, exposure to sanctions



(a) Directly Impacted vs. Control Group (b) Indirectly Impacted vs. Control Group

Figure 9: Effect of Bush's safeguard measures on steel products on countries' intensive margin adjustment: the plots show estimates of the ATT (average treated effects on the treated units) on the share of steel products exports to the US export destinations for countries in each of the respective groups of countries (directly or indirectly impacted). The error bars denote 95% confidence intervals derived from bootstrapping.

as a third party trading with sanction targets corresponds with reducing the concentration of trade partners. Second, looking at a specific incident of securitization of trade, we find trade diversification apparent as a reaction by the middle group of countries that trade with those who are highly dependent on the US market. Equally important, we have null findings for diversification of goods trade in reaction to sanction spillover at the global level and for diversification of product trade by the countries most dependent on the state using security to restrict market access.

Our work draws attention to the many ways states and firms respond to the geopolitical risk associated with the rising use of sanctions. Our findings are consistent with a diversification reaction rather than a move to safety with higher concentration. Sanctions have not pushed countries to narrow their range of trade partners or reduce the scope of goods traded. When a country has more trade exposed to sanctions, it expands trade partners and makes little noticeable change in the composition of goods traded with the world. Where friend-shoring occurs, it takes the form of increased trade with allies and trade agreement partners, alongside broader diversification rather than increased concentration of trade relationships. This implies that sanctions are not yet acting as a trigger to unwind globalization.

Although we do not assess the effectiveness of sanctions, our work speaks to this important ques-

tion. Our evidence that third-party states systematically diversify their trade portfolios in response to sanction spillovers implies that the economic and political leverage afforded by sanctions is eroding at the margin. As more governments learn to anticipate future coercive episodes, they pre-emptively rewire their trade networks by expanding partner diversity and shifting toward trusted allies. These adaptive moves consequently blunt the pain that senders can inflict on future targets who have been engaging in diversification. Over time, each additional sanction episode from an individual sender may therefore elicit less compliance from targets and impose smaller economic costs on targets.

Moreover, third parties shape the impact of the sanction when they either join the sanction or serve as alternative trade partners (Jentleson, 2022, p. 192). The diversification of trade partners we document could represent sanction evasion or cooperation – when the trade partner of a target opens new trade ties, they may do so as a conduit for trade from the target or as a substitute. The evidence of diversification in response to Section 232 tariffs offers support for the risk mitigation logic because the uniform barrier on all trade removes the question of evasion or cooperation. As states build new trade ties, they increase their potential exposure to sanctions by embracing interdependence, but they do so while reducing dependence on any one partner. The wider trade network can shield actors from future sanction events that would disrupt their trade.

Comparing the Section 232 tariffs imposed by the United States with broader economic sanctions raises a fundamental question: how do sanctions differ from protectionism? Increasingly, economic policies are shaped by foreign policy objectives, blurring the line between commercial regulation and strategic coercion. For those caught in the middle, does the stated justification for a trade restriction matter? Whether the rationale is saving jobs, the environment, or national security the trade barrier restricts trade. But similar interventions can signal different motives, with varying implications for global stability. Sanctions may have different effects than natural disasters or infrastructure breakdowns, depending on their intent and legitimacy. For example, tariffs imposed after a WTO ruling may reinforce trust in rules-based trade, while those tied to political agendas may heighten uncertainty. As great power rivalry deepens, more economic policies will be deployed as instruments of statecraft. Understanding how geopolitical risk shapes behavior in the international economy is a

growing priority for scholars and policymakers alike.

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Appendix

A Descriptive Summaries: Summary Statistics

Variable (source)	N	Mean	Sd	Min	Max	Proportion of NA
Sanction Spillover (Authors' Own Calculation, based on The Atlas of Economic Complexity Project and Equation 1)	5793	0.39	0.25	0.001	0.99	0.04
Trade Partner Concentration (cHHI) (Authors' Own Calculation, based on The Atlas of Economic Complexity Project and Equation 2)	5793	0.14	0.11	0.036	0.97	0
Traded Good Concentration (sHHI) (Authors' Own Calculation, based on The Atlas of Economic Complexity Project and Equation 2)	5793	0.07	0.010	0.005	0.78	0
GDP per capita (logged) (Varieties of Democracy Project (v.12))	5026	2.2	1	0.25	4.6	0.13
V-Dem (Varieties of Democracy Project (v.12))	5198	0.51	0.27	0.013	0.92	0.10
Trade Volume (logged) (The Atlas of Economic Complexity)	5793	23	2.5	12	29	0
GATT/WTO membership (Davis and Pratt, 2021)	5793	0.74	0.44	0	1	0
EU membership (Davis and Pratt, 2021)	5793	0.11	0.32	0	1	0
OECD membership (Davis and Pratt, 2021)	5793	0.16	0.37	0	1	0
Sanctioned (Felbermayr et al., 2020)	5793	0.24	0.43	0	1	0
Sanctioning (Felbermayr et al., 2020)	5793	0.95	0.23	0	1	0
Fatal MID (Correlates of War Project)	5793	0.06	0.24	0	1	0

B Full tables for Figure 5

	Trade Partner Concentration					Traded Goods Concentration				
	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5
Sanction Spillover	−0.013**	−0.028***	−0.048***	−0.060***	−0.070***	−0.002	−0.003	−0.009	−0.004	−0.005
	(0.006)	(0.009)	(0.012)	(0.014)	(0.016)	(0.004)	(0.005)	(0.007)	(0.008)	(0.009)
WTO	0.003	0.002	0.001	−0.001	−0.003	−0.006***	−0.008**	−0.010**	−0.011**	−0.008
	(0.002)	(0.003)	(0.005)	(0.006)	(0.007)	(0.002)	(0.003)	(0.004)	(0.005)	(0.006)
EU	−0.001	−0.002	−0.000	0.001	0.002	0.003	0.005	0.008**	0.010**	0.012***
	(0.002)	(0.003)	(0.004)	(0.005)	(0.005)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
OECD	0.002	0.002	0.001	−0.003	−0.007	−0.003	−0.004	−0.004	−0.005	−0.003
	(0.002)	(0.004)	(0.006)	(0.007)	(0.010)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
GDP pc (log)	0.000	0.003	0.006	0.009	0.003	0.017***	0.019**	0.019*	0.014	0.007
	(0.006)	(0.010)	(0.013)	(0.015)	(0.017)	(0.006)	(0.008)	(0.010)	(0.011)	(0.011)
V-Dem	−0.002	0.002	0.008	0.016	0.020	−0.017*	−0.026*	−0.030*	−0.034	−0.038
	(0.006)	(0.010)	(0.013)	(0.017)	(0.021)	(0.009)	(0.015)	(0.017)	(0.021)	(0.023)
Sanctioned	0.000	0.002	0.002	0.002	0.002	−0.005***	−0.004*	−0.004	−0.007**	−0.007**
	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Sanctioning	0.003	0.004	0.005	0.011	0.006	0.003	0.005	0.008	0.022	0.008
	(0.003)	(0.007)	(0.010)	(0.017)	(0.019)	(0.005)	(0.007)	(0.009)	(0.018)	(0.010)
Trade Volume (log)	0.001	−0.000	−0.002	−0.004	−0.001	−0.003	−0.002	−0.001	−0.001	−0.000
	(0.002)	(0.004)	(0.004)	(0.005)	(0.005)	(0.003)	(0.004)	(0.006)	(0.006)	(0.005)
Fatal MID	−0.001	−0.002	−0.002	−0.002	−0.004	0.001	0.002	−0.003	−0.003	−0.002
	(0.003)	(0.006)	(0.009)	(0.010)	(0.011)	(0.002)	(0.004)	(0.004)	(0.005)	(0.006)
Partner Concentration	0.825***	0.698***	0.579***	0.469***	0.393***	–	–	–	–	–
	(0.034)	(0.060)	(0.081)	(0.095)	(0.100)	–	–	–	–	–
Goods Concentration	–	–	–	–	–	0.705***	0.537***	0.411***	0.315***	0.233***
	–	–	–	–	–	(0.034)	(0.043)	(0.056)	(0.065)	(0.062)
Constant	−0.009	0.017	0.061	0.114	0.066	0.040	0.014	0.000	−0.002	0.025
	(0.054)	(0.087)	(0.106)	(0.123)	(0.128)	(0.073)	(0.104)	(0.140)	(0.147)	(0.130)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.777	0.783	0.793	0.803	0.811	0.808	0.809	0.812	0.816	0.816
Adj. R^2	0.767	0.773	0.783	0.793	0.802	0.800	0.801	0.804	0.807	0.807
Num. obs.	5022	4850	4678	4506	4334	5022	4850	4678	4506	4334
N Clusters	172	172	172	172	172	172	172	172	172	172

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table A.1: Regression Table for Figure 5: The effect of sanction shock on trade partner (column 1-5) and traded goods (column 6-10) concentration. Robust Standard Errors Clustered at the Country-Level are Included in Parentheses

B.1 Applying Benjamini-Hochberg Procedures

In this section, we apply the Benjamini-Hochberg (BH) procedure to our main results in Table B to control for the False Discovery Rate (FDR) when performing multiple hypothesis tests. The BH procedure is used to adjust the p-values to reduce the risk of Type I errors, ensuring that the expected proportion of false discoveries, that is, incorrect rejections of the null hypothesis, remains below the conventional statistical significance threshold – i.e., FDR ≤ 0.05 (Benjamini and Hochberg, 1995).

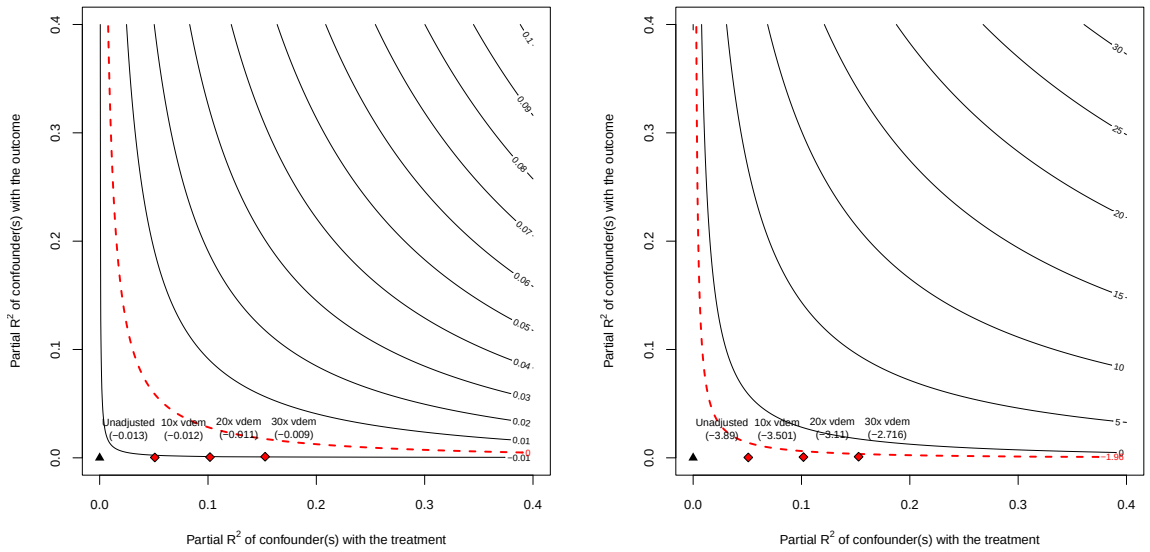
	Partner Concentration					Goods Concentration				
	Lead 1	Lead 2	Lead 3	Lead 4	Lead 5	Lead 1	Lead 2	Lead 3	Lead 4	Lead 5
Sanction Spillover	−0.013	−0.028	−0.048	−0.060	−0.070	−0.002	−0.003	−0.009	−0.004	−0.005
	(0.386)	(0.095)	(0.010)	(0.007)	(0.006)	(0.854)	(0.807)	(0.523)	(0.992)	(0.998)
WTO	0.003	0.002	0.001	−0.001	−0.003	−0.006	−0.008	−0.010	−0.011	−0.008
	(0.715)	(0.906)	(0.963)	(0.997)	(0.979)	(0.047)	(0.104)	(0.174)	(0.325)	(0.625)
EU	−0.001	−0.002	−0.000	0.001	0.002	0.003	0.005	0.008	0.010	0.012
	(0.783)	(0.906)	(0.985)	(0.997)	(0.979)	(0.413)	(0.407)	(0.253)	(0.142)	(0.055)
OECD	0.002	0.002	0.001	−0.003	−0.007	−0.003	−0.004	−0.004	−0.005	−0.003
	(0.772)	(0.907)	(0.947)	(0.997)	(0.979)	(0.535)	(0.476)	(0.542)	(0.743)	(0.998)
GDP pc (log)	0.000	0.003	0.006	0.009	0.003	0.017	0.019	0.019	0.014	0.007
	(0.964)	(0.907)	(0.932)	(0.997)	(0.979)	(0.047)	(0.151)	(0.303)	(0.695)	(0.998)
V-Dem	−0.002	0.002	0.008	0.016	0.020	−0.017	−0.026	−0.030	−0.034	−0.038
	(0.880)	(0.944)	(0.932)	(0.997)	(0.979)	(0.392)	(0.328)	(0.337)	(0.558)	(0.503)
Sanctioned	0.000	0.002	0.002	0.002	0.002	−0.005	−0.004	−0.004	−0.007	−0.007
	(0.926)	(0.906)	(0.932)	(0.997)	(0.979)	(0.089)	(0.276)	(0.441)	(0.248)	(0.277)
Sanctioning	0.003	0.004	0.005	0.011	0.006	0.003	0.005	0.008	0.022	0.008
	(0.726)	(0.907)	(0.932)	(0.997)	(0.979)	(0.854)	(0.807)	(0.816)	(0.894)	(0.998)
Trade Volume (log)	0.001	−0.000	−0.002	−0.004	−0.001	−0.003	−0.002	−0.001	−0.001	−0.000
	(0.880)	(0.951)	(0.932)	(0.997)	(0.979)	(0.711)	(0.841)	(0.969)	(0.992)	(0.998)
Fatal MID	−0.001	−0.002	−0.002	−0.002	−0.004	0.001	0.002	−0.003	−0.003	−0.002
	(0.835)	(0.907)	(0.936)	(0.997)	(0.979)	(0.902)	(0.850)	(0.797)	(0.992)	(0.998)
Partner Concentration	0.825	0.698	0.579	0.469	0.393	–	–	–	–	–
	(0.000)	(0.000)	(0.000)	(0.007)	(0.033)	–	–	–	–	–
Goods Concentration	–	–	–	–	–	0.705	0.537	0.411	0.315	0.233
	–	–	–	–	–	(0.000)	(0.000)	(0.000)	(0.001)	(0.010)
Constant	−0.009	0.017	0.061	0.114	0.066	0.040	0.014	0.000	−0.002	0.025
	(0.935)	(0.938)	(0.932)	(0.997)	(0.979)	(0.854)	(0.958)	(0.997)	(0.992)	(0.998)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.791	0.783	0.788	0.795	0.799	0.791	0.783	0.788	0.795	0.799
Adj. R^2	0.781	0.773	0.778	0.785	0.789	0.781	0.773	0.778	0.785	0.789
Num. obs.	5013	4841	4669	4497	4325	5013	4841	4669	4497	4325
# of States	172	172	172	172	172	172	172	172	172	172

Adjusted p-values in parentheses.

Table A.2: Benjamini-Hochberg adjusted regression results. Adjusted p-values are included in parentheses.

B.2 Sensitivity Analysis

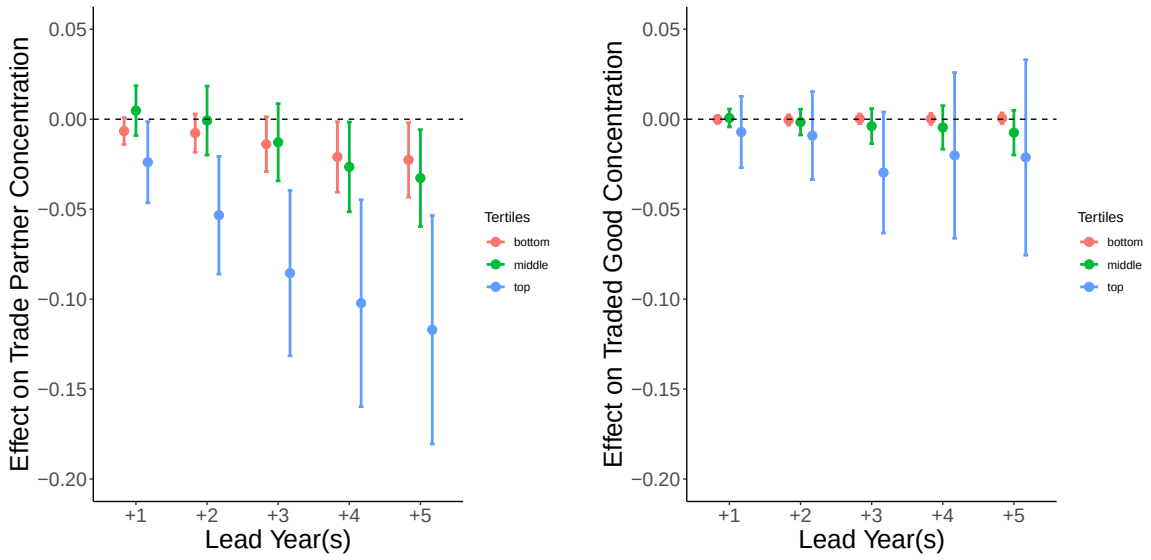
In this section, we present the results of the sensitivity analysis using the omitted variable bias framework proposed by Cinelli and Hazlett (2020). For the first column reported in Table B, the analysis reports a robustness value of 0.055, which means that unobserved confounders that explain more than 5.5% of the residual variance of both the treatment and the outcome are strong enough to bring the point estimate to 0. At the conventional threshold of statistical significance (0.05), the robustness value becomes 0.027, which means that unobserved confounders that explain more than 2.7% of the residual variance of both treatment and outcome are strong enough to bring the estimate to a range where it is no longer statistically different from 0 at the significance level of alpha = 0.05. To interpret these values substantively, the following figure shows the contour plots with benchmarking covariates. The x-axis represents the hypothetical residual share of variation in the treatment (sanction spillover) explained by unobserved confounders, while the y-axis represents the hypothetical partial R^2 of unobserved confounders with the outcome (Trade Partner Concentration). The numbers in parentheses below the variable names and contour lines indicate the effect size. The figure demonstrates that the treatment effect remains negative and statistically significant at the 0.05 level after accounting for the unobserved confounder 30 times as strong as the observed benchmark covariate (Electoral Democracy).



(a) Point Estimate (b) t-value

Figure A.10: Sensitivity Analysis for Main Result (Table A.1, Column (1)). The black triangles indicate the baseline values for coefficient (left) and t-value (right). The red rhombi indicate the adjusted values after accounting for unobserved confounders that are 10x, 20x, and 30x as strong as the benchmark covariate (Electoral Democracy), from left to right consecutively.

B.3 Treatment Heterogeneity



(a) Trade Partner Concentration

(b) Traded Good Concentration

Figure A.11: Heterogeneous treatment effects with respect to levels of concentration measures. The tertiles are defined over the average of countries' observed levels of trade partner (left) and traded good (right) concentration across all years. The top tertile includes countries with highest average levels of concentration, and the bottom tertile includes countries with lowest levels of concentration. Error bars denote 95% confidence intervals.

C H1: Robustness Checks

C.1 Product-level Partner Concentration

To account for potential heterogeneous effects of sanction spillovers across different products (e.g., due to specificity in demand and/or production), we fit a set of models using country-product-year as the unit of analysis with the following specifications:

$$H_{1a} : pHHI_{i,j,t+l} = \beta_0 + \beta_1 S_{i,j,t} + \sum_{k=2}^{n} \beta_k X_{k,i,t} + \beta_{k+1} pHHI_{i,j,t} + \alpha_{ij} + \gamma_t + \epsilon_{it}$$

, where i, j, t are subscripts denoting states, products, and years respectively; and

$$pHHI_{i,j,t} = \sum_{i':i' \neq i}^{\mathcal{I}} p^2_{ii',j,t} := \sum_{i':i' \neq i}^{\mathcal{I}} \left(\frac{d_{ii',j,t}}{\sum_{i' \neq i}^{I} d_{ii',j,t}} \right)^2$$

, where $p_{ii',j,t}$ is the ratio between country i's trade volume of product j with country i' and the total volume of trade country i engages in over product j.

Dependent Variables:	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5
Variables					
Sanction Spillover	-0.003***	-0.003***	-0.008***	-0.015***	-0.014***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GATT/WTO	-0.001	-0.002***	-0.006***	-0.012***	-0.014***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
EU	-0.002**	0.000	0.000	-0.002*	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
OECD	0.008***	0.009***	0.008***	0.006***	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDP per capita (logged)	-0.004***	-0.009***	-0.009***	-0.006***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
V-Dem	-0.036***	-0.038***	-0.036***	-0.034***	-0.033***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Sanctioned	0.005***	0.003***	0.001**	0.001**	0.003***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Sanctioning	0.016***	0.017***	0.018***	0.015***	0.012***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Trade Volume (logged)	-0.024***	-0.019***	-0.017***	-0.015***	-0.013***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Fatal MID	-0.004***	-0.008***	-0.011***	-0.012***	-0.010***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Product Concentration	0.384***	0.266***	0.192***	0.136***	0.091***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Fixed-effects					
state:product	Yes	Yes	Yes	Yes	Yes
year	Yes	Yes	Yes	Yes	Yes
Fit statistics					
Observations	3,500,727	3,368,815	3,237,912	3,107,876	2,978,746
R^2	0.72848	0.70474	0.69486	0.69051	0.68911
Within R^2	0.16169	0.08127	0.04441	0.02403	0.01235

Clustered (state-product) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table A.3: The Effects of Sanction Spillovers on Countries' Partner Concentration at the Product Level. Robust Standard Errors Clustered at the Country-Level are Included in Parentheses

C.2 Dynamic Regression Model

	Trade Partner Concentration					Traded Goods Concentration				
	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5
Sanction Spillover	−0.012	−0.029***	−0.050***	−0.063***	−0.076***	−0.003	−0.005	−0.016*	−0.012	−0.015
	(0.007)	(0.010)	(0.014)	(0.016)	(0.018)	(0.004)	(0.006)	(0.008)	(0.008)	(0.009)
WTO	0.003	0.002	0.000	−0.002	−0.003	−0.007***	−0.008***	−0.010**	−0.011**	−0.009
	(0.002)	(0.003)	(0.005)	(0.006)	(0.007)	(0.002)	(0.003)	(0.004)	(0.005)	(0.006)
EU	−0.001	−0.002	−0.001	0.001	0.001	0.003	0.004	0.007*	0.009**	0.011***
	(0.002)	(0.003)	(0.004)	(0.005)	(0.005)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
OECD	0.002	0.002	0.001	−0.003	−0.007	−0.003	−0.004	−0.004	−0.005	−0.003
	(0.002)	(0.004)	(0.006)	(0.007)	(0.010)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
GDP per capita (logged)	0.001	0.003	0.006	0.008	0.002	0.017***	0.019**	0.018*	0.013	0.007
	(0.006)	(0.010)	(0.013)	(0.015)	(0.017)	(0.006)	(0.008)	(0.010)	(0.011)	(0.011)
V-Dem	−0.002	0.002	0.007	0.016	0.020	−0.017*	−0.027*	−0.030*	−0.035	−0.039*
	(0.006)	(0.010)	(0.013)	(0.017)	(0.021)	(0.009)	(0.015)	(0.017)	(0.021)	(0.023)
Sanctioned	0.000	0.002	0.002	0.001	0.001	−0.005***	−0.005*	−0.005*	−0.008**	−0.008**
	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Sanctioning	0.003	0.004	0.005	0.012	0.007	0.003	0.005	0.008	0.023	0.008
	(0.003)	(0.007)	(0.010)	(0.017)	(0.019)	(0.005)	(0.007)	(0.009)	(0.018)	(0.010)
Trade Volume (logged)	0.001	−0.000	−0.002	−0.004	−0.001	−0.003	−0.002	−0.001	−0.000	0.000
	(0.002)	(0.004)	(0.004)	(0.005)	(0.005)	(0.003)	(0.004)	(0.006)	(0.006)	(0.005)
Fatal MID	−0.001	−0.002	−0.002	−0.002	−0.004	0.001	0.002	−0.003	−0.003	−0.002
	(0.003)	(0.006)	(0.009)	(0.010)	(0.011)	(0.002)	(0.004)	(0.004)	(0.005)	(0.006)
Partner Concentration	0.825***	0.698***	0.579***	0.469***	0.393***	–	–	–	–	–
	(0.034)	(0.061)	(0.081)	(0.095)	(0.100)	–	–	–	–	–
Goods Concentration	–	–	–	–	–	0.705***	0.537***	0.411***	0.314***	0.233***
	–	–	–	–	–	(0.034)	(0.043)	(0.056)	(0.065)	(0.061)
Sanction Spillover (lagged)	−0.002	0.003	0.005	0.007	0.013	0.003	0.006	0.014	0.016	0.021*
	(0.005)	(0.007)	(0.009)	(0.011)	(0.012)	(0.005)	(0.007)	(0.009)	(0.010)	(0.011)
Constant	−0.009	0.017	0.060	0.112	0.063	0.040	0.014	−0.003	−0.005	0.021
	(0.054)	(0.087)	(0.106)	(0.122)	(0.127)	(0.073)	(0.105)	(0.140)	(0.148)	(0.131)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.930	0.938	0.940	0.941	0.943	0.897	0.900	0.901	0.904	0.908
Adj. R^2	0.927	0.935	0.938	0.938	0.940	0.892	0.895	0.897	0.899	0.903
Num. obs.	5019	4847	4675	4503	4331	5019	4847	4675	4503	4331
N Clusters	172	172	172	172	172	172	172	172	172	172

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table A.4: ADL(1,1) Models: Effects of Sanction Spillovers on Trade Concentrations. Robust Standard Errors Clustered at the Country-Level are Included in Parentheses

C.3 Remove Fixed Effects and Lagged Outcomes

	Traded Goods Concentration					Trade Partner Concentration				
	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5
Sanction Spillover	−0.048***	−0.054***	−0.062***	−0.067***	−0.067***	0.016	0.015	0.014	0.014	0.012
	(0.015)	(0.016)	(0.017)	(0.017)	(0.017)	(0.018)	(0.018)	(0.018)	(0.018)	(0.017)
WTO	−0.012	−0.011	−0.012	−0.013	−0.013	−0.029	−0.028	−0.027	−0.027	−0.025
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.019)	(0.018)	(0.018)	(0.018)	(0.018)
EU	−0.063*	−0.064*	−0.064*	−0.062*	−0.061*	−0.009	−0.010	−0.010	−0.010	−0.009
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.010)	(0.010)	(0.011)	(0.011)	(0.011)
OECD	0.054	0.054	0.054	0.054	0.053	−0.027**	−0.027**	−0.026**	−0.026**	−0.025**
	(0.037)	(0.037)	(0.037)	(0.037)	(0.037)	(0.010)	(0.010)	(0.010)	(0.010)	(0.011)
GDP per capita (logged)	0.001	0.000	−0.000	−0.001	−0.002	0.012	0.012	0.012	0.012	0.012
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
V-Dem	0.000	0.001	0.002	0.003	0.004	−0.085***	−0.085***	−0.085***	−0.085***	−0.086***
	(0.023)	(0.023)	(0.023)	(0.022)	(0.022)	(0.026)	(0.027)	(0.027)	(0.027)	(0.027)
Sanctioned	0.008	0.012	0.014	0.015	0.015	−0.003	−0.002	−0.001	−0.001	−0.001
	(0.012)	(0.012)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.014)	(0.014)
Sanctioning	−0.017	−0.010	−0.005	0.002	0.006	0.025	0.025	0.026	0.028	0.024
	(0.031)	(0.026)	(0.023)	(0.019)	(0.014)	(0.014)	(0.014)	(0.013)	(0.013)	(0.014)
Trade Volume (logged)	−0.009**	−0.009**	−0.009**	−0.008**	−0.007*	0.000	0.000	0.000	0.000	−0.000
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Fatal MID	−0.047***	−0.047***	−0.048***	−0.047***	−0.047***	−0.008	−0.008	−0.012	−0.012	−0.011
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.012)	(0.012)	(0.012)
Constant	0.393***	0.379***	0.367***	0.353***	0.335***	0.074	0.075	0.074	0.073	0.081
	(0.085)	(0.081)	(0.079)	(0.077)	(0.074)	(0.062)	(0.062)	(0.061)	(0.062)	(0.061)
R^2	0.097	0.098	0.101	0.103	0.101	0.130	0.128	0.128	0.128	0.126
Adj. R^2	0.095	0.096	0.099	0.101	0.099	0.128	0.126	0.126	0.126	0.124
Num. obs.	5023	4851	4679	4507	4335	5023	4851	4679	4507	4335
N Clusters	172	172	172	172	172	172	172	172	172	172

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table A.5: Effects of Sanction Spillovers on Export Market Concentration. Robust Standard Errors Clustered at the Country-Level are Included in Parentheses

C.4 Remove War-Related Sanctions

	Trade Partner Concentration					Traded Goods Concentration				
	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5
Sanction Spillover	−0.013**	−0.029***	−0.047***	−0.062***	−0.071***	0.000	−0.002	−0.009	−0.004	−0.004
	(0.006)	(0.008)	(0.012)	(0.014)	(0.016)	(0.004)	(0.005)	(0.007)	(0.008)	(0.009)
WTO	0.002	0.002	0.000	−0.002	−0.003	−0.007***	−0.008**	−0.010**	−0.011**	−0.009
	(0.002)	(0.003)	(0.005)	(0.006)	(0.007)	(0.002)	(0.003)	(0.004)	(0.005)	(0.006)
EU	0.000	−0.000	0.001	0.003	0.003	0.004	0.006*	0.009**	0.012**	0.015***
	(0.002)	(0.003)	(0.004)	(0.005)	(0.005)	(0.002)	(0.003)	(0.004)	(0.005)	(0.005)
OECD	0.002	0.001	0.001	−0.003	−0.007	−0.003	−0.004	−0.005	−0.005	−0.004
	(0.002)	(0.004)	(0.006)	(0.007)	(0.010)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
GDP per capita (logged)	−0.000	0.003	0.004	0.008	0.001	0.016**	0.020**	0.020*	0.016	0.009
	(0.006)	(0.010)	(0.012)	(0.015)	(0.017)	(0.006)	(0.008)	(0.010)	(0.011)	(0.011)
V-Dem	−0.001	0.002	0.009	0.017	0.021	−0.014	−0.025*	−0.029*	−0.034	−0.037
	(0.006)	(0.010)	(0.013)	(0.017)	(0.021)	(0.009)	(0.015)	(0.017)	(0.020)	(0.022)
Sanctioned	−0.001	0.001	0.002	0.001	0.002	−0.005**	−0.006*	−0.007*	−0.011**	−0.012**
	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.002)	(0.003)	(0.004)	(0.005)	(0.005)
Sanctioning	−0.001	−0.002	−0.003	−0.003	−0.003	−0.001	−0.001	0.007	0.020***	0.017**
	(0.002)	(0.003)	(0.004)	(0.005)	(0.005)	(0.002)	(0.004)	(0.005)	(0.007)	(0.006)
Trade Volume (logged)	0.001	−0.000	−0.000	−0.004	0.000	−0.001	−0.002	−0.002	−0.002	−0.002
	(0.002)	(0.003)	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)	(0.006)	(0.006)	(0.006)
Fatal MID	−0.001	−0.002	−0.002	−0.002	−0.004	0.000	0.001	−0.003	−0.003	−0.002
	(0.003)	(0.006)	(0.009)	(0.010)	(0.011)	(0.002)	(0.004)	(0.004)	(0.005)	(0.006)
Partner Concentration	0.826***	0.698***	0.582***	0.469***	0.395***	–	–	–	–	–
	(0.034)	(0.061)	(0.080)	(0.096)	(0.100)	–	–	–	–	–
Goods Concentration	–	–	–	–	–	0.701***	0.536***	0.411***	0.315***	0.233***
	–	–	–	–	–	(0.034)	(0.042)	(0.056)	(0.064)	(0.060)
Constant	−0.016	0.019	0.030	0.118	0.049	0.006	0.023	0.021	0.031	0.053
	(0.048)	(0.080)	(0.092)	(0.118)	(0.136)	(0.088)	(0.108)	(0.146)	(0.155)	(0.140)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.777	0.783	0.793	0.803	0.811	0.808	0.809	0.812	0.816	0.816
Adj. R^2	0.767	0.773	0.783	0.793	0.802	0.800	0.801	0.804	0.807	0.807
Num. obs.	5022	4850	4678	4506	4334	5022	4850	4678	4506	4334
N Clusters	172	172	172	172	172	172	172	172	172	172

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table A.6: Effects of Sanction Spillovers on Trade Concentrations, after Removing War-Related Sanctions. Robust Standard Errors Clustered at the Country-Level are Included in Parentheses.

C.5 Remove Sanctions Initiated by Small Economies

	Trade Partner Concentration					Traded Goods Concentration				
	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5
Sanction Spillover	−0.013**	−0.028***	−0.048***	−0.060***	−0.070***	−0.002	−0.003	−0.009	−0.004	−0.005
	(0.006)	(0.009)	(0.012)	(0.014)	(0.016)	(0.004)	(0.005)	(0.007)	(0.008)	(0.009)
WTO	0.003	0.002	0.001	−0.001	−0.003	−0.006***	−0.008**	−0.010**	−0.011**	−0.008
	(0.002)	(0.003)	(0.005)	(0.006)	(0.007)	(0.002)	(0.003)	(0.004)	(0.005)	(0.006)
EU	−0.001	−0.002	−0.000	0.001	0.002	0.003	0.005	0.008**	0.010**	0.012***
	(0.002)	(0.003)	(0.004)	(0.005)	(0.005)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
OECD	0.002	0.002	0.001	−0.003	−0.007	−0.003	−0.004	−0.004	−0.005	−0.003
	(0.002)	(0.004)	(0.006)	(0.007)	(0.010)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
GDP per capita (log)	0.000	0.003	0.006	0.009	0.003	0.017***	0.019**	0.019*	0.014	0.007
	(0.006)	(0.010)	(0.013)	(0.015)	(0.017)	(0.006)	(0.008)	(0.010)	(0.011)	(0.011)
V-Dem	−0.002	0.002	0.008	0.016	0.020	−0.017*	−0.026*	−0.030*	−0.034	−0.038
	(0.006)	(0.010)	(0.013)	(0.017)	(0.021)	(0.009)	(0.015)	(0.017)	(0.021)	(0.023)
Sanctioned	0.000	0.002	0.002	0.002	0.002	−0.005***	−0.004*	−0.004	−0.007**	−0.007**
	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Sanctioning	0.003	0.004	0.005	0.011	0.006	0.003	0.005	0.008	0.022	0.008
	(0.003)	(0.007)	(0.010)	(0.017)	(0.019)	(0.005)	(0.007)	(0.009)	(0.018)	(0.010)
Trade Volume (log)	0.001	−0.000	−0.002	−0.004	−0.001	−0.003	−0.002	−0.001	−0.001	−0.000
	(0.002)	(0.004)	(0.004)	(0.005)	(0.005)	(0.003)	(0.004)	(0.006)	(0.006)	(0.005)
Fatal MID	−0.001	−0.002	−0.002	−0.002	−0.004	0.001	0.002	−0.003	−0.003	−0.002
	(0.003)	(0.006)	(0.009)	(0.010)	(0.011)	(0.002)	(0.004)	(0.004)	(0.005)	(0.006)
Partner Concentration	0.825***	0.698***	0.579***	0.469***	0.393***	–	–	–	–	–
	(0.034)	(0.060)	(0.081)	(0.095)	(0.100)	–	–	–	–	–
Goods Concentration	–	–	–	–	–	0.705***	0.537***	0.411***	0.315***	0.233***
	–	–	–	–	–	(0.034)	(0.043)	(0.056)	(0.065)	(0.062)
Constant	−0.009	0.017	0.061	0.114	0.066	0.040	0.014	0.000	−0.002	0.025
	(0.054)	(0.087)	(0.106)	(0.123)	(0.128)	(0.073)	(0.104)	(0.140)	(0.147)	(0.130)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.930	0.890	0.865	0.848	0.842	0.897	0.861	0.841	0.830	0.823
Adj. R^2	0.927	0.885	0.858	0.841	0.835	0.892	0.854	0.834	0.822	0.814
Num. obs.	5023	4851	4679	4507	4335	5023	4851	4679	4507	4335
N Clusters	172	172	172	172	172	172	172	172	172	172

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table A.7: Effects of Sanction Spillovers on Trade Concentrations, after after removing sanctions initiated by countries in the bottom GDP quartile. Robust Standard Errors Clustered at the Country-Level are Included in Parentheses

C.6 Remove US-initiated Sanctions

	Trade Partner Concentration					Traded Goods Concentration				
	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5
Sanction Spillover	0.002	-0.001	-0.015	-0.021	-0.030	-0.010*	-0.012	-0.019*	-0.013	-0.012
	(0.007)	(0.010)	(0.013)	(0.016)	(0.018)	(0.006)	(0.007)	(0.011)	(0.012)	(0.013)
WTO	0.003	0.003	0.002	0.000	-0.001	-0.006***	-0.008**	-0.010**	-0.011**	-0.009
	(0.002)	(0.003)	(0.005)	(0.006)	(0.007)	(0.002)	(0.003)	(0.004)	(0.005)	(0.006)
EU	-0.003	-0.004	-0.002	-0.001	0.001	0.005**	0.006**	0.010**	0.012***	0.014***
	(0.002)	(0.003)	(0.004)	(0.005)	(0.005)	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)
OECD	0.001	-0.000	-0.002	-0.007	-0.012	-0.003	-0.004	-0.004	-0.005	-0.003
	(0.003)	(0.004)	(0.007)	(0.008)	(0.011)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
GDP per capita (logged)	-0.002	-0.002	-0.000	0.000	-0.006	0.018***	0.021**	0.020**	0.015	0.009
	(0.006)	(0.010)	(0.013)	(0.016)	(0.018)	(0.006)	(0.008)	(0.010)	(0.011)	(0.011)
V-Dem	-0.000	0.005	0.012	0.021	0.025	-0.017*	-0.027*	-0.030*	-0.034	-0.038
	(0.007)	(0.011)	(0.014)	(0.018)	(0.022)	(0.009)	(0.015)	(0.017)	(0.021)	(0.023)
Sanctioned	0.000	0.002	0.002	0.001	0.002	-0.005**	-0.004*	-0.004	-0.007**	-0.007*
	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)
Sanctioning	0.004	0.004	0.006	0.012	0.008	0.003	0.005	0.008	0.022	0.008
	(0.003)	(0.007)	(0.011)	(0.017)	(0.019)	(0.005)	(0.007)	(0.009)	(0.018)	(0.010)
Trade Volume (logged)	0.002	0.001	0.000	-0.001	0.002	-0.003	-0.003	-0.002	-0.001	-0.001
	(0.003)	(0.004)	(0.005)	(0.005)	(0.005)	(0.003)	(0.004)	(0.006)	(0.006)	(0.005)
Fatal MID	-0.001	-0.002	-0.002	-0.003	-0.004	0.001	0.002	-0.003	-0.003	-0.002
	(0.003)	(0.006)	(0.009)	(0.010)	(0.011)	(0.002)	(0.004)	(0.004)	(0.005)	(0.006)
Partner Concentration	0.829***	0.708***	0.595***	0.490***	0.415***	–	–	–	–	–
	(0.033)	(0.059)	(0.080)	(0.096)	(0.101)	–	–	–	–	–
Goods Concentration	–	–	–	–	–	0.704***	0.536***	0.408***	0.314***	0.232***
	–	–	–	–	–	(0.034)	(0.043)	(0.058)	(0.067)	(0.064)
Constant	-0.026	-0.013	0.019	0.061	0.013	0.043	0.019	0.004	0.002	0.027
	(0.057)	(0.092)	(0.111)	(0.126)	(0.125)	(0.072)	(0.103)	(0.140)	(0.148)	(0.131)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.931	0.891	0.866	0.849	0.843	0.898	0.861	0.841	0.832	0.824
Adj. R^2	0.927	0.886	0.860	0.841	0.835	0.893	0.854	0.834	0.824	0.815
Num. obs.	5022	4850	4678	4506	4334	5022	4850	4678	4506	4334
N Clusters	172	172	172	172	172	172	172	172	172	172

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table A.8: Effects of Sanction Spillovers on Trade Concentrations, after Removing Sanctions led by the U.S. Robust Standard Errors Clustered at the Country-Level are Included in Parentheses

C.7 Remove UN-initiated Sanctions

	Trade Partner Concentration					Traded Goods Concentration				
	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5
Sanction Spillover	−0.014***	−0.031***	−0.043***	−0.058***	−0.064***	0.001	−0.002	−0.005	−0.003	−0.003
	(0.005)	(0.008)	(0.011)	(0.014)	(0.016)	(0.005)	(0.006)	(0.007)	(0.008)	(0.009)
WTO	0.002	0.002	0.000	−0.001	−0.003	−0.007***	−0.008**	−0.010**	−0.010*	−0.008
	(0.002)	(0.003)	(0.005)	(0.006)	(0.007)	(0.002)	(0.003)	(0.004)	(0.005)	(0.006)
EU	0.000	−0.001	−0.001	0.002	0.002	0.001	0.003	0.005	0.007	0.009**
	(0.002)	(0.004)	(0.005)	(0.005)	(0.006)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
OECD	0.002	0.002	0.000	−0.004	−0.008	−0.003	−0.004	−0.004	−0.005	−0.003
	(0.002)	(0.004)	(0.006)	(0.007)	(0.010)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
GDP per capita (log)	0.001	0.005	0.003	0.008	−0.002	0.015**	0.019**	0.017	0.014	0.008
	(0.006)	(0.011)	(0.013)	(0.016)	(0.017)	(0.006)	(0.008)	(0.010)	(0.011)	(0.011)
V-Dem	−0.002	−0.002	0.008	0.015	0.023	−0.013	−0.024	−0.027	−0.032	−0.037
	(0.006)	(0.010)	(0.013)	(0.017)	(0.021)	(0.009)	(0.015)	(0.017)	(0.021)	(0.023)
Sanctioned	−0.002	0.000	0.003	0.001	0.002	−0.003*	−0.003	−0.003	−0.004	−0.005*
	(0.002)	(0.003)	(0.004)	(0.004)	(0.005)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Sanctioning	0.002	0.002	0.002	0.000	−0.000	0.001	0.002	0.002	0.003	0.003
	(0.001)	(0.002)	(0.003)	(0.003)	(0.004)	(0.001)	(0.002)	(0.003)	(0.004)	(0.004)
Trade Volume (log)	0.000	−0.002	−0.000	−0.004	0.001	−0.001	−0.002	−0.000	−0.000	−0.000
	(0.003)	(0.005)	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.006)	(0.007)	(0.006)
Fatal MID	−0.001	−0.002	−0.002	−0.002	−0.003	0.000	0.001	−0.003	−0.004	−0.003
	(0.003)	(0.006)	(0.009)	(0.010)	(0.011)	(0.002)	(0.004)	(0.004)	(0.005)	(0.006)
Partner Concentration	0.833***	0.709***	0.590***	0.478***	0.396***	–	–	–	–	–
	(0.032)	(0.058)	(0.079)	(0.096)	(0.103)	–	–	–	–	–
Goods Concentration	–	–	–	–	–	0.706***	0.541***	0.412***	0.318***	0.236***
	–	–	–	–	–	(0.033)	(0.042)	(0.056)	(0.065)	(0.062)
Constant	0.008	0.055	0.029	0.119	0.028	−0.007	0.003	−0.025	0.003	0.028
	(0.056)	(0.107)	(0.100)	(0.128)	(0.133)	(0.092)	(0.113)	(0.156)	(0.158)	(0.142)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.932	0.894	0.866	0.849	0.842	0.898	0.861	0.842	0.830	0.823
Adj. R^2	0.929	0.889	0.860	0.841	0.834	0.894	0.855	0.835	0.822	0.814
Num. obs.	5016	4844	4672	4500	4328	5016	4844	4672	4500	4328
N Clusters	172	172	172	172	172	172	172	172	172	172

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table A.9: Effects of Sanction Spillovers on Trade Concentrations, after Removing Sanctions led by the U.S. Robust Standard Errors Clustered at the Country-Level are Included in Parentheses

D H1: Alternative Explanation

D.1 Examining Trade Diversion Through Product Trades

To compute the number of newly imported/exported/traded (I/E/T) goods for each country during our window of observation, we collected 4-digit level trade data from the Altas of Economic Complexity from 1988-2020. For each country, we classify a product as a newly imported/exported/traded product if the country has no documented I/E/T or a documented I/E/T volume of 0 in year $t-2$ and $t-1$ but has a documented trade volume above 0 in year t.We then tabulate the sum of all new I/E/T products to obtain their count measures at the country-year level, which is then used as dependent variables in the regression analyses.

	Newly Exported Goods		**Newly Imported Goods**		**Newly Traded Goods**	
	Lead = 1	Lead = 2	Lead = 1	Lead = 2	Lead = 1	Lead = 2
Trade Shock	−0.036	0.023	0.058	0.115	0.095	0.139
	(0.081)	(0.081)	(0.101)	(0.108)	(0.106)	(0.111)
WTO	−0.034	−0.024	−0.147***	−0.086*	−0.131**	−0.069
	(0.048)	(0.042)	(0.055)	(0.049)	(0.053)	(0.048)
EU	−0.256**	−0.245***	−0.156	−0.055	−0.117	−0.042
	(0.100)	(0.087)	(0.134)	(0.111)	(0.106)	(0.097)
OECD	0.007	0.017	0.319***	0.304***	0.397***	0.345***
	(0.099)	(0.098)	(0.116)	(0.116)	(0.129)	(0.128)
GDP per Capita (log)	−0.068	0.005	−0.121	−0.075	−0.086	−0.053
	(0.132)	(0.127)	(0.146)	(0.144)	(0.146)	(0.140)
V-Dem	0.234	0.157	0.176	0.172	0.200	0.181
	(0.156)	(0.163)	(0.165)	(0.176)	(0.166)	(0.182)
Sanctioning	0.081**	0.111***	0.168***	0.160***	0.179***	0.170***
	(0.040)	(0.038)	(0.043)	(0.041)	(0.043)	(0.042)
Sanctioned	−0.322**	−0.283***	−0.290***	−0.221	−0.209***	−0.181
	(0.126)	(0.082)	(0.083)	(0.196)	(0.074)	(0.194)
Trade Volume (log)	−0.072	−0.104*	−0.346***	−0.363***	−0.354***	−0.360***
	(0.060)	(0.057)	(0.068)	(0.063)	(0.070)	(0.062)
Fatal MID	0.011	0.020	0.050	0.109**	0.035	0.104*
	(0.029)	(0.034)	(0.049)	(0.047)	(0.055)	(0.056)
New Product (lagged)	0.003***	0.001***	0.002***	0.001***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	1.255	1.859	8.892***	9.077***	8.456***	8.542***
	(1.497)	(1.428)	(1.712)	(1.595)	(1.746)	(1.587)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,881	4,709	4,881	4,709	4,881	4,709

Note: *p<0.1; **p<0.05; ***p<0.01

Table A.10: The effect of sanction shock on newly traded goods (exports, imports, and both): Negative Binomial Regressions

D.2 Examining Product Heterogeneity in Trade Partner Concentration

In this section, we calculate two measurements of trade partner concentration: one based on trade in final goods, and the other based on trade in intermediate goods. Formally, they are computed as:

$$\text{SPILLOVERS FOR FINAL GOODS}_{i,t} = \frac{\sum_{i' \neq i}^{C} \sum_{k \in \mathcal{F}} \left(\mathbf{1}(i'_t \in \mathcal{A}_t) \times d_{ii',k,t} \right)}{\sum_{i' \neq i}^{C} \sum_{k \in \mathcal{F}} d_{ii',k,t}}$$

$$\text{SPILLOVERS FOR INTERMEDIATE GOODS}_{i,t} = \frac{\sum_{i' \neq i}^{C} \sum_{k \in \mathcal{I}} \left(\mathbf{1}(i'_t \in \mathcal{A}_t) \times d_{ii',k,t} \right)}{\sum_{i' \neq i}^{C} \sum_{k \in \mathcal{I}} d_{ii',k,t}}$$

, where $d_{ii',k}$ denotes the bilateral exports and imports between i and i' over good k, C is the full set of countries in the dataset, $\mathcal{A}$ is the set of sanctioned countries, $\mathcal{F}$ is the set of final goods, and $\mathcal{I}$ is the set of intermediate goods. The regressional results are documented in Table A.11 and visualized in Figure A.12.

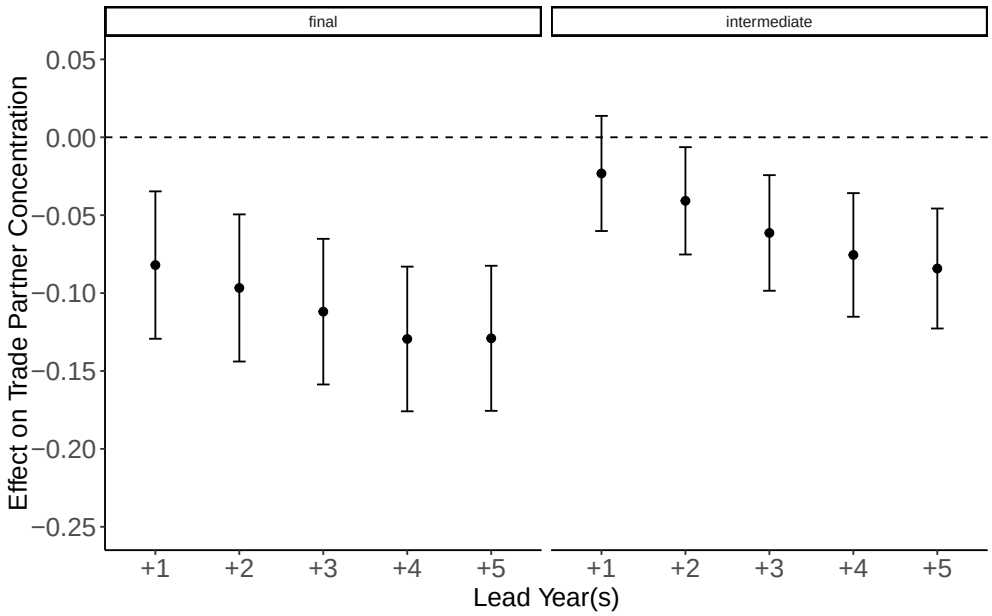


Figure A.12: Heterogeneous treatment effects with respect to product types. Error bars denote 95% confidence intervals.

Dependent Variable:	Partner Concentration of Final Goods					Partner Concentration of Intermediate Goods				
Model:	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5
Sanction Spillover	−0.082***	−0.097***	−0.112***	−0.129***	−0.129***	−0.023	−0.041**	−0.061***	−0.076***	−0.084***
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.019)	(0.018)	(0.019)	(0.020)	(0.020)
WTO	0.008	0.008	0.004	0.001	−0.000	0.008	0.007	0.005	0.005	0.005
	(0.011)	(0.011)	(0.010)	(0.011)	(0.011)	(0.011)	(0.010)	(0.009)	(0.009)	(0.008)
EU	−0.001	0.004	0.008	0.012	0.012	−0.022**	−0.019**	−0.015*	−0.012	−0.010
	(0.013)	(0.012)	(0.012)	(0.011)	(0.011)	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)
OECD	0.001	0.004	0.005	0.005	0.004	0.004	0.006	0.007	0.004	0.002
	(0.008)	(0.008)	(0.009)	(0.011)	(0.014)	(0.010)	(0.009)	(0.009)	(0.009)	(0.010)
GDP per capita (logged)	−0.017	−0.014	−0.016	−0.012	−0.017	0.003	0.003	0.004	0.011	0.007
	(0.025)	(0.025)	(0.022)	(0.021)	(0.020)	(0.028)	(0.027)	(0.026)	(0.024)	(0.023)
V-Dem	−0.031	−0.031	−0.035	−0.036	−0.029	−0.052	−0.054*	−0.049*	−0.033	−0.019
	(0.038)	(0.037)	(0.030)	(0.027)	(0.025)	(0.034)	(0.030)	(0.027)	(0.025)	(0.023)
Sanctioned	0.012	0.012	0.013*	0.012*	0.012*	0.000	0.001	0.001	−0.001	−0.001
	(0.008)	(0.008)	(0.007)	(0.007)	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)
Sanctioning	0.004	−0.005	−0.008	−0.015	−0.018	0.030	0.025	0.025	0.025	0.022
	(0.030)	(0.032)	(0.037)	(0.036)	(0.039)	(0.018)	(0.017)	(0.018)	(0.020)	(0.024)
Trade Volume (logged)	0.019	0.014	0.016	0.011	0.011	0.010	0.007	0.003	−0.004	−0.004
	(0.017)	(0.018)	(0.012)	(0.011)	(0.007)	(0.014)	(0.013)	(0.011)	(0.009)	(0.007)
Fatal MID	−0.017	−0.015	−0.013	−0.015	−0.011	−0.005	−0.003	−0.002	0.000	−0.001
	(0.014)	(0.014)	(0.014)	(0.013)	(0.012)	(0.013)	(0.014)	(0.014)	(0.015)	(0.014)
Constant	−0.305	−0.188	−0.230	−0.090	−0.073	−0.174	−0.094	−0.002	0.146	0.173
	(0.409)	(0.409)	(0.284)	(0.254)	(0.176)	(0.345)	(0.308)	(0.267)	(0.219)	(0.186)
R^2	0.767	0.773	0.788	0.798	0.807	0.745	0.754	0.766	0.777	0.789
Adj. R^2	0.756	0.763	0.779	0.788	0.798	0.733	0.743	0.755	0.766	0.778
Num. obs.	5020	4848	4676	4504	4332	5021	4849	4677	4505	4333
N Clusters	172	172	172	172	172	172	172	172	172	172

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table A.11: The effects of sanction spillover on countries' partner concentration, for final goods and intermediate goods

D.3 Measuring Sanction-Sender Pressure

To examine whether sanction-sending countries' leverage against third-party states drives our main results, we calculate an alternative measurement of sanction spillover, wherein instead of measuring the ratio of a country's total trade and the amount of trade it engages with other countries that are under direct sanctions, we compute the ratio between its total trade and the amount of trade it engages with other countries that are *sending* sanctions. Formally, this alternative measure is computed as:

$$\text{SANCTION SPILLOVERS}_{i,t} = \frac{\sum_{j \neq i}^{C} \mathbf{1}(j_t \in \mathcal{B}_t) \times d_{ij,t}}{\sum_{j \neq i}^{C} d_{ij,t}}$$

, where d denotes the bilateral exports and imports between i and j, C is the full set of countries in the dataset, and $\mathcal{B}$ is the set of sanction-sending countries.

	Partner Concentration					Goods Concentration				
	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5
Sanction Spillover	0.015*	0.019*	0.014	0.012	0.013	−0.004	−0.002	0.004	0.008	0.008
	(0.008)	(0.011)	(0.014)	(0.017)	(0.020)	(0.006)	(0.009)	(0.012)	(0.016)	(0.021)
WTO	0.002	−0.002	−0.006	0.001	0.004	−0.025	−0.030	−0.031	−0.025	0.003
	(0.003)	(0.004)	(0.007)	(0.007)	(0.012)	(0.020)	(0.024)	(0.023)	(0.029)	(0.035)
EU	0.000	0.005	0.009	−0.000	−0.005	0.019	0.022	0.022	0.015	−0.011
	(0.003)	(0.005)	(0.008)	(0.009)	(0.014)	(0.021)	(0.025)	(0.025)	(0.031)	(0.035)
OECD	0.000	−0.002	−0.004	−0.010	−0.015	−0.002	−0.003	−0.003	−0.002	−0.000
	(0.003)	(0.004)	(0.006)	(0.008)	(0.011)	(0.002)	(0.003)	(0.004)	(0.004)	(0.005)
GDP per capita (logged)	−0.005	−0.005	−0.003	−0.003	−0.010	0.016**	0.018**	0.017*	0.013	0.007
	(0.006)	(0.011)	(0.014)	(0.017)	(0.018)	(0.006)	(0.008)	(0.010)	(0.010)	(0.010)
V-Dem	−0.001	0.003	0.010	0.019	0.023	−0.017*	−0.026*	−0.029*	−0.034	−0.038
	(0.007)	(0.011)	(0.015)	(0.019)	(0.022)	(0.009)	(0.015)	(0.017)	(0.021)	(0.023)
Sanctioned	0.001	0.002	0.002	0.000	0.000	−0.004**	−0.003	−0.003	−0.005*	−0.004
	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Sanctioning	0.003	0.003	0.005	0.012	0.008	0.003	0.005	0.009	0.024	0.010
	(0.004)	(0.008)	(0.011)	(0.018)	(0.020)	(0.005)	(0.007)	(0.009)	(0.017)	(0.009)
Trade Volume (logged)	0.004	0.003	0.001	−0.000	0.002	−0.000	0.000	0.002	0.001	0.002
	(0.003)	(0.004)	(0.006)	(0.006)	(0.005)	(0.004)	(0.004)	(0.006)	(0.006)	(0.005)
Fatal MID	−0.001	−0.001	−0.002	−0.002	−0.003	0.001	0.002	−0.003	−0.003	−0.003
	(0.003)	(0.006)	(0.008)	(0.010)	(0.011)	(0.002)	(0.004)	(0.004)	(0.005)	(0.006)
Partner Concentration	0.811***	0.693***	0.597***	0.498***	0.432***	–	–	–	–	–
	(0.037)	(0.060)	(0.076)	(0.089)	(0.094)	–	–	–	–	–
Goods Concentration	–	–	–	–	–	0.670***	0.513***	0.383***	0.296***	0.215***
	–	–	–	–	–	(0.049)	(0.049)	(0.062)	(0.067)	(0.063)
Constant	−0.083	−0.068	0.001	0.045	0.010	−0.022	−0.042	−0.077	−0.068	−0.046
	(0.062)	(0.101)	(0.146)	(0.153)	(0.138)	(0.091)	(0.107)	(0.140)	(0.142)	(0.121)
R^2	0.927	0.887	0.861	0.843	0.835	0.893	0.859	0.839	0.830	0.821
Adj. R^2	0.924	0.882	0.855	0.836	0.827	0.888	0.853	0.832	0.821	0.813
Num. obs.	5026	4854	4682	4510	4338	5026	4854	4682	4510	4338
N Clusters	172	172	172	172	172	172	172	172	172	172

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table A.12: Effects of Sanction Spillovers on Partner and Goods Concentration, Measured by Trade Ties with Sanction Senders.

D.4 Trade with Allies

We use the alliance data from Alliance Treaty Obligations and Provisions (ATOP). In particular, a pair of country ij is considered as allies in year t if i and j have share a defence treaty in $t \in [1990, 2018]$. As the ATOP data end in 2018, we impute the alliance indicator after 2018 using the last observed alliance status. We then calculate the ally trade ratio using the following formula:

$$\text{Ally Trade Ratio}_{i,t} = \frac{\sum_{j \neq i}^{C} \mathbf{1}(j_t \in \mathcal{D}_t) \times d_{ij,t}}{\sum_{j \neq i}^{C} d_{ij,t}} \tag{4}$$

, where d denotes the bilateral exports and imports between i and j, C is the full set of countries in the dataset, and $\mathcal{D}$ is the set of countries that have defense pacts with i in year t.

	Ally Trade Ratio					Number of Allies				
	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5
Sanction Spillover	0.001	0.019**	0.022**	0.025**	0.028**	0.118	1.258**	0.895***	0.847**	1.377***
	(0.006)	(0.009)	(0.009)	(0.011)	(0.011)	(0.319)	(0.482)	(0.323)	(0.412)	(0.498)
WTO	−0.010*	−0.015**	−0.019	0.005	0.004	−0.815**	−1.087**	−1.605	0.434	1.111
	(0.004)	(0.005)	(0.013)	(0.005)	(0.005)	(0.204)	(0.224)	(0.859)	(0.888)	(0.232)
EU	0.021**	0.033**	0.038*	0.017	0.018	0.550	0.961**	1.728	−0.233	−0.920
	(0.006)	(0.008)	(0.015)	(0.010)	(0.011)	(0.261)	(0.317)	(0.888)	(0.942)	(0.443)
OECD	0.027*	0.033*	0.024	0.021	0.022	1.440*	1.698	0.942	0.915	0.907
	(0.015)	(0.018)	(0.016)	(0.017)	(0.018)	(0.793)	(0.942)	(0.741)	(0.788)	(0.829)
GDP per capita (logged)	−0.007	−0.009	−0.003	−0.004	−0.006	−0.616	−0.821*	−0.091	0.098	0.179
	(0.008)	(0.010)	(0.011)	(0.012)	(0.013)	(0.400)	(0.481)	(0.345)	(0.437)	(0.529)
V-Dem	0.007	0.019	0.019	0.015	0.012	0.054	0.440	0.476	0.648	0.821
	(0.009)	(0.012)	(0.013)	(0.015)	(0.016)	(0.538)	(0.654)	(0.525)	(0.682)	(0.814)
Sanctioned	0.009**	0.010**	0.007*	0.004	0.004	0.590***	0.769***	0.493***	0.547**	0.645**
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.171)	(0.199)	(0.186)	(0.239)	(0.287)
Sanctioning	0.002	−0.003	−0.004	−0.005	−0.000	0.428	−0.238	−0.588	−0.366	−0.287
	(0.011)	(0.023)	(0.020)	(0.017)	(0.012)	(0.979)	(1.380)	(0.832)	(0.569)	(0.467)
Trade Volume (logged)	−0.005**	−0.006*	−0.007	−0.006	−0.004	−0.047	−0.045	−0.370***	−0.490***	−0.511***
	(0.002)	(0.003)	(0.005)	(0.006)	(0.006)	(0.149)	(0.169)	(0.108)	(0.142)	(0.152)
Fatal MID	0.001	0.004	0.005	0.008	0.006	−0.227	−0.243	−0.099	−0.149	−0.369
	(0.003)	(0.004)	(0.005)	(0.007)	(0.005)	(0.150)	(0.169)	(0.173)	(0.224)	(0.250)
Ally Trade Ratio (lagged)	0.650***	0.541***	0.592***	0.502***	0.399***	–	–	–	–	–
	(0.037)	(0.042)	(0.052)	(0.061)	(0.080)	–	–	–	–	–
Number of Allies (lagged)	–	–	–	–	–	0.664***	0.604***	0.844***	0.787***	0.727***
	–	–	–	–	–	(0.043)	(0.041)	(0.021)	(0.025)	(0.029)
Constant	0.365***	0.461***	0.438***	0.482***	0.503***	22.172***	26.525***	21.443***	27.394***	31.822***
	(0.069)	(0.099)	(0.123)	(0.142)	(0.143)	(4.559)	(4.805)	(2.825)	(3.535)	(3.750)
R^2	0.898	0.878	0.876	0.866	0.860	0.926	0.919	0.932	0.925	0.921
Adj. R^2	0.894	0.872	0.871	0.860	0.852	0.923	0.915	0.928	0.922	0.917
Num. obs.	5023	4851	4679	4507	4335	5023	4851	4679	4507	4335
N Clusters	172	172	172	172	172	172	172	172	172	172

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table A.13: Effects of Sanction Spillovers on Trade Ratio with Allies (column 1-5) and the Number of Allies (column 6-10). Robust Standard Errors Clustered at the Country-Level are Included in Parentheses

D.5 Trade with Trade Agreement Partners

To measure the trade patterns countries have with their trade agreement partners, we utilize the Design of Trade Agreements Database (DESTA). In particular, a pair of country ij is considered as preferential trade agreement (PTA) partners in year t if i and j have *signed* at least one trade agreement in $t \in [1990, 2020]$ (note that by entering some PTAs, a country can add more than one partner, sometimes dozens at once). We calculate the trade ratio with PTA partners using the following formula:

$$\text{Trade Ratio with PTA Partners}_{i,t} = \frac{\sum_{j \neq i}^{C} \mathbf{1}(j_t \in \mathcal{P}_t) \times d_{ij,t}}{\sum_{j \neq i}^{C} d_{ij,t}} \tag{5}$$

, where d denotes the bilateral exports and imports between i and j, C is the full set of countries in the dataset, and $\mathcal{P}$ is the set of countries that have signed PTAs with i in year t.

	Trade Ratio with PTA Partners					Number of PTA Partners				
	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5
Sanction Spillover	0.042***	0.060***	0.074***	0.080***	0.073**	3.505***	6.676***	9.839***	13.719***	15.478***
	(0.012)	(0.017)	(0.021)	(0.027)	(0.029)	(0.630)	(1.143)	(1.641)	(2.205)	(2.516)
WTO	−0.009	−0.022	−0.037	−0.062**	−0.039	−0.376	−0.589	−1.080	−1.643	−0.591
	(0.007)	(0.012)	(0.016)	(0.016)	(0.017)	(1.186)	(2.928)	(4.354)	(6.254)	(9.546)
EU	0.022*	0.044*	0.064**	0.092**	0.070	1.420	2.802	4.179	6.194	5.696
	(0.010)	(0.016)	(0.020)	(0.021)	(0.024)	(1.290)	(3.066)	(4.526)	(6.454)	(9.743)
OECD	−0.031*	−0.045	−0.047	−0.048	−0.048	3.140**	6.371**	9.565**	11.657**	14.503**
	(0.016)	(0.026)	(0.030)	(0.034)	(0.039)	(1.255)	(2.565)	(3.999)	(4.769)	(5.670)
GDP per capita (logged)	0.022*	0.055**	0.092***	0.132***	0.151***	1.334**	2.394**	3.135**	3.716**	4.567**
	(0.012)	(0.022)	(0.030)	(0.036)	(0.041)	(0.515)	(0.957)	(1.368)	(1.706)	(1.999)
V-Dem	0.027	0.052*	0.084**	0.110**	0.101*	1.689	2.679	3.450	3.764	3.516
	(0.016)	(0.028)	(0.039)	(0.051)	(0.059)	(1.279)	(2.252)	(2.977)	(3.499)	(3.932)
Sanctioned	−0.002	0.000	0.001	−0.004	−0.008	0.161	0.492	0.592	0.515	−0.173
	(0.004)	(0.006)	(0.008)	(0.010)	(0.010)	(0.324)	(0.618)	(0.862)	(1.086)	(1.132)
Sanctioning	−0.009	−0.026	−0.039	−0.049	−0.033	2.206	5.053	7.748	8.592	9.735
	(0.015)	(0.030)	(0.046)	(0.043)	(0.051)	(2.561)	(4.304)	(6.734)	(6.232)	(5.714)
Trade Volume (logged)	−0.008*	−0.014*	−0.020*	−0.026*	−0.018	−0.395	−0.557	−0.663	−0.810	−0.915
	(0.004)	(0.008)	(0.011)	(0.013)	(0.013)	(0.242)	(0.432)	(0.583)	(0.686)	(0.695)
Fatal MID	−0.007	−0.007	−0.005	−0.001	−0.002	0.048	−0.224	0.156	0.307	0.428
	(0.006)	(0.010)	(0.010)	(0.012)	(0.013)	(0.471)	(0.588)	(0.674)	(0.726)	(0.746)
Trade Ratio (lagged)	0.855***	0.738***	0.643***	0.565***	0.493***	–	–	–	–	–
	(0.013)	(0.022)	(0.029)	(0.033)	(0.036)	–	–	–	–	–
# PTA Partners (lagged)	–	–	–	–	–	0.870***	0.760***	0.658***	0.561***	0.481***
	–	–	–	–	–	(0.009)	(0.014)	(0.020)	(0.024)	(0.026)
Constant	0.196*	0.315	0.354	0.375	0.134	−2.418	−11.744	−19.585	−21.958	−22.363
	(0.105)	(0.190)	(0.273)	(0.320)	(0.328)	(6.339)	(11.274)	(15.683)	(18.072)	(18.638)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.936	0.892	0.863	0.843	0.825	0.975	0.959	0.948	0.941	0.938
Adj. R^2	0.933	0.887	0.857	0.836	0.817	0.974	0.957	0.946	0.938	0.934
Num. obs.	5023	4851	4679	4507	4335	5023	4851	4679	4507	4335
N Clusters	172	172	172	172	172	172	172	172	172	172

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table A.14: Effects of Sanction Spillovers on Trade Ratio with Trade Partners (column 1-5) and PTA Network Size (column 6-10). Robust Standard Errors Clustered at the Country-Level are Included in Parentheses

E H1: Gravity Model

To investigate how sanction spillover affects bilateral trade flows, we fit a set of gravity models. In particular, we are interested in examining how does country *i*'s import change as it becomes exposed to higher levels of sanction spillover. We focus on import as the government and firms in the importing country have larger controls over sourcing decisions, the demand-side perspective is more relevant for our arguments. Moreover, import data typically are better recorded by government seeking to enforce and collect tariffs. As such, we specify our models as:

$$\ln(\text{Import})_{ij,t+l} = \tau \cdot (\text{Sanction Spillover})_{j,t} + Z'_{ij,t}\beta + X'_{it}\beta_o + X'_{j,t}\beta_d + \alpha_{ij} + \gamma_i + \delta_j + \xi_t + \varepsilon_{ijt}$$

, where l is the number of lead years. Z_{ijt} is a vector of dyadic-level covariates. X_{it} and X_{jt} include country-level covariates of both the importing country i and the exporting country j, with β_o and β_d their corresponding coefficients. α_{ij} is the fixed effect for country dyad ij, γ_i and δ_j are the fixed effects for country i and j respectively, and ξ_t is the fixed effect for year t. ε_{ijt} is a random shock with mean zero.

Table A.15 presents the impact of sanction spillover on bilateral trade flows, measured as the logged import volume of country i from country j. Similar to our main analysis, the gravity model includes five specifications with different leads (1 to 5 years) of the dependent variable, providing a dynamic assessment of how spillover effects evolve over time. Across all specifications, the coefficient on Sanction Spillover is consistently negative and statistically significant. The effect grows in magnitude over time, ranging from -0.28 (Lead = 1) to -0.35 (Lead = 5). These results indicate that when a country experiences larger sanction spillover as a result of sanctions imposed on its trading partners, its imports from other countries decline. This supports our expectation that countries respond to sanction-induced market uncertainty by reducing dependence on any single partner.

Table A.15: The effect of sanction spillover on bilateral imports

Dependent Variables:	i's import volume from j				
Model:	Lead = 1	Lead = 2	Lead = 3	Lead = 4	Lead = 5
Sanction Spillover$_i$	-0.275***	-0.238***	-0.265***	-0.313***	-0.348***
	(0.068)	(0.074)	(0.075)	(0.075)	(0.081)
GDP$_i$ (logged)	0.407***	0.319***	0.285***	0.170***	0.085
	(0.049)	(0.055)	(0.058)	(0.059)	(0.060)
GDP$_j$ (logged)	0.323***	0.265***	0.178**	0.078	0.035
	(0.060)	(0.070)	(0.071)	(0.071)	(0.072)
Population$_i$ (logged)	0.399***	0.477***	0.493***	0.527***	0.462***
	(0.152)	(0.174)	(0.180)	(0.179)	(0.175)
Population$_j$ (logged)	-0.301**	-0.213	-0.151	-0.202	-0.373**
	(0.142)	(0.161)	(0.160)	(0.168)	(0.174)
V-Dem$_i$	0.370**	0.354**	0.165	0.252	0.038
	(0.148)	(0.167)	(0.176)	(0.175)	(0.170)
V-Dem$_j$	0.400***	0.515***	0.355**	0.447***	0.471***
	(0.146)	(0.170)	(0.168)	(0.167)	(0.169)
PTA$_{ij}$	0.131***	0.166***	0.143***	0.142***	0.141***
	(0.036)	(0.040)	(0.042)	(0.043)	(0.042)
Defense alliance$_{ij}$	0.054	0.031	0.070*	0.066	0.097**
	(0.033)	(0.036)	(0.039)	(0.041)	(0.040)
WTO membership$_i$	0.063	0.060	0.123**	0.136***	0.168***
	(0.045)	(0.051)	(0.051)	(0.049)	(0.048)
WTO membership$_j$	0.140***	0.170***	0.259***	0.272***	0.256***
	(0.052)	(0.057)	(0.056)	(0.055)	(0.055)
Sanctioned by j	-0.005	0.056	0.052	0.119**	0.097*
	(0.044)	(0.049)	(0.050)	(0.053)	(0.052)
Sanctioning j	-0.267***	-0.250***	-0.268***	-0.257***	-0.216***
	(0.057)	(0.064)	(0.068)	(0.069)	(0.069)
Import Volume$_{ij}$ (logged)	0.377***	0.280***	0.232***	0.196***	0.174***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Fixed-effects					
dyad	Yes	Yes	Yes	Yes	Yes
year	Yes	Yes	Yes	Yes	Yes
importer (i)	Yes	Yes	Yes	Yes	Yes
exporter (j)	Yes	Yes	Yes	Yes	Yes
Fit statistics					
Observations	107,494	107,220	106,848	106,376	105,690
R^2	0.802	0.792	0.790	0.790	0.788
Within R^2	0.160	0.095	0.070	0.052	0.041

Clustered (id) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

F H2: Google Trends of Section 232 between 2017.10 - 2018.08

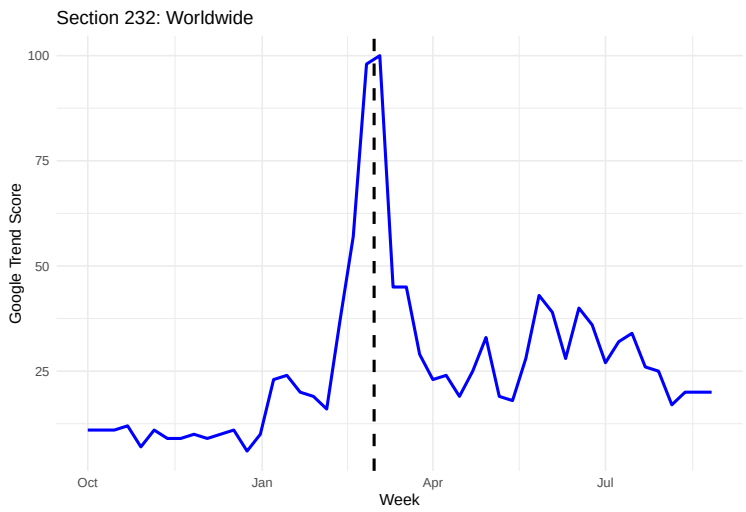


Figure A.13: Google search trend of the term “section 232" worldwide. Dashed line indicates 03.01.2018, the date on which the tariffs were announced.

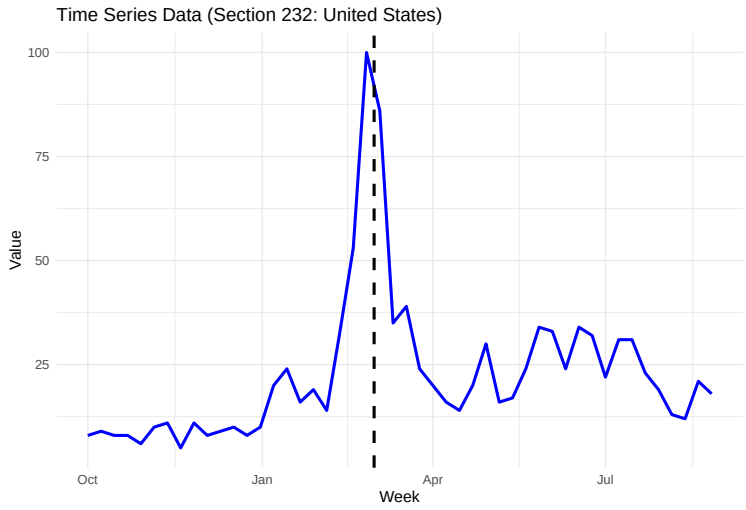


Figure A.14: Google search trend of the term “section 232" in the US. Dashed line indicates 03.01.2018, the date on which the tariffs were announced.

G H2: Exposure Type to 232 Tariff by Country

To make the number of countries roughly balance across each group, we set the grouping criteria as the following:

- Directly Impacted: Countries for which the US is among the top 5 export destinations for steel and aluminum
- Indirectly Impacted: Countries for which at least one directly impacted country is among the top 3 export destinations for steel and aluminum
- Controlled: The rest of the countries in the dataset

Table A.16: Alphabetized Country List

Directly Impacted	**Indirectly Impacted**	**Pure Control**
Antigua & Barbuda	Azerbaijan	Algeria
Argentina	Belarus	Angola
Armenia	Belgium	Belgium
Australia	Benin	Burkina Faso
Austria	Bosnia & Herzegovina	Burundi
Barbados	Botswana	Cambodia
Belize	Brunei	Côte d'Ivoire
Bolivia	Bulgaria	Croatia
Brazil	Burkina Faso	Czechia
Canada	Congo - Brazzaville	France
Chile	Congo - Kinshasa	Germany
China	Cyprus	Greece
Colombia	Denmark	Iceland
Dominican Republic	Estonia	Kenya
Ecuador	Eswatini	Kiribati
Egypt	Ethiopia	Lesotho
El Salvador	Finland	Luxembourg
Georgia	Gambia	Madagascar
Guatemala	Ghana	Malawi
India	Grenada	Maldives
Indonesia	Guyana	Mauritania
Ireland	Honduras	Mauritius
Israel	Hungary	Morocco
Mexico	Iceland	Netherlands
Pakistan	Italy	Nicaragua
Panama	Japan	Niger
Paraguay	Jordan	North Macedonia
Peru	Kazakhstan	Oman
Philippines	Kuwait	Poland
Portugal	Kyrgyzstan	Romania
Qatar	Laos	Russia
Russia	Latvia	Senegal
Saudi Arabia	Lithuania	Sierra Leone
South Africa	Luxembourg	Slovakia

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Table A.16 continued from previous page

Directly Impacted	Indirectly Impacted	Pure Control
South Korea	Malta	Slovenia
St. Kitts & Nevis	Moldova	St. Vincent & Grenadines
Sweden	Montenegro	Switzerland
Thailand	Mozambique	Tanzania
Trinidad & Tobago	Myanmar (Burma)	Uganda
Turkey	Namibia	Uruguay
Ukraine	Netherlands	Uzbekistan
United Arab Emirates	New Zealand	Yemen
United Kingdom	Niger	Zambia
Vietnam	Nigeria	Zimbabwe
	Norway	
	Oman	
	Poland	
	Romania	
	Russia	
	Rwanda	
	Samoa	
	São Tomé & Príncipe	
	Seychelles	
	Sierra Leone	
	Singapore	
	Slovenia	
	Solomon Islands	
	Spain	
	Sudan	
	Tanzania	