



Centre for Globalisation Research

From Russia with Love: International Risk-sharing, Sanctions, and Firm Investments

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Abstract

We propose a novel explanation for why sanctions on Russian firms might not work as intended: these firms' ability to diversify sanction risks via partner countries friendly with Russia. Using indirect links with partner firms as a plausibly exogenous proxy for this risk-sharing channel, we show that exposed Russian firms were able to leverage these links to alleviate the negative impacts of sanctions in 2014.

Keywords: International risk-sharing, sanction, Russia, firm-level

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*The order of authors is determined alphabetically by their last names. We are grateful for Peter Tillman for helpful comments. All errors remain ours.

1 Introduction

Recent sanctions on Russia have rekindled interest from academics and policymakers alike on the potential impacts of these policies on Russian firms. While it is well-documented that these sanctions have largely been ineffective (Ahn and Ludema, 2020; Nigmatulina, 2022; Gaur et al., 2023), the channels through which Russian firms avoid the negative impacts of sanctions are still unclear.

Our paper fills this gap by exploring Russian firms' ability to diversify sanction risks via partner firms as a potential channel to explain why sanctions on Russian firms might not be as effective as intended. Among key metrics on firm outcomes, our focus is on firm investments since hindering the ability of Russian firms to leverage the capital channel has been one of the cornerstones of the Biden administration strategy regarding Russian sanctions.¹ Such a focus on firm investments is also motivated, in part, by theoretical literature on economic gains from international risk-sharing via the asset channel (Cole and Obstfeld, 1991; Devereux and Smith, 1994).

Turning to more details, we study the risk-sharing channel of sanctions by examining indirect business relations between Russian firms and those in countries not supporting sanctions against Russia, leveraging such ties as a plausibly exogenous proxy for diversifying sanction risks. By focusing on indirect relations, we aim to establish causal links by circumventing potential biases where firm characteristics might influence business relations, thus avoiding confounding effects when assessing the impact of sanctions on firm investments.

Our paper contributes to the ongoing literature on sanctions by providing a channel that helps Russia avoid the adverse impacts of sanctions. While recent literature has documented accesses to partners via international trades (Morgan et al., 2023) and country-to-country relations, our paper is the first, to the best of our knowledge, to assess how firm-to-firm relations can help alleviate the impacts of sanction along the capital channel.

¹See, for example, recent comments by Deputy Treasury Secretary Wally Adeyemo. Source: <https://www.cfr.org/background/what-are-economic-sanctions>. Last accessed August 2, 2024.

2 Empirical Strategy

2.1 Identification

We leverage indirect firm-to-firm business relations between Russian firms and their business partners from a friendly nation to identify the risk-sharing channel of sanctions. Our strategy critically hinges on identifying Russian firms' indirect business relations with companies in countries that voted absent or against sanctioning Russia in 2014 (i.e., friendly countries).²

Intuitively, firms can maintain direct business relations with their counterparts from friendly countries despite sanctions, allowing these firms to actively diversify risks associated with declines in aggregate demand due to sanction-related constraints. Alternatively, firms can also maintain indirect business relations with their counterparts from friendly countries via other intermediate partners. Whether the relation is direct or indirect, firms benefit from having access to the global market via partners in friendly countries in both the production factor and the goods market.

One potential issue arising from using direct business relations to proxy for the risk-sharing channel is that Russian firms may choose to engage in business relations with firms in specific countries based on the nature of their business and their fundamentals, possibly confounding the effects of the risk-sharing channel of sanction. After all, relations can improve economic outcomes, and the latter can determine which relation to establish. This issue, if not adequately dealt with, shall prevent us from establishing a causal relation from having access to risk-sharing to firm fundamentals.

Such an issue motivates us to use *indirect* business relations (either as a customer or supplier) of Russian firms with partner firms in friendly nations to capture the extent to which these Russian firms can diversify sanction risks. In particular, we construct a list of intermediate firms with a business tie with all Russian firms in the sample (i.e., first-level). We then identify each intermediate firm's relations with firms in countries friendly to Russia (i.e., second-level). While Russian firms know which intermediate firms they are dealing with, they do not have complete information concerning the partner firms with which each intermediate firm has business dealings. This lack of complete

²Source: <https://www.nytimes.com/2014/03/28/world/europe/General-Assembly-Vote-on-Crimea.html>. Retrieved Jun 21, 2024.

information allows us to leverage each Russian firm’s indirect relations with partners from countries friendly to Russia as a plausibly exogenous proxy for their ability to diversify sanction risks in 2014. As we advance, we shall use indirect business relations in all empirical analyses.

Figure 1 depicts how relations between Russian firms and those from friendly countries are constructed. A business relation exists between two firms if the two firms are either customers or suppliers of each other. An indirect business relation exists if two firms maintain business relations via a third partner. An indirect relation thus encompasses two relation levels. In the first level, a Russian firm is connected to an intermediate firm, which can be located in any country.³ In the second level, such an intermediate firm is connected to another non-Russian firm in other countries friendly with Russia; that is, countries that voted “abstain” or “against” in United Nations General Assembly resolutions that aim to sanction Russia in 2014 and 2022.⁴

Our identification strategy is motivated, in part, by the growing existing literature on the differential impacts of sanctions on firm performances (Ahn and Ludema, 2020; Nigmatulina, 2022; Gaur et al., 2023). This literature typically categorizes firms into sanctioned groups using government documents,⁵ with subsidiaries of sanctioned firms included in the treatment group, and all other firms placed in the control group. Arguably, these sanctioned firms may have already drawn the attention of Western entities before the implementation of sanctions, suggesting that their selection is not exogenous to firm characteristics. Although the sanctions are designed to be ‘smart’ tools targeting specific firms, there might be ways to avoid these sanctions through strategies like ‘strategic allocation’ (Ahn and Ludema, 2020) or using government contractors (Nigmatulina, 2022), ex-ante their predictions. Thus, relying solely on the explicit list of sanctioned firms or individuals might diminish the effects of sanctions.

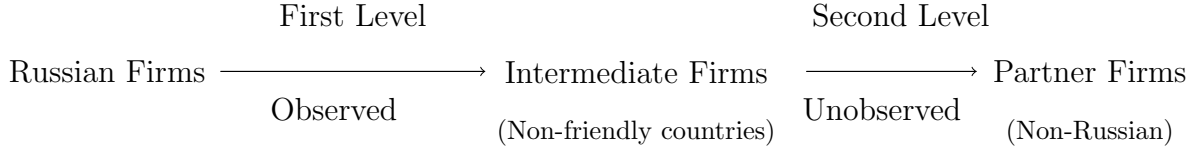
To avoid the possibility that firms’ characteristics might influence the extent to which firms are exposed to firm-specific sanctions, we leverage the general timing of nationwide sanctions imposed on

³To explicitly avoid the possibility that Russian firms intentionally engaged in risk-sharing via this first level, thereby confounding our identification strategy, we exclude connections to nations friendly with Russia.

⁴By counting countries that vote in favor of Russia in both sanction waves, we can avoid the issue of whether the 2014 sanction itself led to a country switching allegiance.

⁵These documents include, but are not limited to, the lists of companies and individuals sanctioned by the US, provided by the Office of Foreign Assets Control (OFAC), or the lists of persons and entities affected by EU sanctions as outlined in Council Decision 2014/145/CFSP.

Figure 1: The Anatomy of an Indirect Relation



Russia. Intuitively, while a nationwide sanction might impact an individual firm’s business conduct, the average firm cannot impact Russia’s probability of imposing a sanction on its own.

2.2 Empirical Specification

Our benchmark empirical specification is as follows:

$$Y_{it} = \alpha + \beta_1 \mathbb{I}(t \geq T_{\text{Sanction}}) + \beta_2 \mathbb{I}(t \geq T_{\text{Sanction}}) \times \mathbb{R}_{it-1} + \beta_3 \mathbb{R}_{it-1} + \theta \mathbb{X}_{it-1} + \gamma \Gamma_i + \xi \Xi_t + \varepsilon_{it}, \quad (1)$$

where Y_{it} is our dependent variable of interest for firm i at time t , $\mathbb{I}(t \geq T_{\text{Sanction}})$ is an indicator function that take a value of 1 if the observation is on or after the year of sanction T_{Sanction} and 0 otherwise, \mathbb{R}_{it} is the fraction of *indirect* business relations that the firm has with firms in countries that voted absent or against sanctioning Russia in 2014 at time t over its total number of business relations.⁶ Γ_i and Ξ_t denote the firm and year fixed effects, respectively.

Our coefficient of interest is β_2 , which captures the extent to which having access to international risk-sharing *ex-ante* (i.e., \mathbb{R}_{it-1}) via indirect business relations can help Russian firms alleviate the impact of the 2014 sanction on Russia. Our dependent variable Y_{it} is either tangible assets or capital expenditures, both of which are logged and detrended using a quadratic trend at the firm level.⁷ As a result, β_2 captures the effects of risk-sharing exposure after the 2014 sanction on the deviations of Y_{it} relative to the trends. \mathbb{X}_{it-1} indicates our control variables, including one-lagged firm leverage (i.e., the ratio of total debt to total assets in year t-1) and one-lagged firm dividends (i.e., the ratio of total cash dividends to total assets in year t-1).

⁶Source: <https://www.nytimes.com/2014/03/28/world/europe/General-Assembly-Vote-on-Crimea.html>. Retrieved Jun 21, 2024.

⁷Specifically, for each firm i , we consider the following regression to compute the trend $Y_{it} = \alpha_i + \beta_{1i} \times t + \beta_{2i} \times t^2 + \varepsilon_{it}$, the predicted value of which is subtracted from the raw log values for Y_{it} to obtain the de-trended values used in the empirical analysis.

2.3 Data

We gather data on global supply chain relations from the FactSet Revere database, which has been employed in recent studies to capture both domestic and international supply chain relations (Jiao and Sarkissian, 2021). As shown in Figure 1, based on information of the relation types, start date, end date, and country codes from the FactSet Revere, we identify first-level intermediate firms and the second-level business partners that Russian firms annually have business relations with. We focus on the indirect relations and compute our main risk-sharing variable as the number of second-level relations with partners from friendly countries divided by the total number of relations. Firm-level financial/accounting data, including firm investments, leverage, and dividends, are collected from Factset Fundamentals covering 2003-2023. Our sample after merging data between FactSet Revere and FactSet Fundamentals is 9,735 firm-year observations (i.e., 241 unique Russian firms) between 2003 and 2023.⁸ We describe our data in detail in the online Appendix.⁹

3 Results

3.1 Risk-sharing, Sanctions, and Firm Investments in 2014

Table 1 presents our baseline results for Eq. (1), where we find that Russian firms who had established relations with supply chain partners from friendly countries tend to increase investments in tangible assets and capital expenditures post-2014 sanctions. Our results suggest that such a risk-sharing channel helps firms overcome the impact of the sanctions. Given the sanctions starting in 2014, a one-percent increase in lagged relations induces approximately a 0.44% increase in tangible assets relative to firms without access to this risk-sharing channel (Columns 1-3), while this effect is 0.67% for total capital expenditures in the post-sanction period (Columns 4-6).

Figure 2 presents the coefficient plot for the interaction terms in Eq. (1). We expect the β_2 values to be indistinguishable from zero before the sanction. The pre-trends are flat, and we observe

⁸The observation number varies across different regressions due to the data availability for the variables of interest.

⁹In the online Appendix, we present first-level and second-level relations, as well as the descriptive statistics. We conduct a number of exercises where we calculate relations with specific trading partners or removing countries that are also sanctioned in 2014.

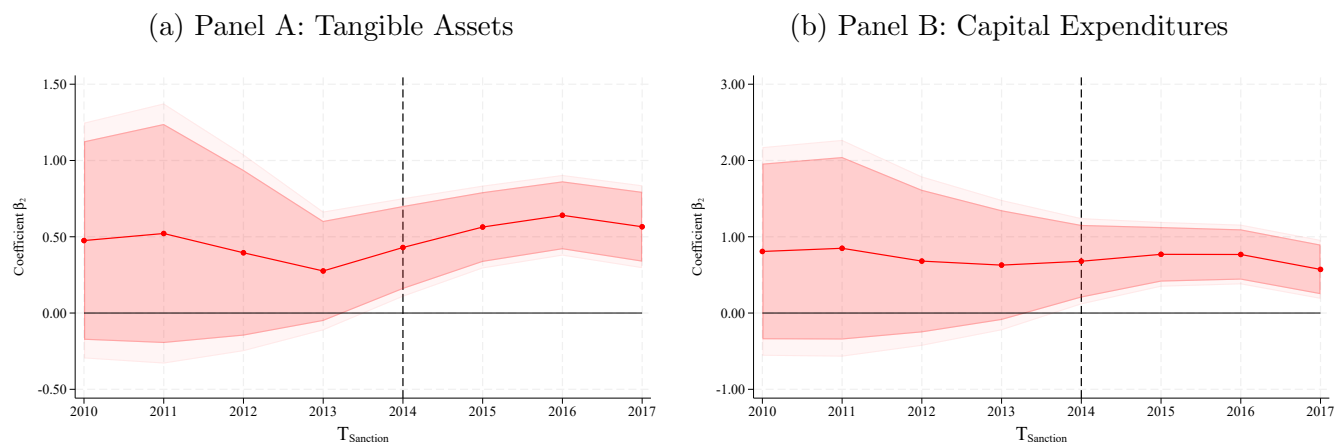
Table 1: How Risk-sharing Alleviates the Impacts of 2014 *Sanction* on *Firm Investments*

| | Tangible Assets | | Capital Expenditures | |
|---|-----------------|----------|----------------------|-----------|
| | (1) | (2) | (3) | (4) |
| Sanction 2014 \times Lagged Relations | 0.321* | 0.430*** | 0.738** | 0.679** |
| | (0.181) | (0.165) | (0.287) | (0.289) |
| Lagged Relations | 0.086 | -0.080 | -0.421 | -0.489* |
| | (0.157) | (0.143) | (0.260) | (0.267) |
| Sanction 2014 | 0.068 | -0.167** | 0.694*** | 0.482*** |
| | (0.076) | (0.069) | (0.094) | (0.089) |
| Lagged Leverage | | 0.011 | | -0.296*** |
| | | (0.059) | | (0.080) |
| Lagged Dividends | | 0.222 | | 2.533*** |
| | | (0.157) | | (0.434) |
| Constant | 0.929*** | 1.105*** | 0.425*** | 0.718*** |
| | (0.094) | (0.096) | (0.115) | (0.110) |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Adj-R2 | 0.897 | 0.923 | 0.838 | 0.857 |
| Obs. | 9,404 | 8,208 | 9,173 | 8,181 |

Notes: This table presents the estimates for Eq. (1). All variables are defined in the Appendix. The estimation includes firm and year fixed effects. Robust standard errors are shown in parentheses. Significance levels are denoted as follows: * for $p < 0.10$, ** for $p < 0.05$, and *** for $p < 0.01$.

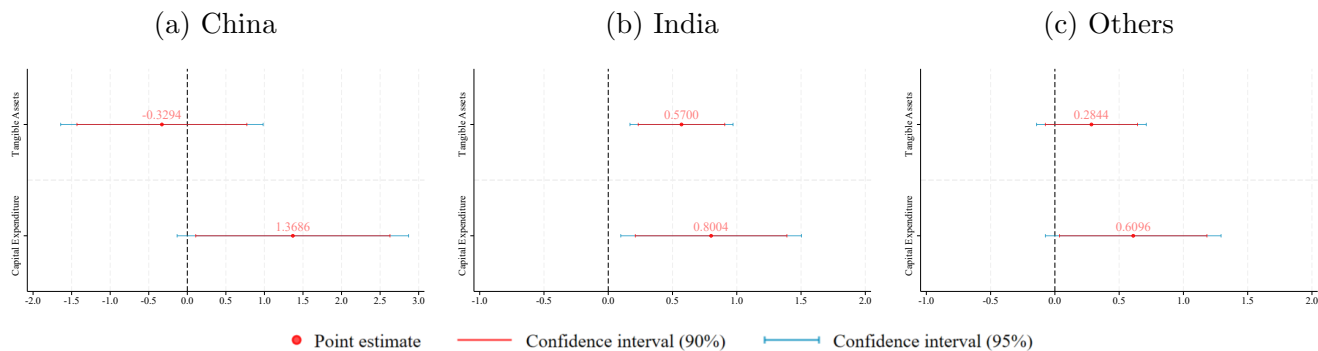
positive trend breaks in both variables, *Tangible Assets* and *Capital Expenditures*, after 2014 for firms with more relations. We observe no significant pre-trend for either outcome, which aligns with our initial hypothesis that the risk-sharing channel activates a protective mechanism for Russian firms. Despite severe sanctions, this mechanism allows firms to increase their capital expenditures and invest in tangible assets.

Figure 2: Risk-sharing Effects (β_2) by Sanction Timing



Notes: The figure displays the regression coefficients for the interaction between the lagged relations and time period dummies, along with 90% (darker) and 95% (lighter) confidence intervals. Standard errors are robust, and the model includes all control variables.

Figure 3: Risk-sharing Effects (β_2) by Countries of Partner Firms



Notes: The figure displays the regression coefficients for the baseline results with the sub-sample of partner firms located in China, India, or other countries. Standard errors are robust, and the model includes all control variables.

3.2 Sources and Nature of Risk-sharing Matter

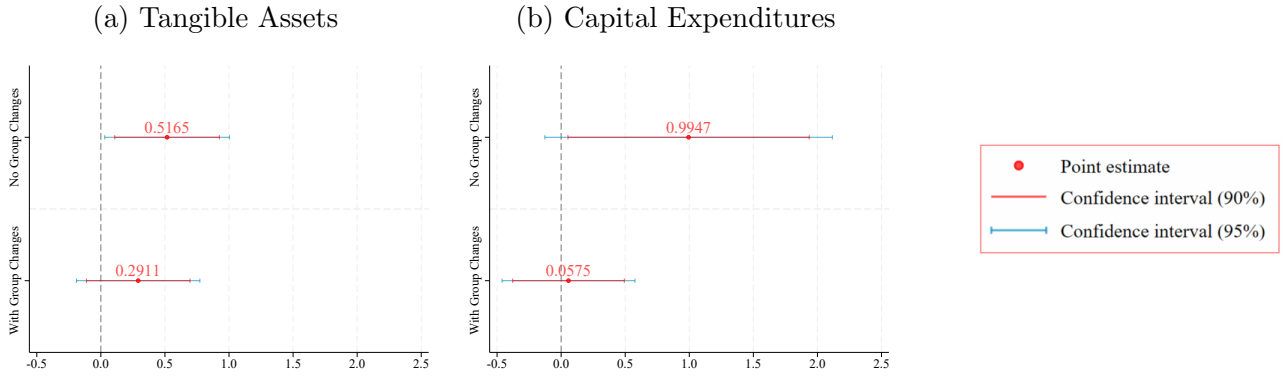
3.2.1 Risk-sharing Effects by Countries

Intuitively, Russian firms can diversify sanction risks via countries with varying access to the global market; such variations in sanction exposure can determine how effective the risk-sharing channel is. We estimated Eq. (1) within a sub-sample analysis and plotted the coefficients in Figure 3. In particular, we considered subsamples that include indirect relations where the second-level partner firms are from Russia’s top trading partners.¹⁰ One might argue that firms impacted by sanctions are more likely to do businesses with non-sanctioned nations, some of which maintain strong trade connections with the sanctioned country (Besedeš et al., 2021).

This approach naturally leads us to consider a subset of indirect relations where the second-level partner firms from China, India, or other countries (see Figure 1). We found that the risk-sharing channel of Russian firms is most effective if the relations are with firms in India, with the estimates of β_2 for both tangible assets and capital expenditures significantly positive at the 5% level. However, we only find a marginal effect for other countries and China, with a 10% significance level for capital expenditures. We find no effect on tangible assets or capital expenditures should the sample be restricted to second-level partner firms not in India or China.

¹⁰The top trading partners for Russia in 2017 by export value were India and China. Source: <https://oec.world/en>. Last retrieved: July 29, 2024.

Figure 4: Risk-sharing Effects (β_2) by whether the Number of Relations Changes after 2014



Notes: The figure displays the regression coefficients for the baseline results, considering whether Russian firms choose to increase or maintain their risk-sharing relations before 2014. Standard errors are robust, and the model includes all control variables.

3.2.2 Excluding the Feedback Effects of Sanctions

Since firms might change business ties after receiving sanctions, the previous estimate might not disentangle the effects of risk-sharing before and after sanctions. We account for such feedback by excluding firms that change the number of relations after the 2014 sanction. In particular, we re-estimate Eq. (1) for firms whose number of relations change after 2014 and for firms whose number of relations do not and plot the coefficient on the risk-sharing effects (β_2) in Figure 4. In Figure 4, the dependent variables are tangible assets and capital expenditures in the left and right panels, respectively. Overall, we find significant effects on both tangible assets (at the 5% level) and capital expenditures (at the 10% level) for firms that do not experience a change in the fraction of indirect relations with other firms from friendly nations. This result further highlights the importance of having access to risk-sharing *ex-ante* in alleviating the effects of sanction.

3.2.3 Risk-sharing and Financial Frictions

Following [Hennessy and Whited \(2007\)](#) to use low-dividend as a proxy for high financing frictions, we explore how risk-sharing plays a role in alleviating the adverse effects of higher financial frictions for Russian firms *ex-post*. Table 2 shows that firms subject to higher financing frictions are more likely to be able to leverage risk-sharing to diversify away from sanctions to increase their investments. Accordingly, firms may encounter challenges in obtaining bank loans due to restrictions ([Efing et al., 2023](#)), which supports our use of low-dividend payout as a proxy for financial frictions.

Table 2: Financial Friction Channel: Low-dividend Firms

| | Tangible Assets | Capital Expenditures |
|---|-----------------|----------------------|
| | (1) | (2) |
| Lagged Low Dividends \times Sanction 2014 \times Lagged Relations | 0.841* | 1.764* |
| | (0.480) | (0.907) |
| Sanction 2014 \times Lagged Relations | -0.724*** | -0.751*** |
| | (0.157) | (0.197) |
| Lagged Low Dividends \times Lagged Relations | -0.717 | -1.706* |
| | (0.447) | (0.876) |
| Lagged Low Dividends \times Sanction 2014 | -0.275*** | -0.497*** |
| | (0.038) | (0.055) |
| Lagged Relations | 0.750*** | 0.685*** |
| | (0.136) | (0.170) |
| Sanction 2014 | -0.051** | 0.052* |
| | (0.023) | (0.029) |
| Lagged Low Dividends | 0.090*** | 0.055 |
| | (0.029) | (0.042) |
| Lagged Leverage | 0.256*** | -0.143* |
| | (0.069) | (0.083) |
| Constant | 0.024 | 0.162*** |
| | (0.027) | (0.032) |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |
| Adj-R2 | 0.902 | 0.836 |
| Obs. | 8,815 | 8,654 |

Notes: The regression specification considered is $Y_{it} = \alpha + \beta_1 \mathbb{I}(t \geq T_{\text{Sanction}}) \times \mathbb{R}_{it-1} \times \text{Low-Dividends}_{it-1} + \beta_2 \mathbb{I}(t \geq T_{\text{Sanction}}) \times \text{Low-Dividends}_{it-1} + \beta_3 \mathbb{I}(t \geq T_{\text{Sanction}}) \times \mathbb{R}_{it-1} + \beta_4 \text{Low-Dividends}_{it-1} \times \mathbb{R}_{it-1} + \beta_5 \mathbb{I}(t \geq T_{\text{Sanction}}) + \beta_6 \mathbb{R}_{it-1} + \beta_7 \text{Low-Dividends}_{it-1} + \theta \mathbb{X}_{it-1} + \gamma \Gamma_i + \xi \Xi_t + \varepsilon_{it}$. Here $\text{Low-Dividends}_{it}$ is one if firm i 's dividends are lower than the median of all firms and zero otherwise. All variables are defined in the Appendix. The estimation includes firm and year fixed effects. Robust standard errors are shown in parentheses. Significance levels are denoted as follows: * for $p < 0.10$, ** for $p < 0.05$, and *** for $p < 0.01$.

3.3 Robustness

The Online Appendix includes further robustness checks. Specifically, we examine the baseline results using the 2022 sanction, assess the impacts of risk-sharing channels on other firm outcomes often considered in the literature, and consider a counterfactual exercise using direct relations. Furthermore, as the number of business relations may change due to the 2014 sanction, we removed partners in friendly countries that started to be sanctioned in 2014. All in all, our results remain consistent across these checks.

4 Conclusion

Leveraging Russian firms' indirect business ties with partners in friendly nations as a plausibly exogenous proxy for these firms' ability to diversify sanction risks, we offer a novel explanation for why sanctions on Russian firms might be ineffective. Specifically, Russian firms were able to leverage these indirect business ties to alleviate the impacts of the 2014 sanction through higher investments and an increase in tangible assets. Such a result highlights the importance of accounting for the risk-sharing channel of sanctions from both the perspectives of the sanctioned and sanctioning states.

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Online Appendix Accompanying

From Russia with Love: International Risk-sharing, Sanctions, and Firm Investments*

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A Literature Review

A.1 The Economics of Sanctions

The literature on sanctions effectiveness increasingly evaluates specific sanction episodes by assessing economic impacts on economies, firms, or individuals. For instance, sanctions on North Korea are estimated to reduce manufacturing output by 12.9% and real income by 15.3% (Kim et al., 2023). Sanctions also carry economic costs for both targeted and imposing countries; Russia and Western countries are projected to see declines in exports by 7.4% and 0.3%, respectively, due to increased country risk in international trade (Crozet and Hinz, 2020). Using data from 542 explicitly sanctioned Russian firms compared to a control group of 77,995, significant losses in operating revenue, assets, and employee numbers are documented, particularly for firms reliant on Western inputs (Ahn and Ludema, 2020). Despite strategic protections for some firms by the Russian government, overall, sanctions led to a 35% and 21% increase in capital inputs and revenue for some firms. At the same time, Total Factor Productivity in Russia fell by 1% (Nigmatulina, 2022). The impact of sanctions extends to trade, with reciprocal sanctions affecting EU and US exports more than Russian imports (Bélín and Hanousek, 2021). Multilateral EU sanctions are shown to be more effective than unilateral US actions (Weber and Schneider, 2020), influenced by coalition dynamics within sanctions regimes (Chowdhry et al., 2024). Economic and political assessments form the core analytical frameworks, with the global sanctions database documenting an increase in sanctions and their negative effects on trade from 1950 to 2016 (Felbermayr et al., 2020).

A.2 Risk-sharing Channels

Our study builds upon the established literature of risk-sharing (Devereux and Smith, 1994; Maz-zocco, 2004). Numerous studies have explored the variables influencing international risk, such as firm heterogeneity (Chang et al., 2024), and the trade-offs between risk sharing and contagion effects (Cabrales et al., 2017), among others. Within the globalization framework, risk-sharing mechanisms may stem from interactions between domestic and international asset trades. Consequently, countries can attain international risk sharing without penalties for default (Broner and Ventura, 2011). In a related contribution, Fidrmuc and Degler (2021) explore inter-regional consumption risk sharing in Russia between 1999 and 2009. Notably, the risk-sharing channel also plays an important role in privatization by splitting shares in China (Li et al., 2011).

B Data

B.1 *Relations*

Our variable *Relations* measures the second-level risk-sharing between Russian firms and firms from countries that voted *abstain* or *against* United Nations General Assembly Resolution 68/262 (in response to the Russian annexation of Crimea in 2014, titled “Territorial Integrity of Ukraine”) and United Nations General Assembly Resolution ES-11/4 (concerning the Russian-Ukraine war in 2022). This approach allows us to exogenously separate potential biases where Russian firms might prefer to establish business relations with firms from countries considered “friendly” to Russia.

[Table A1 here]

B.2 Descriptive Statistics

Table A1 summarizes the descriptive statistics for all our variables of interest covering 2003 to 2023. The *Sanction 2014* variable has a mean value of 0.44, indicating that nearly half of the observations fall into the period post-2014 sanctions, while the *Sanction 2022* variable shows that only 1.3% of the observations fall into the period post-2022 sanctions. *Lagged Relations*, which measures the percentage of second-tier relations between Russian firms and firms from “friendly countries,” over its total number of business relation has a mean of 3.4%, indicating moderate connectivity. *Tangible Assets* and *Intangible Assets* show substantial differences, with means of 10.03 and 5.81, respectively, and significant standard deviations, reflecting high variability across firms. *Capital Expenditures* also has high mean and standard deviation values of 8.02 and 2.70, respectively. The average values of the *No. of Employees* and *Sales* are high, at 9.3 and 10.7, respectively. *Lagged Leverage* exhibits wide ranges, indicating a diverse set of firm financial profiles. Finally, *Lagged Dividends* shows that most firms have low-dividend payouts. These highlights indicate that the dataset encompasses firms with varied characteristics, setting a comprehensive foundation for further analyses of the impacts of sanctions and firm outcomes.

C Robustness Checks

C.1 The Impacts of the 2022 Sanctions on Firm Investments

Table A2 indicates how the second-wave sanction in 2022 affects firm investments. The coefficients of the interaction terms for both proxies for firm investments, including *Tangible Assets* and *Capital Expenditures*, are all insignificant. The findings show that the risk-sharing channel implied by the business relation between Russian firms and firms in the alliance no longer works in the post-2022 sanction period.

[Table A2 here]

Given the reported results, we would like to note a caveat: we might not find significant coefficients due to the small number of observations after 2022. Therefore, due to the limitation of our data, which ends in 2023, further investigations should be conducted to examine whether this risk-sharing channel holds.

C.2 The Impacts of Sanctions on other Firm Outcomes

Table A3 presents the impact of sanctions on other firm outcomes following two sanction periods. Panel A reports the results of the post-2014 sanction, and Panel B shows the outcomes from 2022 onwards. Most interaction coefficients are insignificant, even after controlling for some control variables. These results imply that there is no impact of sanction on the number of employees, sales, and intangible assets in Russian firms in relations with firms belonging to allied countries.

[Table A3 here]

The main reasons for choosing these variables for comparative analysis with the existing literature include studies on employees [Ahn and Ludema \(2020\)](#) and performance ([Gaur et al., 2023](#)). Furthermore, [Nigmatulina \(2022\)](#) found that Russian firms might benefit from misallocation by increasing their chances of winning government bids. Given our limited data, we do not test this aspect.

However, we provide another explanation for why Russian firms could avoid sanctions: through risk-sharing channels.

C.3 The Impacts of Two Waves of Sanctions on Firm Investments by Countries

Table A4 provides estimated results to examine the risk-sharing channel through the business relation between Russia and China following the post-2014 (Panel A) and post-2022 (Panel B) sanctions. While the coefficients of the interaction terms for *Tangible Assets* are insignificant in both sanction waves, the coefficients for *Capital Expenditures* are significantly positive in the first wave of sanction. These results indicate that a one-percent increase in lagged relations with China results in an increase of 1.84% in capital expenditures for Russian firms relative to firms without access to business relations in the post-2014 sanction period.

[Table A4 here]

We investigate whether a rise in the established relation between Russia and India could activate the risk-sharing channel following sanction episodes. The estimation is presented in Table A5. The finding is different from the results of China in terms of *Capital Expenditures*, showing that one percentage rise in lagged relation between Russian firms and Indian enterprises increased their investments by 2.23% following the post-2022 sanction. Regarding *Tangible Assets*, this risk-sharing mechanism only works for the first wave with an increase of 0.56% for Russian firms increasing their relation with Indian companies. At the same time, no impact is found in the post-2022 sanction wave.

[Table A5 here]

When it comes to the relation between Russian firms and others in the list of friendly countries except for China and India, the estimated results on the effect of sanction on firm investments are reported in Table A6. All interaction term coefficients are insignificant implying that this risk-sharing channel does not work. It is possible to explain that these countries are small so their trades have negligible impact on Russian firm investments.

[Table A6 here]

C.4 Using First-level Direct Relations in lieu of Indirect Relations

As another robustness check, we investigate how sanction affects investment policy in Russian firms through their direct relations with firms in the alliance. The results are shown in Table A7. Only interaction term coefficients of *Tangible Assets* are statistically significant and positive in the first wave of sanction, while they become insignificant in the second wave. In particular, a 1% increase in lagged relation conditional on the 2014 sanction induces tangible assets of Russian firms to increase by 0.34% relative to firms without access to relation in the prior year. In the case of *Capital Expenditures*, we find no evidence of the risk-sharing channel for both sanction periods, as all coefficients of the interaction terms are insignificant.

[Table A7 here]

One of our arguments for not using the second-level relations as the baseline results is the obvious observation that if Russian firms have risk-sharing relations with their first-level alliances,

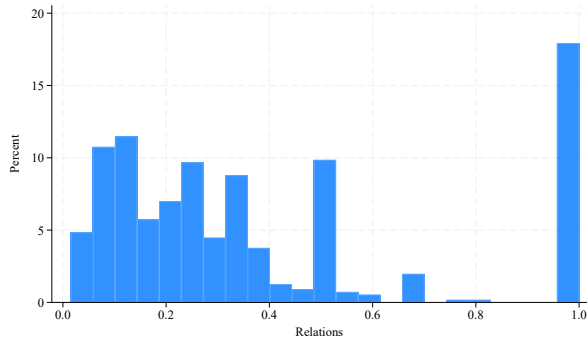
policymakers (or the Western) might consider their support in mitigating the effects of sanctions. Building on micro-level sanctions, [Joshi and Mahmud \(2020\)](#) emphasized the role of detectable links in sanctioned networks. Therefore, we establish second-level relations instead of first-level ones to avoid endogeneity. This part only attempts to show the first-level relation for robustness checks.

C.5 Excluding Friendly Countries Sanctioned in 2014

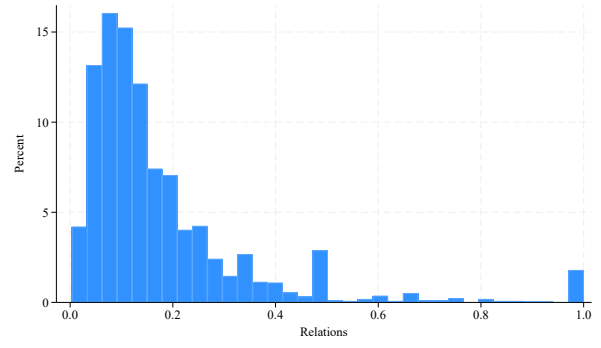
We exclude firms in the alliance that were sanctioned in 2014 and re-estimate our main specification. To identify these sanctioned countries, we refer to the [Felbermayr et al. \(2020\)](#) database to see which countries were imposed with sanctions in 2014. Among the friendly countries¹, Armenia, South Sudan, Tanzania, and Uganda are the ones who also started to be sanctioned in 2014. By doing so, we avoid feedback from firms in countries that were newly sanctioned due to the Russian sanctions in 2014. The results are documented in [Table A8](#). All interaction term coefficients of investment proxies are significantly positive at 0.43% and 0.67% respectively, which suggests the risk-sharing channel is viable to help Russian firms cope with sanctions. The findings imply that our baseline results are robust.

[[Table A8](#) here]

¹Source: <https://www.nytimes.com/2014/03/28/world/europe/General-Assembly-Vote-on-Crimea.html>. Retrieved Jun 21, 2024.



(a) First-level Relations



(b) Second-level Relations

Figure A.1: Histogram of Relations (excluding observation having no relations)

Table A1: Summary of Descriptive Statistics

| | Obs. | Mean | Std. | Median | Min | Max |
|----------------------|------|--------|-------|--------|-------|--------|
| Sanction 2014 | 9735 | 0.441 | 0.496 | 0.000 | 0.000 | 1.000 |
| Sanction 2022 | 9735 | 0.015 | 0.120 | 0.000 | 0.000 | 1.000 |
| Lagged Relations | 9735 | 0.034 | 0.105 | 0.000 | 0.000 | 1.000 |
| Tangible Assets | 9735 | 10.032 | 2.477 | 10.327 | 0.000 | 16.643 |
| Capital Expenditures | 9377 | 8.019 | 2.699 | 8.385 | 0.000 | 14.475 |
| No.of Employees | 2425 | 9.310 | 1.836 | 9.418 | 1.099 | 13.077 |
| Sales | 9732 | 10.740 | 1.987 | 10.814 | 0.000 | 16.142 |
| Intangible Assets | 9085 | 5.815 | 3.755 | 6.477 | 0.000 | 13.066 |
| Lagged Leverage | 8933 | 0.291 | 0.276 | 0.252 | 0.000 | 4.576 |
| Lagged Dividends | 8334 | 0.020 | 0.054 | 0.001 | 0.000 | 0.787 |

Notes: This table displays the descriptive statistics of all our variables of interest. The *Sanction 2014* variable is a dummy variable that is set to 1 for years after 2014 and 0 otherwise. The *Sanction 2022* variable is a dummy variable that is set to 1 for years after 2022 and 0 otherwise. *Lagged Relations* denotes the percentage of the second-level relations between Russian firms and other firms from “friendly countries” in the prior year. *Tangible Assets* is the logarithmic value of net properties, plants, and equipment. *Capital Expenditures* is the natural logarithm of capital expenditures. *No. of Employees*, *Sales*, and *Intangible Assets* represent the natural logarithm of the number of employees, firm sales, and intangible assets, respectively. *Lagged Leverage* is the ratio of debt to total assets in previous year. *Lagged Dividends* is the one-year lagged dividends divided by total assets.

Table A2: The Impacts of the 2022 *Sanction* on *Firm Investments*

| | Tangible Assets | | | Capital Expenditures | | |
|----------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Sanction 2022 × Lagged Relations | 0.033 (0.124) | -0.173 (0.122) | -0.173 (0.122) | -0.132 (0.253) | -0.124 (0.247) | -0.067 (0.240) |
| Lagged Relations | 0.181*** (0.051) | 0.202*** (0.052) | 0.201*** (0.052) | 0.150* (0.087) | 0.106 (0.086) | 0.096 (0.086) |
| Sanction 2022 | -0.788*** (0.051) | -0.612*** (0.053) | -0.613*** (0.053) | -0.411*** (0.086) | -0.415*** (0.085) | -0.444*** (0.085) |
| Lagged Leverage | | 0.036 (0.124) | 0.019 (0.124) | | -0.246 (0.154) | -0.226 (0.154) |
| Lagged Dividends | | | 0.090 (0.188) | | | 1.543*** (0.424) |
| Constant | 2.131*** (0.159) | 2.105*** (0.171) | 2.111*** (0.171) | 1.918*** (0.114) | 2.045*** (0.139) | 2.018*** (0.136) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj-R2 | 0.962 | 0.962 | 0.962 | 0.934 | 0.934 | 0.934 |
| Obs. | 3,690 | 3,562 | 3,540 | 3,602 | 3,500 | 3,484 |

Notes: This table applies Eq.(1) to examine the impact of the risk-sharing channel on Russian firms in the second wave of sanction. The dependent variables are *Tangible Assets* which is the natural logarithm of net properties, plants, and equipment, and *Capital Expenditures* which is the natural logarithm of capital expenditures. *Sanction 2022* is a dummy variable taking a value of one if the observation is on or after 2022, and zero otherwise. *Lagged Relations* denotes the percentage of the second-level relations between Russian firms and other enterprises in the alliance in the prior year. *Lagged Leverage* is the ratio of debt to total assets in previous year. *Lagged Dividends* is the one-year lagged dividends divided by total assets. The estimation includes firm and year fixed effects. Robust standard errors are shown in parentheses. Significance levels are denoted as follows: * for $p < 0.10$, ** for $p < 0.05$, and *** for $p < 0.01$.

Table A3: Additional Results: *Sanction* and *Firm Outcomes* following Two Sanction Periods

| | No. of Employees | | | Sales | | | Intangible Assets | | |
|----------------------------------|----------------------|----------------------|----------------------|---------------------|---------------------|---------------------|---------------------|----------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Sanction 2014 × Lagged Relations | 0.652** (0.329) | 0.673** (0.332) | 0.642* (0.332) | -0.062 (0.164) | -0.076 (0.164) | -0.071 (0.162) | -1.001** (0.458) | -0.816* (0.452) | -0.597 (0.441) |
| Lagged Relations | -0.472 (0.319) | -0.514 (0.323) | -0.510 (0.324) | 0.088 (0.138) | 0.078 (0.138) | 0.069 (0.137) | 1.055** (0.423) | 0.825** (0.418) | 0.623 (0.410) |
| Sanction 2014 | -0.419*** (0.091) | -0.513*** (0.096) | -0.467*** (0.092) | 0.461*** (0.064) | 0.314*** (0.070) | 0.329*** (0.068) | 0.195 (0.193) | 0.004 (0.224) | -0.104 (0.224) |
| Lagged Leverage | | -0.099 (0.076) | -0.069 (0.077) | | -0.165** (0.076) | -0.205** (0.080) | | 0.111 (0.122) | 0.027 (0.117) |
| Lagged Dividends | | | -0.200 (0.262) | | 0.593*** (0.130) | | | -1.357*** (0.496) | |
| Constant | 1.052*** (0.082) | 1.222*** (0.093) | 1.152*** (0.088) | 0.991*** (0.057) | 1.193*** (0.065) | 1.176*** (0.064) | 1.204*** (0.207) | 1.298*** (0.240) | 1.430*** (0.242) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj-R2 | 0.944 | 0.955 | 0.960 | 0.881 | 0.892 | 0.898 | 0.786 | 0.793 | 0.806 |
| Obs. | 2,318 | 2,192 | 2,043 | 9,437 | 8,845 | 8,238 | 8,818 | 8,303 | 7,753 |

| | No. of Employees | | | Sales | | | Intangible Assets | | |
|----------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Sanction 2022 × Lagged Relations | 0.023 (0.185) | -0.164 (0.166) | -0.181 (0.168) | 0.049 (0.122) | -0.039 (0.119) | -0.025 (0.121) | 0.591 (0.405) | 0.311 (0.412) | 0.295 (0.414) |
| Lagged Relations | 0.066 (0.081) | 0.074 (0.080) | 0.074 (0.081) | 0.059 (0.061) | 0.045 (0.061) | 0.042 (0.062) | 0.252** (0.112) | 0.230** (0.112) | 0.234** (0.111) |
| Sanction 2022 | -0.567*** (0.098) | -0.457*** (0.115) | -0.455*** (0.114) | -0.332*** (0.049) | -0.231*** (0.051) | -0.239*** (0.051) | -1.606*** (0.143) | -1.223*** (0.155) | -1.211*** (0.154) |
| Lagged Leverage | | 0.019 (0.116) | -0.016 (0.124) | | -0.283 (0.198) | -0.270 (0.199) | | -0.300 (0.227) | -0.358 (0.225) |
| Lagged Dividends | | | -1.015 (0.693) | | 0.381** (0.163) | | | -0.131 (0.389) | |
| Constant | 1.130*** (0.039) | 1.112*** (0.068) | 1.142*** (0.077) | 2.018*** (0.058) | 2.166*** (0.119) | 2.156*** (0.119) | 2.202*** (0.140) | 2.379*** (0.182) | 2.401*** (0.181) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj-R2 | 0.982 | 0.981 | 0.981 | 0.953 | 0.954 | 0.954 | 0.914 | 0.916 | 0.916 |
| Obs. | 795 | 773 | 771 | 3,715 | 3,578 | 3,556 | 3,483 | 3,368 | 3,348 |

Notes: This table presents additional results of the impact of risk-sharing channel on other firm outcomes following two waves of sanction (2014 and 2022) sanctions in Panel A and Panel B, respectively) using the specification in Eq.(1). *No. of Employees* is computed as natural logarithm of the number of employees. *Sales* and *Intangible Assets* are calculated as the natural logarithms of firm sales and intangible assets, respectively. *Sanction 2014* and *Sanction 2022* are dummy variables taking a value of one if the observation is on or after 2014 and 2022, respectively, and zero otherwise. *Lagged Relations* denotes the percentage of the second-level relations between Russian firms and other enterprises in the alliance in the prior year. *Lagged Leverage* is the ratio of debt to total assets in previous year. *Lagged Dividends* is the one-year lagged dividends divided by total assets. The estimation includes firm and year fixed effects. Robust standard errors are shown in parentheses. Significance levels are denoted as follows: * for $p < 0.10$, ** for $p < 0.05$, and *** for $p < 0.01$.

Table A4: Second Relations with **China**

| | Tangible Assets | | | Capital Expenditures | | |
|----------------------------------|---------------------|---------------------|---------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Sanction 2014 × Lagged Relations | -0.273 (0.661) | -0.093 (0.638) | 0.588 (0.523) | 1.413* (0.777) | 1.555* (0.815) | 1.843** (0.892) |
| Lagged Relations | 0.591 (0.619) | 0.539 (0.597) | -0.249 (0.474) | -1.045 (0.720) | -1.225 (0.763) | -1.544* (0.849) |
| Sanction 2014 | 0.095 (0.076) | -0.081 (0.090) | -0.146** (0.069) | 0.711*** (0.094) | 0.753*** (0.113) | 0.489*** (0.089) |
| Lagged Leverage | | 0.116* (0.063) | 0.013 (0.059) | | -0.309*** (0.080) | -0.295*** (0.080) |
| Lagged Dividends | | | 0.246 (0.156) | | | 2.565*** (0.434) |
| Constant | 0.933*** (0.094) | 1.018*** (0.108) | 1.107*** (0.095) | 0.427*** (0.115) | 0.546*** (0.131) | 0.719*** (0.110) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj-R2 | 0.897 | 0.911 | 0.924 | 0.838 | 0.846 | 0.857 |
| Obs. | 9,399 | 8,811 | 8,204 | 9,168 | 8,650 | 8,177 |

| | Tangible Assets | | | Capital Expenditures | | |
|----------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Sanction 2022 × Lagged Relations | 0.420 (0.263) | -0.088 (0.269) | -0.083 (0.270) | 0.283 (0.702) | 0.241 (0.685) | 0.351 (0.647) |
| Lagged Relations | 0.094 (0.146) | 0.130 (0.148) | 0.134 (0.148) | 0.011 (0.208) | -0.069 (0.208) | -0.082 (0.208) |
| Sanction 2022 | -0.792*** (0.051) | -0.617*** (0.053) | -0.618*** (0.054) | -0.421*** (0.085) | -0.424*** (0.085) | -0.450*** (0.084) |
| Lagged Leverage | | 0.036 (0.124) | 0.020 (0.123) | | -0.247 (0.153) | -0.227 (0.153) |
| Lagged Dividends | | | 0.104 (0.189) | | | 1.555*** (0.424) |
| Constant | 2.140*** (0.159) | 2.115*** (0.171) | 2.121*** (0.171) | 1.928*** (0.114) | 2.054*** (0.139) | 2.028*** (0.136) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj-R2 | 0.962 | 0.962 | 0.962 | 0.934 | 0.934 | 0.934 |
| Obs. | 3,690 | 3,562 | 3,540 | 3,602 | 3,500 | 3,484 |

Notes: This table presents a robustness check of our baseline results by using Eq. (1) to examine the risk-sharing channel through the second-level relations between Russian firms and Chinese companies only. *Tangible Assets* is the natural logarithm of net properties, plants, and equipment, and *Capital Expenditures* is the natural logarithm of capital expenditures. *Sanction 2014* and *Sanction 2022* are dummy variables taking a value of one if the observation is on or after 2014 and 2022, respectively, and zero otherwise. *Lagged Relations* denotes the percentage of the second-level relations between Russian firms and Chinese ones in the prior year. *Lagged Leverage* is the ratio of debt to total assets in previous year. *Lagged Dividends* is the one-year lagged dividends divided by total assets. The estimation includes firm and year fixed effects. Robust standard errors are shown in parentheses. Significance levels are denoted as follows: * for $p < 0.10$, ** for $p < 0.05$, and *** for $p < 0.01$.

Table A5: Second Relations with **India**

| | Tangible Assets | | | Capital Expenditures | | |
|----------------------------------|---------------------|---------------------|---------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Sanction 2014 × Lagged Relations | 0.566*** (0.209) | 0.586*** (0.203) | 0.556*** (0.196) | 0.788** (0.361) | 0.787** (0.375) | 0.524 (0.327) |
| Lagged Relations | 0.124 (0.145) | 0.163 (0.141) | 0.116 (0.146) | -0.260 (0.250) | -0.255 (0.276) | -0.157 (0.225) |
| Sanction 2014 | 0.077 (0.075) | -0.093 (0.089) | -0.158** (0.068) | 0.694*** (0.093) | 0.739*** (0.112) | 0.482*** (0.088) |
| Lagged Leverage | | 0.096 (0.063) | -0.004 (0.059) | | -0.338*** (0.080) | -0.317*** (0.081) |
| Lagged Dividends | | | 0.192 (0.157) | | | 2.508*** (0.437) |
| Constant | 0.941*** (0.094) | 1.034*** (0.109) | 1.120*** (0.095) | 0.439*** (0.115) | 0.567*** (0.131) | 0.737*** (0.110) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj-R2 | 0.896 | 0.910 | 0.923 | 0.837 | 0.845 | 0.856 |
| Obs. | 9,402 | 8,813 | 8,205 | 9,171 | 8,652 | 8,178 |

| | Tangible Assets | | | Capital Expenditures | | |
|----------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Sanction 2022 × Lagged Relations | 0.334 (0.397) | -0.032 (0.409) | -0.027 (0.409) | 2.449** (1.100) | 2.363** (1.106) | 2.231* (1.319) |
| Lagged Relations | 0.297*** (0.084) | 0.304*** (0.088) | 0.301*** (0.088) | 0.238 (0.185) | 0.198 (0.184) | 0.178 (0.181) |
| Sanction 2022 | -0.788*** (0.049) | -0.626*** (0.051) | -0.626*** (0.051) | -0.456*** (0.081) | -0.462*** (0.080) | -0.481*** (0.080) |
| Lagged Leverage | | 0.029 (0.125) | 0.012 (0.124) | | -0.260* (0.153) | -0.237 (0.153) |
| Lagged Dividends | | | 0.048 (0.188) | | | 1.460*** (0.433) |
| Constant | 2.141*** (0.159) | 2.121*** (0.172) | 2.128*** (0.172) | 1.930*** (0.114) | 2.061*** (0.139) | 2.033*** (0.136) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj-R2 | 0.962 | 0.962 | 0.962 | 0.934 | 0.934 | 0.934 |
| Obs. | 3,686 | 3,558 | 3,536 | 3,598 | 3,496 | 3,480 |

Notes: This table provides the robustness check of our baseline results by using Eq. (1) to detect the risk-sharing channel through the second-level relations between Russian firms and Indian firms only. *Tangible Assets* is the natural logarithm of net properties, plants, and equipment, and *Capital Expenditures* is the natural logarithm of capital expenditures. *Sanction 2014* and *Sanction 2022* are dummy variables taking a value of one if the observation is on or after 2014 and 2022, respectively, and zero otherwise. *Lagged Relations* denotes the percentage of second-level relations between Russian firms and Indian firms in the prior year. *Lagged Leverage* is the ratio of debt to total assets in previous year. *Lagged Dividends* is the one-year lagged dividends divided by total assets. The estimation includes firm and year fixed effects. Robust standard errors are shown in parentheses. Significance levels are denoted as follows: * for $p < 0.10$, ** for $p < 0.05$, and *** for $p < 0.01$.

Table A6: Second Relations with **Other Alliances**

| | Tangible Assets | | | Capital Expenditures | | |
|----------------------------------|---------------------|---------------------|---------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Sanction 2014 × Lagged Relations | 0.293 (0.225) | 0.315 (0.201) | 0.326 (0.200) | 0.640* (0.353) | 0.544 (0.346) | 0.560 (0.352) |
| Lagged Relations | 0.043 (0.190) | -0.063 (0.170) | -0.107 (0.173) | -0.430 (0.320) | -0.440 (0.319) | -0.493 (0.328) |
| Sanction 2014 | 0.091 (0.075) | -0.078 (0.089) | -0.144** (0.068) | 0.714*** (0.093) | 0.759*** (0.112) | 0.497*** (0.088) |
| Lagged Leverage | | 0.114* (0.063) | 0.012 (0.059) | | -0.309*** (0.080) | -0.294*** (0.080) |
| Lagged Dividends | | | 0.228 (0.156) | | | 2.540*** (0.433) |
| Constant | 0.936*** (0.094) | 1.023*** (0.109) | 1.110*** (0.096) | 0.430*** (0.115) | 0.549*** (0.131) | 0.721*** (0.110) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj-R2 | 0.897 | 0.911 | 0.924 | 0.838 | 0.846 | 0.857 |
| Obs. | 9,404 | 8,815 | 8,208 | 9,173 | 8,654 | 8,181 |

| | Tangible Assets | | | Capital Expenditures | | |
|----------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Sanction 2022 × Lagged Relations | 0.037 (0.174) | -0.137 (0.163) | -0.138 (0.164) | -0.279 (0.261) | -0.268 (0.257) | -0.209 (0.250) |
| Lagged Relations | 0.153** (0.063) | 0.179*** (0.065) | 0.178*** (0.065) | 0.149 (0.103) | 0.110 (0.102) | 0.106 (0.103) |
| Sanction 2022 | -0.775*** (0.048) | -0.615*** (0.049) | -0.616*** (0.050) | -0.400*** (0.081) | -0.405*** (0.081) | -0.433*** (0.080) |
| Lagged Leverage | | 0.035 (0.124) | 0.018 (0.124) | | -0.248 (0.153) | -0.228 (0.153) |
| Lagged Dividends | | | 0.103 (0.187) | | | 1.547*** (0.424) |
| Constant | 2.142*** (0.159) | 2.117*** (0.171) | 2.124*** (0.171) | 1.928*** (0.113) | 2.053*** (0.138) | 2.026*** (0.135) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj-R2 | 0.962 | 0.962 | 0.962 | 0.934 | 0.934 | 0.934 |
| Obs. | 3,690 | 3,562 | 3,540 | 3,602 | 3,500 | 3,484 |

Notes: This table provides the robustness check of our baseline results by applying Eq.(1) to detect the risk-sharing channel through the second-level relations between Russian firms and firms in the alliance except for Chinese and Indian companies. *Tangible Assets* is the natural logarithm of net properties, plants, and equipment, and *Capital Expenditures* is the natural logarithm of capital expenditures. *Sanction 2014* and *Sanction 2022* are dummy variables taking a value of one if the observation is on or after 2014 and 2022, respectively, and zero otherwise. *Lagged Relations* denotes the percentage of the second-level relations between Russian firms and firms in the alliance in the prior year excluding Chinese and Indian ones. *Lagged Leverage* is the ratio of debt to total assets in previous year. *Lagged Dividends* is the one-year lagged dividends divided by total assets. The estimation includes firm and year fixed effects. Robust standard errors are shown in parentheses. Significance levels are denoted as follows: * for $p < 0.10$, ** for $p < 0.05$, and *** for $p < 0.01$.

Table A7: Robustness Tests Using **only the First-Level Relations**: *Sanction* and *Firm Investments*

| | Tangible Assets | | | Capital Expenditures | | |
|----------------------------------|---------------------|---------------------|---------------------|----------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Sanction 2014 × Lagged Relations | 0.408** (0.195) | 0.387** (0.191) | 0.335* (0.193) | -0.008 (0.372) | -0.005 (0.355) | -0.085 (0.346) |
| Lagged Relations | -0.356** (0.173) | -0.307* (0.172) | -0.235 (0.174) | 0.277 (0.365) | 0.225 (0.349) | 0.298 (0.340) |
| Sanction 2014 | 0.230** (0.110) | 0.041 (0.126) | -0.028 (0.106) | 0.898*** (0.155) | 0.804*** (0.170) | 0.555*** (0.139) |
| Lagged Leverage | | 0.113 (0.094) | -0.006 (0.087) | | -0.173 (0.114) | -0.168 (0.114) |
| Lagged Dividends | | | 0.297 (0.266) | | | 1.726*** (0.530) |
| Constant | 0.981*** (0.129) | 1.083*** (0.146) | 1.182*** (0.136) | 0.295* (0.174) | 0.481** (0.187) | 0.663*** (0.159) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj-R2 | 0.885 | 0.901 | 0.915 | 0.838 | 0.848 | 0.861 |
| Obs. | 4,163 | 3,925 | 3,684 | 4,047 | 3,841 | 3,665 |

| | Tangible Assets | | | Capital Expenditures | | |
|----------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Sanction 2022 × Lagged Relations | -0.555*** (0.205) | -0.498 (0.318) | -0.436 (0.322) | 0.730 (0.709) | 0.787 (0.709) | 1.161 (0.739) |
| Lagged Relations | 0.164** (0.077) | 0.205*** (0.063) | 0.201*** (0.063) | 0.247** (0.100) | 0.220** (0.096) | 0.194** (0.095) |
| Sanction 2022 | -0.411*** (0.080) | -0.311*** (0.084) | -0.321*** (0.085) | -0.333*** (0.126) | -0.338*** (0.129) | -0.391*** (0.127) |
| Lagged Leverage | | -0.002 (0.181) | -0.020 (0.179) | | -0.087 (0.195) | -0.053 (0.194) |
| Lagged Dividends | | | 0.323 (0.348) | | | 2.100*** (0.732) |
| Constant | 2.088*** (0.220) | 2.085*** (0.239) | 2.091*** (0.239) | 1.759*** (0.162) | 1.794*** (0.190) | 1.760*** (0.183) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj-R2 | 0.955 | 0.954 | 0.955 | 0.931 | 0.930 | 0.931 |
| Obs. | 1,682 | 1,635 | 1,628 | 1,633 | 1,595 | 1,591 |

Notes: This table, utilizing Eq.(1), presents a robustness check of our baseline results using the first-level relations, which involves Russian firms conducting business directly with their allies. *Tangible Assets* is the natural logarithm of net properties, plants, and equipment, and *Capital Expenditures* is the natural logarithm of capital expenditures. *Sanction 2014* and *Sanction 2022* are dummy variables taking a value of one if the observation is on or after 2014 and 2022, respectively, and zero otherwise. *Lagged Relations* denotes the percentage of direct relations between Russian firms and firms in the alliance in the prior year. *Lagged Leverage* is the ratio of debt to total assets in previous year. *Lagged Dividends* is the one-year lagged dividends divided by total assets. The estimation includes firm and year fixed effects. Robust standard errors are shown in parentheses. Significance levels are denoted as follows: * for $p < 0.10$, ** for $p < 0.05$, and *** for $p < 0.01$.

Table A8: Robustness Tests Removing Friendly Countries that are Sanctioned in 2014: *Sanction* and *Firm Investments*

| | Tangible Assets | | | Capital Expenditures | | |
|----------------------------------|-----------------|----------|----------|----------------------|-----------|-----------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Sanction 2014 × Lagged Relations | 0.320* | 0.396** | 0.427*** | 0.726** | 0.688** | 0.666** |
| | (0.181) | (0.168) | (0.165) | (0.287) | (0.286) | (0.289) |
| Lagged Relations | 0.086 | 0.005 | -0.078 | -0.422 | -0.440* | -0.488* |
| | (0.156) | (0.142) | (0.142) | (0.260) | (0.260) | (0.266) |
| Sanction 2014 | 0.070 | -0.103 | -0.166** | 0.697*** | 0.742*** | 0.484*** |
| | (0.076) | (0.090) | (0.069) | (0.094) | (0.113) | (0.089) |
| Lagged Leverage | | 0.113* | 0.011 | | -0.311*** | -0.295*** |
| | | (0.063) | (0.059) | | (0.080) | (0.080) |
| Lagged Dividends | | | 0.229 | | | 2.544*** |
| | | | (0.157) | | | (0.434) |
| Constant | 0.932*** | 1.020*** | 1.107*** | 0.427*** | 0.547*** | 0.720*** |
| | (0.094) | (0.108) | (0.095) | (0.114) | (0.131) | (0.109) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj-R2 | 0.897 | 0.911 | 0.924 | 0.838 | 0.846 | 0.857 |
| Obs. | 9,399 | 8,811 | 8,204 | 9,168 | 8,650 | 8,177 |

Notes: This table presents a robustness check of our baseline results using Eq.(1) after removing friendly countries that are also being sanctioned in 2014. *Tangible Assets* is the natural logarithm of net properties, plants, and equipment, and *Capital Expenditures* is the natural logarithm of capital expenditures. *Sanction 2014* and *Sanction 2022* are dummy variables taking a value of one if the observation is on or after 2014 and 2022, respectively, and zero otherwise. *Lagged Relations* denotes the percentage of the second-level relations between Russian firms and firms in the alliance in the prior year. *Lagged Leverage* is the ratio of debt to total assets in previous year. *Lagged Dividends* is the one-year lagged dividends divided by total assets. The estimation includes firm and year fixed effects. Robust standard errors are shown in parentheses. Significance levels are denoted as follows: * for $p < 0.10$, ** for $p < 0.05$, and *** for $p < 0.01$.

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