ABSTRACT

HOOE, AUSTIN SAGE. Studies on International Sanctions and Foreign Direct Investments. (Under the direction of Ivan Kandilov and Mark Walker).

This dissertation investigates how international sanctions shape foreign direct investment (FDI) flows by analyzing country-level, industry-level, and firm-level responses. Using a series of gravity models and comprehensive data on sanctions and foreign direct investments from 2003 to 2022, I examine how sanctions affect greenfield projects and mergers and acquisitions (M&A) between sanctioning states and their targets.

Chapter I shows that sanctions significantly reduce greenfield investments and the incidence of M&A between sanctioning states and their targets, with effects varying by sanction type. Export sanctions increase greenfield FDI—suggesting a substitution of capital for restricted trade—while import sanctions increase M&A, likely reflecting supply chain adaptations and export-platform strategies.

Chapter II turns to industry-level heterogeneity. I examine how sectoral responses to sanctions depend on upstreamness, geographic concentration, and trade dependence. The negative impacts of sanctions on FDI are concentrated in sectors that are directly targeted due to their military and strategic applications. Positive impacts occur in some sectors that are upstream or often exempted from sanctions. The degree of sector-level trade dependence for country-pairs explains where sanction jumping occurs. Export bans lead to increased greenfield investments when the sanctioning state depends on the target country for imports. Import bans lead to increased M&A activity when the sanctioning state depends on the target country to sell its exports. These results could indicate that firms use capital investments to preserve two-way trade between sanctioning states and target countries.

Chapter III uses firm-level M&A data on U.S. multinationals to uncover which firms increase investment activity in sanctioned countries. I find that export bans lead to increased M&A activity in sanctioned countries by firms that are larger, have more cash, and have more prior sanctions experience. Import bans lead to increased M&A activity among smaller firms with less cash and less sanctions experience.

Studies on International Sanctions and Foreign Direct Investments

by
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BIOGRAPHY

Austin Hooe grew up in a blue-collar family in Mechanicsville, Virginia. After discovering a passion for geoeconomics, Austin pursued a PhD at North Carolina State University to become an expert on the impacts of geopolitical competition on global trade and finance. He continues his career at University of North Carolina Asheville, where he lectures and researches issues in international economics.

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Thank you to everyone who made this journey possible – especially my wife, Allyson; my parents, Chuck and Terre; my lifelong friend, Wade; and my advisors, Mark and Ivan. You all guided me through the fog.

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INTERNATIONAL SANCTIONS AND CROSS-BORDER INVESTMENTS

In response to Russia's invasion of Ukraine in 2022, the G7 countries, European Union, and their allies implemented a wide range of sanctions, targeting trade, finance, travel, military assistance, and arms deals with Russia. While these sanctions are notably more extensive than those typically imposed, they highlight the use of sanctions during times of geopolitical conflict. Between 1949 and 2022, there were 1,325 distinct sanction events, with more than half of these occurring after 2000 (Syropoulos et al., 2023). This study examines how sanctions alter global value chains through capital flows between sanctioning states (senders) and sanctioned states (targets). I also investigate the indirect effects of sanctions by examining how they impact the relationships between countries involved in sanctions and third-party states. I explore the effects of all types of sanctions on both greenfield and M&A investments using the most comprehensive data available.

Sanctions often fall short of achieving the official policy goals set by the sanctioning governments. Between 2000 and 2022, only 33 percent of sanctions fulfilled at least one policy objective despite a sharp increase in sanctions use (see figure 1.1). A possible reason for this

frequent failure is that targeted entities can often bypass the negative effects of sanctions by finding alternative ways to conduct restricted activities, such as diverting business through neutral countries or substituting FDI for prohibited trade flows. Evidence of these evasive measures can help adjust sanction frameworks to close loopholes and ensure that sanctions align with intended policy outcomes.

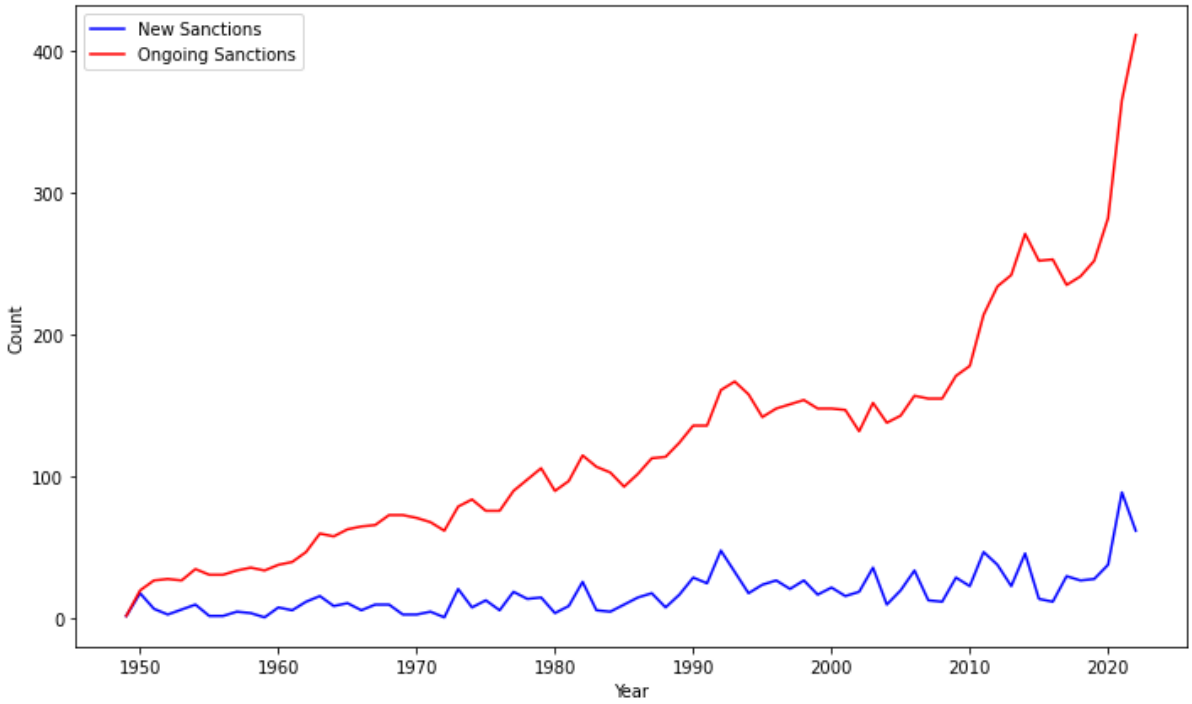

Figure 1.1: New and Ongoing Sanctions, 1949 - 2022

In addition to policy implications, the effects of international sanctions on economic fragmentation fits into a growing body of literature on the institutional drivers of deglobalization. During the 2010s and continuing through the 2020s, many US firms have perceived China as a less desirable location for trade and investment due to the US-China trade war, economic slowdowns, currency manipulation, Covid-19 policies, and a general increase in policy uncertainty. Thus, in an event dubbed the Great Reallocation, US firms began to shift activities away from China to geographically close countries – nearshoring – and countries that are on economically friendly terms with the US government – friendshoring (Alfaro and Chor, 2023). Antràs, 2020 argued that this Great Reallocation is due to factors that are political and institutional in nature. More broadly, global economic activity has been

disrupted by changes in the policies of national governments, such as tariffs, migration restrictions, and interstate conflicts. Future geopolitical tensions, especially those between the world's superpowers, could further elevate the role of conflict and sanctions as drivers of economic decoupling. This study seeks to determine how sanctions contribute to capital reallocation patterns by examining two decades of foreign investment data.

I employ a series of gravity models to assess the direct and indirect impacts of sanctions on cross-border greenfield and M&A across a sample of 199 countries from 2003 to 2022. The most general model of country-level investments reveals that sanctions significantly reduce the value and count of foreign investments between senders and targets. On average, greenfield investments are more sensitive to sanctions than mergers and acquisitions. However, the direct effects vary considerably depending on the type of sanction. Greenfield investments are most negatively affected by sanctions on imports and military assistance, but increase in response to export restrictions. M&A investments from sanctioning states to target countries decrease due to financial sanctions, military assistance sanctions, and arms sanctions, but increase in response to import sanctions. The increase in FDI in response to trade sanctions indicates that firms adapt to sanctions, but in different ways depending on the nature of the restrictions. I provide two plausible mechanisms. The increase in greenfield investments after export sanctions is an effort to maintain market access in the foreign country. Meanwhile, the positive impact of import sanctions on M&A investments suggests that investors from the sanctioning state acquire firms in the target country to gain direct control over a vulnerable part of their supply chain, potentially rerouting through neutral countries and back to the sanctioning state. I also find that complete trade embargoes trigger investment diversion, with M&A deals declining between neutral countries and targets and increasing between neutral countries and senders.

This study begins with an overview of the possible effects of sanctions on cross-country trade and investment flows. I then proceed with an empirical strategy motivated by the structural gravity model of foreign direct investment before describing the data. Next, I present the main analysis and additional results concerning heterogeneity. Finally, I discuss this study's implications for policy and future research.

1.1 Effects of Sanctions on Economic Integration

Sanctions can alter cross-border economic relationships across direct and indirect channels. The direct channel involves sanctioning states (senders) and sanctioned states (targets). Sanctions are expected to reduce economic activity between the sender and target in most scenarios. This initially seems like a foregone conclusion; after all, sanctions often explicitly restrict trade and investment between the sender and target. However, sanctions can impact economic activity beyond what is directly restricted by the sanctioning government. For instance, a sender's ban on exports to the target country may also curb the sender's greenfield investments in the target country due to supply chain disruptions and a heightened perception of risk. On the other hand, trade sanctions may prompt firms to build or acquire capital to operate locally in the target country instead of using trade channels. In line with this possibility, prior studies indicated that trade and horizontal FDI[1] are substitutes (Brainard, 1997, Swenson, 2004, Helpman et al., 2004 and Antràs and Yeaple, 2014). Firms may find it advantageous to produce directly within the destination market instead of exporting if trade costs are sufficiently high. Using foreign investment to mitigate the increased trade costs from sanctions is akin to tariff-jumping — a strategy in which firms avoid tariffs by establishing production facilities within the protectionist market (Blonigen et al., 2004, Beladi et al., 2009, and Roeger and Welfens, 2022).

"Sanctions-jumping" could be a response to either export or import restrictions. Export-sanctions-jumping occurs when the sanctioning state's firms increase investments into the target country to bypass export restrictions. Export-sanctions-jumping closely follows the logic of tariff-jumping. Import-sanctions-jumping, however, entails the sanctioning state's firms increasing investments into the target to bypass a ban on imports sourced from the target country. Import-sanctions-jumping can be explained as an attempt by the firm to maintain the flow of resources sourced from the sanctioned state. FDI could establish an export platform that facilitates rerouting trade through neutral countries (Baltagi et al., 2007, Ekholm et al., 2007, Blonigen et al., 2004, Bergstrand and Egger, 2007, and Antràs et al., 2024). Under the export platform hypothesis, trade and FDI are complementary. In a world of sanctions, the export platform allows firms to secure the sanctioned country's resources, export them to an unsanctioned third country, and re-export them to the sanctioning state. Import-sanctions-jumping FDI and the resulting export platform are probably most likely when the sanctioning state or its firms depend on the target for critical inputs. In other

[1] In this context, horizontal FDI is the replication of production processes across countries.

words, resource dependence shapes the firm's response to sanctions (Weber and Stępień, 2020 and Witt et al., 2023). There are other reasons that sanctions might promote FDI beyond sanction jumping though. Namely, certain investors seeking greater risk premiums may also find investments into sanctioned states attractive (Kaempfer and Lowenberg, 2007).

The effect of sanctions on trade has been estimated numerous times using the state-of-the-art structural gravity framework with the new Global Sanctions Database. Researchers have examined the general effects across the global sample of country-pairs (Syropoulos et al., 2023), the timing of those impacts (Dai et al., 2021), and various explanations of underlying heterogeneity – including specific targets (Felbermayr, Kirilakha, et al., 2020), global value chain positions (Bruno et al., 2023), and agricultural trade (Larch et al., 2024). Robust gravity studies are in general agreement that sanctions significantly reduce trade flows between senders and targets. For instance, Kwon et al., 2024 finds that trade sanctions reduce trade flows between the sender and target by 16 percent when they are non-comprehensive and 28 percent when they are applied to all industries.

Several studies have estimated the impact of sanctions on FDI into the target country. Focusing exclusively on US sanctions, Lektzian and Biglaiser, 2013 and Biglaiser et al., 2024 find that sanctions cause a short-run decline in sender-to-target foreign direct investments. Considering sanctions from many senders, Shin et al., 2016 uses time series methods to find that sanctions have no detectable impact on the target country's FDI inflows. The null effect suggests that the FDI loss from sanctions is offset by an influx of capital from alternative sources. Mirkina, 2018 uses a synthetic controls methodology to find that high-cost sanctions reported in the Threat and Imposition of Sanctions (TIES) database lead to a significant decrease in target country FDI inflows in the short run but not in the long run. Nguyen and Ahmed, 2023 relies on GMM estimation to find that sanctions reduce the total value of inbound greenfield and M&A investments in the sanctioned economy. Finally, Le and Bach, 2022 uses a gravity model to find that sanctions had a negative impact on bilateral FDI during the 2000 - 2012 period.

Sanctions induce spillover effects if they change trade or investment flows between sanction-involved countries (senders or targets) and sanction-neutral third countries (neither sender or target). Identifying these indirect effects informs us how sanctions alter flows between neutral countries and involved states while also properly specifying the reference group as

the group of unsanctioned dyads that are unaffected by spillovers.

1.1.1 Diversion Effects

The spillover effects can be used to identify economic diversion. In the context of sanctions, diversion occurs if sanctions shift flows between sanction-involved and sanction-neutral states. It should be noted that not all diversionary flows can be identified. Sanctions likely drive some economic activity to the underground economy. Additionally, shifts of greenfield capital to the domestic economy cannot be identified due to data limitations. Total diversion effects should thus be interpreted as lower bounds.

The impact of sanction spillovers on international economic flows involving third countries is ex ante ambiguous, but there are several plausible hypotheses. First, third countries may cut ties with sanction targets if the sanctions are extraterritorial. A sanction is extraterritorial if firms and individuals outside of the sanctioning state are expected to comply with sanction rules. Additionally, those entities that engage with the sanction target could see themselves targeted by secondary sanctions designed to punish sanction busters. Many sanctions imposed by the United States are extraterritorial because non-US persons are penalized with secondary sanctions if they do not comply. Having lost access to the target economy, third countries may shift their international economic activity to sanction senders. This first set of effects is referred to as the **extraterritorial effects** of sanctions. Extraterritorial sanctions were the subject of study in Kwon et al., 2024. They find that complete trade sanctions reduce the volume of trade between third countries and targets by about 6 percent and increase the volume of trade between third countries and senders by about 8 percent.

Sanctions can also reduce economic ties between third countries and targets as firms respond to political risk and worsening economic conditions. I refer to this effect as the **risk effect**, based on the theories of political risk introduced in Simon, 1984 and Haendel, 2019. Political risk theory identifies numerous ways in which governments can expose firms to risk. Sanctions can be modeled as harmful policies that flow from the sanctioning state to the host country to the multinational enterprise. Similar to the extraterritorial effect, the risk effect affects the third country's firms through the increased costs or uncertainty of engaging with sanction targets. However, I am careful to attribute these costs to changing political or economic conditions in the target country rather than as penalties imposed by

the sanction sender. For example, sanctions disrupted supply chains to and from Russia after the annexation of Crimea in 2014 and again after the invasion of Ukraine in 2022. Multinational enterprises operating or planning to operate in Russia must incur additional costs to adapt to these supply chain disruptions. One should note that, without a proper identification strategy, the risk effect of sanctions is often entangled with the risk effect of war, humanitarian crises, and political instability – events that often trigger sanctions.

On the other hand, sanctions may increase economic activity between third countries and targets if new opportunities arise as a result. In line with this hypothesis, Early, 2009 found that third countries will sanction-bust, or increase trade with the target, only when the commercial benefits of doing so are high. The idea that harmful government policies can trigger opportunism by multinational firms was formally introduced in Williamson, 1981 and Rugman, 1986. This **opportunity effect** can manifest as inbound or outbound flows from the perspective of the target. After the sanction triggers the withdrawal of multinational corporations, firms from third countries can enter the market to fill the void if they believe doing so would be profitable – through abnormally high returns to compensate investors for risk (Kaempfer and Lowenberg, 2007) or advantages brought by the new market structure. Many researchers have studied the impacts of sanctions on the targets' FDI inflows and found that capital displaced by sanctions is often replaced by opportunistic investors (Early, 2009, Barry and Kleinberg, 2015, Shin et al., 2016, and Lektzian and Biglaiser, 2013). An outbound opportunity could appear as the target country's firms search for new consumers or production networks in third countries after losing access to markets in sanctioning states. In some cases, target country firms can offer lower than usual prices to third country consumers. Additionally, third country consumers now have more power to negotiate lower prices due to the absence of consumers in sanctioning states. In a trade context, the opportunity effect succinctly describes what happened when India and China increased their sales of Russian Urals oil at low prices brought by sanctions against Russia in early 2023 (Kao, 2023). Ghironi et al., 2024 provides a theoretical justification for the opportunity effect, as third countries experience welfare gains from not joining sanctions.

Flows between third countries and senders may increase as activity is diverted away from target countries towards other areas of the global economy. Crozet et al., 2021 provides some evidence of this diversion, finding that sanctions cause firms from the sanctioning state to increase exports to third countries that neighbor the target. It is also possible that flows between third countries and senders are unaffected by sanctions if flows shift from

targets to other third countries or domestic economies. A final possibility is that sanctions decrease flows between third countries and senders as neutral countries want to avoid exposing their value chains to counter-sanctions imposed against senders by targets.

In summary, the effects of sanctions on flows involving third countries can be positive, negative, or null. How sanctions impact trade and investment ties with neutral states is truly an empirical question.

1.1.2 Heterogeneous Effects

The characteristics of each pair of countries can lead to heterogeneous estimates. The sanction-involved country's size, political significance, and industrial composition likely shape both the direct and diversionary effects of sanctions. Industry heterogeneity is addressed in a separate study because of its complexity.

The role of influence is motivated by recent sanctions against Russia and China. Most sanctions have historically been imposed against countries that contribute a small portion of global GDP. However, as global geopolitical tensions rose during the 2010s and 2020s, Western countries imposed sanctions against Russia and China. Russia and China have generally responded by countering with their own sanctions against Western senders. Unlike in the past, the current global economic system is shaped by sanctions imposed by and against influential countries. Understanding how sanction effects vary across influential and less influential countries is critical for understanding why recent sanction events are so significant. Sanctions between major powers present significant opportunities for diversion and adaptation as a large amount of economic activity is disrupted by the restrictions.

1.2 Foreign Direct Investments and Integration

The degree of economic integration across countries can be measured in numerous ways, including international trade and foreign direct investments (FDI) flows. Since this study focuses on adaptations to sanctions, I have chosen to focus on forward-looking investment decisions rather than more immediate trading decisions. Foreign direct investment decisions are future-oriented as they rearrange global supply networks by constructing new capital (greenfield investments) or by transferring control of existing firms (mergers and acquisitions). Greenfield investments as well as mergers and acquisitions (M&A) can pro-

vide interesting insights into how firms adapt to sanctions. Greenfield investment patterns indicate where firms plan to operate in the future – revealing their expectations of risk and opportunities. Meanwhile, M&A can indicate how firms reallocate the ownership of existing capital. M&A data also capture divestment decisions, which are useful for determining how multinational firms in affected markets perceive the risk of sanctions.

Both types of FDI require investors to be mindful of future economic conditions in their markets. The high fixed costs of a greenfield project encourage firms to consider the long-term economic outlook of the target market. It could take several years to complete the project and longer still for the project to payoff. While mergers and acquisitions bypass the fixed costs of new projects, firms similarly depend on future conditions for the M&A investment to be fruitful. Trade flows, on the other hand, capture near-term changes to economic integration and reflect current conditions.

I expect the effect of sanctions on foreign direct investment to be consistent with effects of sanctions on integration described in the previous section. However, the magnitude of the effect of sanctions on greenfield and M&A investments can vary. It is plausible that mergers and acquisitions are more responsive to sanctions than greenfield investments because legal transfers of ownership are quicker and less costly to execute than new capital projects. Considering country-level factors, R. B. Davies et al., 2018 found that M&A investors are more opportunistic than greenfield investors, with M&A investments being more sensitive to short-term shocks. It could just as well be the case that greenfield investments are more sensitive to explicit risks like sanctions, especially if investors expect sanctions to persist over time.

Investment diversion occurs through different behaviors under greenfield and M&A investments. Greenfield investment diversion implies a shift in new capital projects away from sanctioned dyads to dyads involving third countries. Put differently, investment diversion involving greenfield physically moves part of the production network to third countries[2]. M&A investment diversion implies a shift in the ownership of firms to dyads with third countries. The physical distribution of capital is unaffected.

[2]The new part of the production network does not necessarily replace the old part.

1.3 Modelling Approach

1.3.1 Theoretical

I model bilateral foreign direct investment flows with a gravity model. The gravity model is arguably the most appropriate tool for modeling the impacts of sanctions on foreign investments because it is consistent with economic theory and adequately controls for bilateral and multilateral sources of endogeneity. I use the modified gravity model of foreign direct investment from Kox and Rojas-Romagosa, 2020. This modified gravity model of foreign direct investment is based on the structural model of trade and investment in Anderson et al., 2019. Kox and Rojas-Romagosa, 2020 make numerous changes to the model by focusing exclusively on investments and by relaxing the assumption that multilateral resistance to investment is the same as multilateral resistance to trade.

Multilateral resistance captures the average difficulty faced by a country to invest or trade in the broader global environment, not just in the bilateral channel. Protectionism and trade barriers implemented by third countries increase the average difficulty to trade elsewhere, which increases bilateral trade. Multilateral resistance to foreign direct investment is the average attractiveness of countries outside of the bilateral channel to investors. Infrastructure, corporate tax rates, wages, and institutions of third countries can influence expected investment flows in a given bilateral channel. Global sanctions can influence FDI flows through both both bilateral and multilateral channels.

The structural model of FDI stems from the knowledge-capital theory. Knowledge capital, such as technology or management expertise, is leased to a foreign subsidiary to increase the value of its assets. The model consists of several components. FDI_{jk} is the value of foreign direct investments from origin country j to target country k. Economic mass is accounted for by Y_j and Y_k. In practice, the mass terms are variables that measure the size of the economy, like population or gross domestic product. The size of the economy is theoretically important because countries with more consumers and firms have a greater ability to absorb knowledge capital. Bilateral resistance is accounted for by $\omega_{jk} \in [0,1]$, with $\omega_{jk} = 1$ indicating frictionless foreign direct investment from j to k. Bilateral resistance is not necessarily symmetric. Due to differences in government policies like joint partnership requirements, it is perhaps easier for Chinese nationals to invest in the United States than it is for American nationals to invest in China. Asymmetric bilateral resistance is also relevant

for sanctions. Some sanctions restrict both directions of the bilateral channel (complete trade embargoes) while others restrict either outbound or inbound activity (finance, travel, and partial trade sanctions). P_j is multilateral resistance to the origin country j, Multilateral resistance to j is large when the average barrier to j to invest in other countries is high. π_k is multilateral resistance to the target country k. Multilateral resistance to k is large when the average barrier to invest in k by all other countries is high.

The structural gravity equation is as follows:

$$FDI_{jk} = \omega_{jk} \frac{\alpha Y_j}{P_j} \frac{\beta Y_k}{\pi_k} \tag{1.1}$$

α and β are parameters that relate the economic mass of the countries to foreign direct investments. The multilateral resistance terms P_j and π_k are solved as the system of equations shown below.

$$\begin{aligned} P_j &= \left[\sum_{k=1}^{N} \left(\frac{Z_{jk}}{\pi_k} \right)^{1-\sigma} \frac{Y_j}{Y} \right]^{\frac{1}{1-\sigma}} \\ \pi_k &= \left[\sum_{j=1}^{N} \left(\frac{Z_{kj}}{P_j} \right)^{1-\sigma} \frac{Y_k}{Y} \right]^{\frac{1}{1-\sigma}} \end{aligned} \tag{1.2}$$

Z_{jk} and Z_{kj} are bilateral frictions. These costs can be symmetric like distance or asymmetric like sanctions. All types of resistance reduce bilateral foreign direct investment. However, the $\frac{Z_{jk}}{\pi_k}$ term address whether it is better to invest outside of the bilateral channel. If Z_{jk} exceeds π_k, then the barriers j faces to invest in k are lower than the average cost of investment in k by all other countries. $\frac{Y_j}{Y}$ shows the mass of j relative to the world economy. $Y = \sum Y_j$ is global GDP. σ is a constant elasticity of substitution parameter. The interpretations for the terms in π_k are similar.

The structural gravity model asserts that bilateral FDI will be highest when economic masses are large and frictions are low. Sanctions enter this model through the resistance terms.

1.3.2 Empirical

I estimate the effects of sanctions on foreign direct investments in an empirical gravity framework that uses fixed effects to control for all components of the structural gravity

model. The model should also reflect the timing of investment decisions. Foreign direct investments are the result of a firm's past decisions – which can be months or years prior to the transaction. That is, there is a gap between the firm's decision to invest and the transaction date observed in the data. Consistent with most FDI models, I use lagged independent variables to reflect the assumption that firms make investment decisions with the information available during a previous period.

Baseline Model

A gravity model that estimates the direct effect of lagged sanctions on bilateral FDI flows is below.

$$FDI_{jkt} = \exp\left(\beta \text{ Sanction}_{jk,t-lag} + P_{jk,t-lag} + \gamma_{kt} + \gamma_{jt} + \mu_{jk}\right) \times \epsilon_{jkt} \tag{1.3}$$

FDI_{jkt} is the measure of foreign direct investment flows from origin country j to the destination country k during the year t. Depending on the model, the FDI measure is the total count or value of greenfield or M&A investments from j to k during year t. Count and value data allow for a richer analysis of investment behavior on the extensive and intensive margins. While the count model is intensive, each dyad-year FDI count is ultimately the sum of extensive margin decisions by firms from j to invest in k. The dyad-year FDI values capture the intensity of the investment decisions. Results from the count and value models are complimentary because they are informative about how firms respond to sanctions through discrete choices and investment size.

β captures the direct effect of sanctions on bilateral investment flows. P_{jkt} is a vector of time-varying bilateral variables like trade agreements and international conflict. γ_{kt} and γ_{jt} are country-year fixed effects that control for economic mass and variables like war, institutions, government policy, infrastructure, and unemployment. Country-year fixed effects are also included to absorb the multilateral resistance terms from the structural model. Controlling for multilateral resistance with country-time dummies has been the standard practice in gravity modeling since Anderson and van Wincoop, 2003. μ_{jk} is a country-pair fixed effect controlling for the standard set of dyadic gravity variables and all other time-invariant factors associated with the bilateral investment channel. Following Baier et al., 2019, the country-pair fixed effects are directed to control for more sources of bias within each investment channel. Directed dyad fixed effects control for both symmetric and asymmetric bilateral variables. If left unaccounted, asymmetric bilateral variables can introduce bias through uneven investor perceptions, treaty obligations, and tariffs. I use

these dyadic fixed effects to absorb time-variant pair variables like geographic distance. As demonstrated in Egger and Nigai, 2015 and Agnosteva et al., 2019, the gravity model performs better with dyadic fixed effects because the standard set of gravity variables used to proxy bilateral costs (e.g., distance, common language, etc.) can fail to account for all possible bilateral frictions.

It is possible that sanctions have asymmetric effects on foreign investments within pairs of countries. For instance, when the United States sanctioned Russia, US-to-Russia investments may be impacted differently than Russia-to-US investments since sanctions often do not restrict both directions of the investment channel (e.g., import bans). Additionally, the sanctioned state may attempt to maintain ties with the sanctioning country wherever possible to avoid further economic harm. I account for these asymmetric direct effects by augmenting the baseline specification with the variable $Sanction_{kj,t-lag}$. β_2 captures the effect of the destination country k's sanctions against the origin country j on origin-to-destination investments. Including both $Sanction_{kj,t-lag}$ and $Sanction_{jk,t-lag}$ allows for clear identification of how $j-to-k$ investments are distinctly impacted by sanctions originating from the investor's country and the host country. The baseline specification of this study is as follows:

$$FDI_{jkt} = \exp\left(\beta_1 \text{Sanction}_{jk,t-lag} + \beta_2 \text{Sanction}_{kj,t-lag} + P_{jk,t-lag} + \gamma_{kt} + \gamma_{jt} + \mu_{jk}\right) \times \epsilon_{jkt} \tag{1.4}$$

I explore multiple sources of heterogeneity after estimating the effects of any sanction on FDI flows. To explore these sources of varying effects, I must modify the model to account for sanction type, the timing of sanctions, the influence wielded by sanction-involved countries, and the level of sanction coordination.

Types and Other Categories of Sanctions

The estimating equation to can be refined further to account for the effects of each type of sanction. The index m represents each type of sanction. As I explain later in the data section, there are six broad sanction types and various sub-types that can be represented in this specification. This specification can also be used to estimate the impact of sanctions imposed by or against influential countries. Instead of sanction type, m represents four degrees of influential sanctions. These include 1) sanctions imposed by a member of the UN Security Council against a non-member, 2) sanctions imposed against a member of

the UN Security Council by a non-member, 3) sanctions between two members of the UN Security Council, and 4) sanctions between two non-members. I reiterate that, regardless if the interest is the type of sanction or the influence of the involved countries, m indexes categories of sanctions. A specification that estimates the heterogeneous effects of multiple sanction categories is below:

$$FDI_{jkt} = \exp\Bigg(\sum_m \beta_{1m} \text{Sanction}^m_{jk,t-\text{lag}} + \sum_m \beta_{2m} \text{Sanction}^m_{kj,t-\text{lag}} + P_{jk,t-\text{lag}} + \gamma_{kt} + \gamma_{jt} + \mu_{jk} \Bigg) \times \epsilon_{jkt} \tag{1.5}$$

I account for the diversionary effects of sanctions by including two dummy variables: $SenderDiversion_{jk,t-lag}$ and $TargetDiversion_{jk,t-lag}$. Due to data limitations explained in the next section, I estimate only the impact of complete trade embargoes on diversionary investments. $SenderDiversion_{jk,t-lag}$ identifies investment flows involving a complete trade sanction sender and a third country. $TargetDiversion_{jk,t-lag}$ identifies investment flows involving a complete trade sanction target and a third country.

$$FDI_{jkt} = \exp\Big(\sum_m \beta_{1m} \text{Sanction}^m_{jk,t-\text{lag}} + \sum_m \beta_{2m} \text{Sanction}^m_{kj,t-\text{lag}} + \beta_3 \text{SenderDiversion}_{jk,t-\text{lag}} + \beta_4 \text{TargetDiversion}_{jk,t-\text{lag}} + P_{jk,t-\text{lag}} + \gamma_{kt} + \gamma_{jt} + \mu_{jk} \Big) \times \epsilon_{jkt} \tag{1.6}$$

The diversion coefficients β_3 and β_4 capture the effects of sanctions on investment flows between sanction-involved and sanction-neutral countries. I am primarily interested in the signs of these coefficients. If β_3 is positive (negative), sanctions increase (decrease) flows between third countries and sanction senders. If β_4 is positive (negative), sanctions increase (decrease) flows between third countries and sanction targets. Each dummy coefficient should be interpreted as a semi-elasticity with the value of $100 \times (exp(\beta) - 1)$.

Timing of Sanctions

The models presented so far estimate the impact of sanctions on future investment flows by lagging the sanctions indicator. However, adaptation to sanctions could be a dynamic process that occurs across many years due to a combination of immediate decisions occurring during sanction onset, short-run adaptations occurring soon after onset, and long-run adaptations occurring much later. Additionally, it is important to account for anticipatory

effects in the pre-sanction period and any recovery occurring the post-sanction period. I address these sanction dynamics with a specification adapted from Dai et al., 2021:

$$FDI_{jkt} = \exp\Bigg(\beta_1 \text{Sanction}_{jk,t} + \sum_s \beta_{2s} \text{Sanction}_{jk,t+s} + \sum_k \beta_{3k} \text{Sanction}_{jk,t-k} + P_{jk,t-\text{lag}} + \gamma_{kt} + \gamma_{jt} + \mu_{jk}\Bigg) \times \epsilon_{jkt} \tag{1.7}$$

β_1 captures the average effect of active sanctions on FDI. I explore the evolution of effects during the sanction period by saturating the model with dummies that identify how long sanctions have been continuously imposed in each directed dyad. For instance, $sanction_{jkt}(year1)$ equals 1 if the sanction by origin j against k is in its first year. β_{2s} and β_{3k} capture effects on FDI during the post-sanction and pre-sanction periods, respectively.

1.4 Data

The sample used to estimate the gravity models of greenfield and M&A investments consists of 199 countries from 2003 to 2022. The sample starts at 2003 because it is the first year with available greenfield FDI data. This sample period provides a long enough time series to estimate the effects and also is more applicable to the current state of the world, with stable definitions of sanctions throughout the entire period. This period corresponds to a highly globalized world – emphasized by China's accession to the World Trade Organization and multiple European Union expansions.

The data are structured as a dyadic panel. Each row is a distinct dyad-year observation. I omit self-pairs (domestic flows) due to data limitations concerning domestic greenfield investments. The lack of domestic greenfield investment data is a limitation because intranational flows can resolve several endogeneity issues related to border effects (Yotov, 2022). Unfortunately, my models are unable to account for how sanctions may increase domestic flows due to higher cross-border frictions. The sample of 199 countries gives 39,402 directed dyads. Each distinct dyad is observed exactly once per year from 2003 until 2022. This results in a dataset of 788,040 dyad-year observations. The data are zero-inflated, a typical trait of foreign direct investments flows. 751,612 observations (95 percent of the sample) have zero greenfield investments. 754,269 (96 percent of the sample) have zero M&A investments. 715,906 observations (91 percent of the sample) have zero sanction

events.

Zero-inflation and the threat of heteroskedasticity lead me to use Poisson pseudo-maximum likelihood (PPML) to estimate the gravity models. The Poisson model is typically suitable when the dependent variable is comprised of count data like the number of deals in the context of investments or the number of exports or imports in the context of trade. However, the Poisson model is also adaptable to volume data like the value of investments and trade because the dependent variables are always non-negative. The Poisson model is superior to OLS for modeling international flows because the zero-inflated dependent variable is always defined. Poisson does not require one to take the natural log of the dependent variable for theoretically-consistent gravity estimation. Additionally, PPML addresses concerns of heteroskedasticty. In the absence of heteroskedasticity, the gravity equation's error term is independent of the explanatory variables. However, omitted variables can vary with different values of the explanatory variables in international flow models. For example, investments for dyads in a sanction relationship may be influenced by different sets of unobserved geopolitical factors than country pairs outside of a sanction relationship. Both heteroskedasticity and zero-inflation lead to biased estimates in log-linearized ordinary least squares models. I mitigate these sources of bias by using the PPML estimator, as suggested by Silva and Tenreyro, 2006.

My analysis requires data on foreign direct investments, sanctions, and time-varying dyadic controls like trade agreements.

1.4.1 Foreign Direct Investments

I focus on two types of foreign direct investment: M&A and greenfield investments. Mergers and acquisitions are investment deals that transfer the ownership of firms. M&A deals increase linkages between two countries by transferring ownership of a firm in the destination country to a firm in the origin country. Greenfield projects are investments in which a firm from the origin country builds new facilities (headquarters, production plants, distribution centers, etc.) in the destination country.

Mergers and acquisition data come from SDC, a database maintained and published by Refinitive (**securities_data_corporation_mergers_2023**) and used by UN Trade and Development (UNCTAD) to construct country-level M&A inflows in their annual World

Investment Report. M&A data are available for a comprehensive set of countries from 1985 until present. Each transaction-level observation in the database provides information on the M&A deal's announcement date, transaction date, industry, company name, origin country, target country, and transaction value. I prepared the transaction-level data for gravity estimation by aggregating transactions to the dyad-year level. From the beginning of 2003 until the end of 2022, SDC reports 984,471 M&A deals. M&A values are reported for only 435,484 of these transactions. With 56 percent of the M&A deal values missing, an analysis of the impact of sanctions on M&A volume must be approached with extra caution. The correlation coefficient between the missing value indicator and the sanction indicator is very weak at 0.0118 – suggesting that the missing data is not a large source of bias in the context of sanctions. All transactions belonging to each directed dyad are counted by year to form the $M\&A\ Count$ variable. The values of all transactions belonging to each directed dyad are summed by year to form the $M\&A\ Value$ variable. I carry out these tasks using the collapse command in STATA.

Greenfield data are sourced from fDi Markets, a database provided by the Financial Times. fDi Markets has information on greenfield projects in nearly every country since 2003. fDi Markets is regarded as the most comprehensive source for information on cross-border capital expenditures. UNCTAD also uses this database to create country-level greenfield aggregates in the annual World Investment Report. Each project-level observation in the dataset provides information on the transaction date, investing firm, parent company, industry, the number of jobs created by the project, and the value of the capital expenditure ($GF\ Value$). Each project is classified by its related business activity, such as headquarter services, research and development, and manufacturing. A subset of observations also provide the firm's investment motive like proximity to consumers or regulatory environment.

fDi Markets imposes a download limit of 500 project-level observations per day, so it is impractical to download the entire universe of greenfield investments. Fortunately, fDi Markets provides the option to create country-level aggregates with pivot tables. I used the pivot tables to construct datasets of total capital expenditures flowing to and from the 199 countries for 22 industries from 2003 until 2022 [3]. Each industry dataset was combined to

[3] Industries include aerospace; automotive components; automotive OEM; building materials; business machines; ceramics and glass; chemicals; coal, oil and gas; communications; consumer electronics; electronics components, engines and turbines; industrial equipment; metals; minerals; non-automotive transportation OEM; pharmaceuticals; plastics; rubber; semiconductors; space and defense; and wood products.

form an industry-level panel of dyadic greenfield flows. Finally, industry-dyad-year capital expenditure values were summed to calculate the dyad-year capital expenditure values used in the gravity model.

1.4.2 International Sanctions

I obtain information on international sanctions from the Global Sanctions Database (GSDB) introduced in Felbermayr, Kirilakha, et al., 2020 and updated in Kirilakha et al., 2021 and Syropoulos et al., 2023. GSDB is a comprehensive dataset of every sanction event since 1949. Each observation is a directed dyad that identifies the sanctioning state (the sender) and the sanctioned state (the target). Some sanction events are multilateral in the sense that a coalition of countries imposes sanctions against a common target for the same reason during the same year. GSDB records multilateral sanctions as a collection of bilateral sanctions occurring at the same time. The database tracks the imposition and termination of sanctions over time, so I can identify dyad-year observations with an active sanction relationship. The variable $sanction_{jkt}$ equals 1 in all observations with any sanction event. Each row also contains information on the type of sanction imposed during each event. Sanctions are organized into categories that are not mutually exclusive: trade, financial, travel, arms deals, military assistance, and other.

Trade sanctions are complete or partial restrictions on the import or export of goods and services between two countries. $trade_{jkt}$ equals 1 in observations with any trade restriction. $complete_{jkt} = 1$ indicates a general embargo against imports or exports. $partial_{jkt} = 1$ indicates a ban on imports or exports for a specific industry. The data also indicate whether the trade restriction applies to imports, exports, or both.

Financial sanctions are freezes on financial investments or financial assets. Bank accounts in the target country are frozen by the sanctioning state. In practice, financial institutions are ordered by the sanctioning government to halt any transactions involving targeted accounts. Asset freezes are typically applied to individuals or firms, but broad countrywide financial sanctions are possible by restricting the target country's access to financial infrastructure. Russia and Iran were targeted with these broad financial sanctions through their expulsion from the Society for Worldwide Interbank Financial Telecommunication (SWIFT) payment system. Broad financial sanctions can also be carried out by freezing the target's currency reserves in the sanctioning country's central bank. Government and

intergovernmental loans to the target can also be restricted.

Travel sanctions are restrictions against the movement of people. Travel restrictions can be general by restricting movement of all people of a particular citizenship or specific by restricting blacklisted individuals. The exact restriction varies by case, but travel sanctions often fit into two categories. The first category includes travel sanctions that restrict the movement of people from the target country into the sanctioning country. The second category of travel restrictions bars people from the sanctioning state from traveling to the target country.

Finally, there are sanctions imposed specifically with military goals in mind. Arms sanctions are restrictions on arms sales between two countries. Sanctions on military assistance prohibit monetary or personal support from being given to the target. Rare diplomatic, flight, and harbor restrictions are grouped together as "other" in the Global Sanctions Database.

Sanctions of different types are often imposed at the same time. For example, financial and travel restrictions are often imposed together to punish specific entities, such as military officers, government officials, and business leaders. Between 2003 and 2022, there are 48,776 observations with financial sanctions and 46,689 observations with travel sanctions. There is substantial overlap between these two groups. Travel and financial sanctions are imposed together in 78 percent of cases where either is used. Sanctions against arms sales and military assistance are also frequently imposed together. There are 55,315 observations with arms sanctions and 40,146 observations with military sanctions. Arms and military sanctions are imposed together in 70 percent of cases where either is used. Table 1.1 presents the correlations across each type of sanction. Unsurprisingly, there are very large correlations between travel sanctions and financial sanctions and between arms sanctions and military sanctions. I use data on sanction types to assess if greenfield and M&A investments are more sensitive to certain restrictions. It should be noted that the joint imposition of sanction types can make it difficult to disentangle each type's true effect on sanction activity. Travel sanctions are seldom imposed without financial restrictions, so their effects on cross-border investments may have large standard errors and imprecise estimates.

Table 1.1: Correlations Across Sanction Types

	Trade	Financial	Travel	Military	Arms	Other
Trade	1.0000					
Financial	0.5810	1.0000				
Travel	0.5781	0.8429	1.0000			
Military	0.5688	0.7291	0.7238	1.0000		
Arms	0.5291	0.6895	0.6949	0.8098	1.0000	
Other	0.4428	0.4824	0.4865	0.4516	0.4005	1.0000

Note: The table shows the correlation coefficients between different types of sanctions.

1.4.3 Diversion Variables

Diversion, defined as a shift in FDI flows with sanction-neutral countries, is captured using two dummy variables that identify flows between senders and neutral countries and between targets and neutral countries. It is important to note that neutrality is a matter of perspective. From a global perspective, a country is considered sanction-neutral if it is not involved in any sanctions, either as a sender or target, during a given year. Under this global definition, the diversion indicators capture FDI flows between sanction-involved states and the small set of countries that have not imposed sanctions. However, this definition is generally not suitable because most countries in the sample become sanctioning states when the UN initiates sanctions.

Realistically, diversion can occur between two sanction-involved states, as long as they do not actively sanction each other. For instance, when the United States sanctioned Russia in 2022, Russia could still divert investments to Iran, despite both Russia and Iran being targets of sanctions from other countries. In this sense, investment diversion depends on whether the investing and host countries perceive each other as neutral. Thus, neutrality is a bilateral relationship, not a global one. Under a bilateral definition of neutrality, two countries are considered neutral if they do not sanction each other during a given year, even if they are involved in sanctions against other countries. The diversion indicators under this bilateral perspective capture FDI flows between countries that do not sanction each other but are involved in sanctions in other dyads.

I construct both bilateral and global versions of the diversion indicators. While global neutrality is typically a strict criterion for diversionary flows, it is useful for examining FDI flows involving countries that are not subject to complete trade embargoes. Complete embargoes, which restrict all imports and exports from a country, are rare and usually imposed by a small set of countries on a narrow group of targets. Examples include the U.S. embargo on Cuba and the League of Arab States' embargo on Israel. As a result, the set of countries that remain neutral to complete embargoes each year is quite large. For example, between 2001 and 2022, 171 countries were neutral to complete embargoes in at least one year. In contrast, only six countries were neutral to any sanctions at some point during the same period. Complete trade embargoes provide a unique opportunity to examine how the most restrictive trade sanctions influence FDI flows between sanction-involved states and neutral countries.

An econometric challenge arises when a model includes variables for origin-to-destination sanctions, destination-to-origin sanctions, and diversion indicators. When all of these variables are included, the estimated coefficients are relative to a reference group consisting of unsanctioned country pairs that are unaffected by spillovers. In other words, the reference group becomes all unsanctioned dyads minus those that include a sender or target of sanctions elsewhere. This baseline is a justifiable point of comparison for complete trade embargoes, as the majority of countries contribute to their flows. However, in the case of any sanction, the reference group is approximately the same regardless of if diversion is included. Diversion indicators are omitted when modeling the effects of any sanction on FDI because sanction-neutral countries are rare. However, they should be included when analyzing the effects of complete embargoes, as spillover effects may be more significant.

Constructing the Global Diversion Indicator

The global diversion variables are similar to the ones used by Kwon et al., 2024 to identify the extraterritorial effects of sanctions on trade flows. Due to the forward-looking nature of FDI decisions, each diversion indicator is defined based on the observation's lagged sanctions indicator. I used Python's pandas library to create the diversion variables from a panel of sanctions data beginning in 1995. While the greenfield observations do not begin until 2003, the extended sanctions data allow me to implement the appropriate lags without losing observations. First, I create $Diversion_{jk,t-lag}$, a variable that identifies flows between

third countries and either senders or targets. I rely on a global definition of a third country that identifies countries that do not participate in sanctions (or, in some specifications, a particular type of sanction) as either sender or target. $Diversion_{jk,t-lag} = 1$ if:

1. Either the origin or destination in the dyad is in another dyad with active sanctions during the year
2. The other country in the primary dyad is never in another dyad with active sanctions during the year
3. There is never an active sanction in the primary dyad during the year

Next, I create $TargetDiversion_{jk,t-lag}$, a dummy variable that identifies flows between third countries and sanction targets. $TargetDiversion_{jk,t-lag} = 1$ if:

1. Either the origin or destination in the primary dyad is the target by sanctions in another dyad during the year.
2. The other country in the primary dyad is never in another dyad with active sanctions during the year.
3. There is never an active sanction in the primary dyad during the year.

It is important to realize that $TargetDiversion_{jk,t-lag}$ is a deviation of $Diversion_{jk,t-lag}$. When both diversion variables are included in the model, $Diversion_{jk,t-lag}$ identifies dyads involving a third country and a sanction sender. For clarity, I refer to $Diversion_{jk,t-lag}$ as $SenderDiversion_{jk,t-lag}$ when $TargetDiversion_{jk,t-lag}$ is also present in the model.

Constructing the Bilateral Diversion Indicator

Bilateral diversion variables are less restrictive to allow for the possibility that sanctions affect FDI between countries that are involved in sanctions, but not with each other. In this case, $Diversion_{jk,t-lag} = 1$ if:

1. Either the origin or destination in the primary dyad is in another dyad with active sanctions during the year.
2. There is never an active sanction in the primary dyad during the year.

$TargetDiversion_{jk,t-lag} = 1$ if:

1. Either the origin or destination in the primary dyad is targeted in another dyad during the year.

2. There is never an active sanction in the primary dyad during the year.

1.4.4 Country Influence

I identify highly influential countries in the global political system to analyze how sanction effects vary when imposed by or against countries with different degrees of political importance. An indicator variable that identifies the permanent members of the United Nations Security Council (UNSC) serves this purpose well because it contains Russia, China, the United States, the United Kingdom, and France. These countries are highly influential because they have large trading economies, are militarily or diplomatically involved in many countries beyond their own, and have veto power over any United Nations resolution, including UN multilateral sanctions.

1.4.5 Dyadic Covariates

I do not require explicit information on time-invariant country-pair characteristics due to the fixed effects strategy. The fixed effects approach allows me to omit standard dyadic gravity variables like colonial ties, bilateral distance, contiguity, common legal origins, and shared language.

1.4.6 Descriptive Statistics

It is helpful to understand the state of international sanctions and cross-border investments during the 2003 - 2022 sample period. The number of sanction events has grown considerably during these two decades. This naturally has led to many more pairs of countries involved in sanction relationships. The number of directed dyads facing active sanctions peaked at about 5,000 in 2014 due to the annexation of Crimea by Russia. This number then fell until 2019 before rising until the end of the sample period (see figure 1.2).

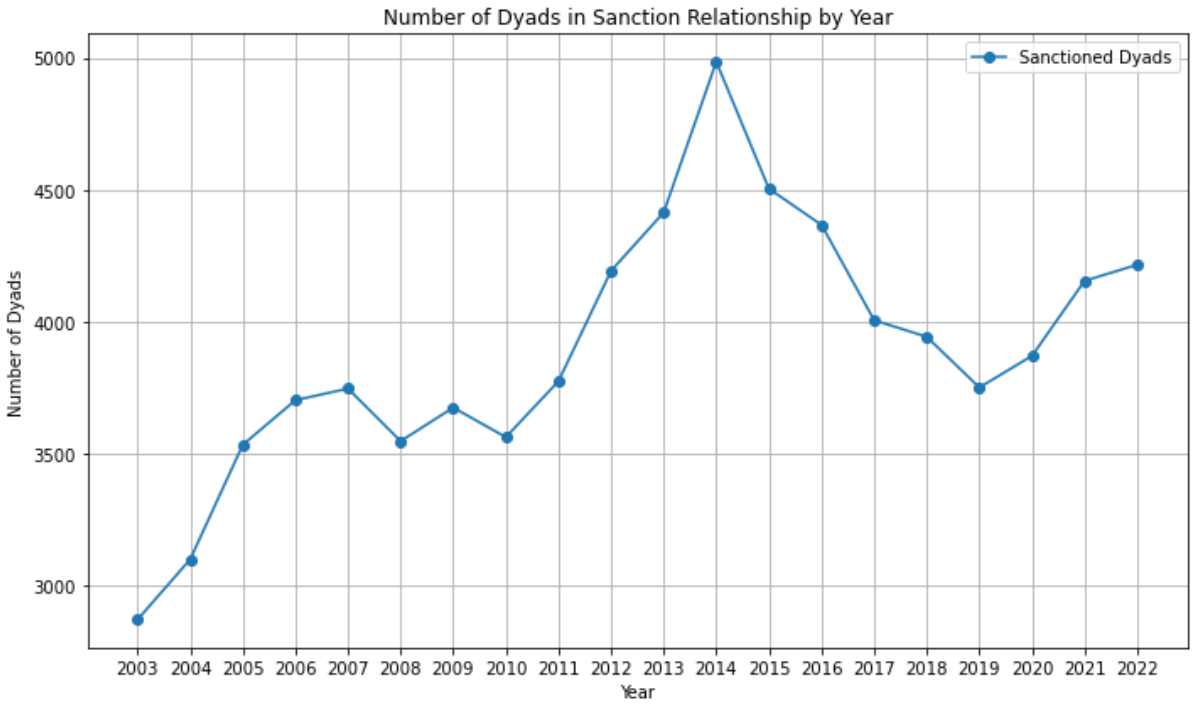

Figure 1.2: Count of Country-Pairs with $Sanction_{jkt} = 1$ over sample period, 2003 - 2022

As figures 1.3 and 1.4 demonstrate, the vast majority of FDI activity occurs between countries that do not sanction each other. This does not imply that FDI in sanctioned dyads is low though. Billions of FDI dollars flow from sanctioning states to their targets each year. Table 1.2 provides descriptive statistics across each dyad group. Looking at the entire sample, it is clear that greenfield investment flows are rarer and smaller than M&A flows. The average greenfield flow is $14.287 million while the average M&A flow is $26.362 million. The largest greenfield flow is three times smaller than the largest M&A flow. These summary statistics remain approximately the same in the unsanctioned dyads. FDI flows are considerably different in the treatment group of sanctioned dyads. For country-pairs with an active sanction, the average greenfield flow is $25.024 million and the average M&A flow is $26.697. It is interesting that the largest observed greenfield flow of $59,792.2 million occurs in a sanctioned dyad. I also compute summary statistics for not-yet-sanctioned dyads. The not-yet-sanctioned group consists of dyad-year observations during the years preceding a sanction event. The idea is that not-yet-sanctioned dyads can be compared to sanctioned dyads to demonstrate how investments might change before and after sanctions. Average investment flows are larger and have less spread prior to sanctions than during sanctions.

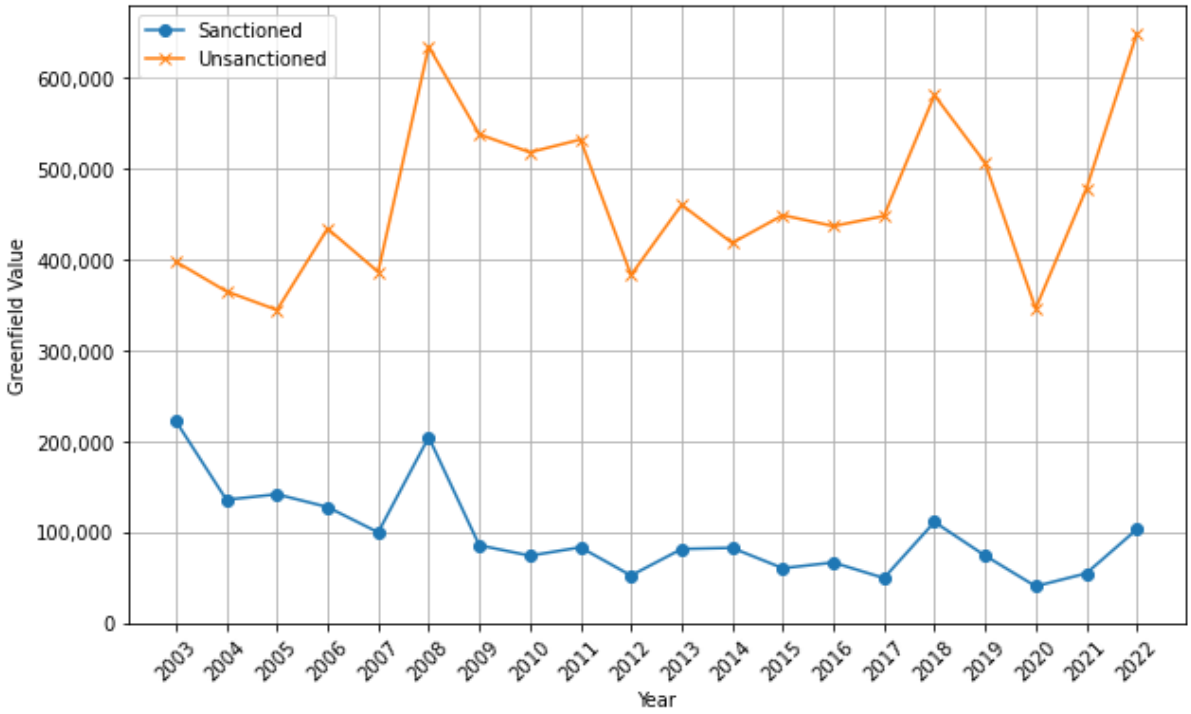

Figure 1.3: Global Value of New Greenfield Investments

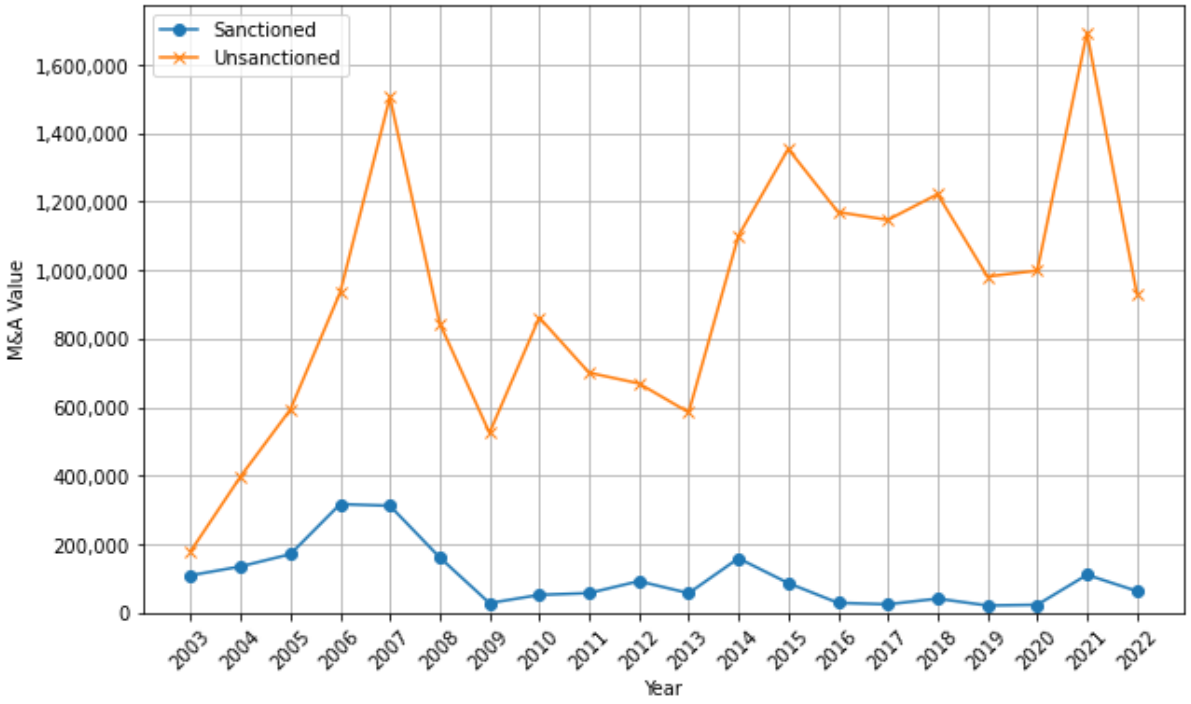

Figure 1.4: Global Value of New Mergers and Acquisitions

This is true for both greenfield and M&A counts. The descriptive statistics appear to indicate that sanctions affect bilateral FDI, but exactly how this occurs is unclear without a formal identification strategy.

1.5 Results

I begin my analysis by estimating the direct effects of sanctions on country-level FDI flows across the full 199-country sample. The outcome variable is always the total value or count of bilateral FDI. All models are estimated via PPML and include the full set of country-year, country-pair, and year fixed effects using the PPMLHDFE STATA command introduced in Correia et al., 2020a. Standard errors are clustered by directed dyad.

Foreign investment flows stem from investor decisions made in the recent past, so sanction indicators and other independent variables are lagged. To determine the optimal lag, I estimate the effects of sanctions at $t-2$ through t on foreign investments at t. Table 1.3 presents the effects of sanctions under different lags. The estimated coefficients reveal that sanctions at $t-2$ have a larger and more significant impact on foreign investments than those at $t-1$ and t. The significance of the lagged effect indicates that the impact of sanctions on FDI evolves over time, but there are several competing explanations for this observation. It could be that investors need time to process and make decisions based on new information. Alternatively, the lagged effect could be capturing the impacts of sanctions that have been in place for two or more years. Regardless of the reason, it is clear that there are temporal dynamics at play. I will revisit the temporal effects of sanctions in a model that examines how the impact of sanctions on FDI evolves during the pre-sanction, during-sanction, and post-sanction periods. For now, though, I lag the independent variables by two-years when estimating the average impact of sanctions across all dyads and years. This simplification is necessary to maintain parsimonious models.

Table 1.2: Descriptive Statistics for Cross-Border Dyads

	All	Unsanctioned	Sanctioned	Not Yet Sanctioned
Greenfield Value				
Observations	788,040	710,118	77,922	34,061
Mean	14.287	13.108	25.024	28.749
Std. Dev.	263.746	238.014	432.553	260.191
Min	0	0	0	0
Max	59,792.2	44,942.12	59,792.2	15,013.3
Greenfield Count				
Observations	788,040	710,118	77,922	34,061
Mean	0.258	0.241	0.408	0.516
Std. Dev.	3.485	3.185	5.511	3.852
Min	0	0	0	0
Max	391	391	320	171
M&A Value				
Observations	775,083	698,580	76,503	32,962
Mean	26.362	26.325	26.697	31.233
Std. Dev.	805.923	808.121	785.577	539.421
Min	0	0	0	0
Max	180,114.7	180,114.7	104,491.8	69,925.99
M&A Count				
Observations	788,040	710,118	77,922	34,061
Mean	0.267	0.264	0.293	0.411
Std. Dev.	4.518	4.415	5.368	3.739
Min	0	0	0	0
Max	698	698	391	287

Note: Statistics are computed for cross-border dyads only, for the years 2003 and onward. Unsanctioned and sanction sum to the total sample size. "Not Yet Sanctioned" is a subset of unsanctioned dyad-year observations that eventually face sanctions later. Values are expressed in millions of US dollars.

Table 1.3: Lagged Sanctions vs. FDI

Independent Variable	**Dependent Variables**			
	$GF\ Value_{jkt}$	$GF\ Count_{jkt}$	$M\&A\ Value_{jkt}$	$M\&A\ Count_{jkt}$
$Sanction_{jk,t-2}$	-0.367***	-0.037	0.033	-0.127***
	(0.14)	(0.03)	(0.16)	(0.04)
$Sanction_{jk,t-1}$	0.169	0.005	0.340**	-0.031
	(0.17)	(0.04)	(0.16)	(0.04)
$Sanction_{jk,t}$	-0.114	-0.072**	-0.187	-0.006
	(0.11)	(0.04)	(0.13)	(0.04)
Fixed Effects				
Origin-Year	✓	✓	✓	✓
Destination-Year	✓	✓	✓	✓
Directed Dyad	✓	✓	✓	✓
N	788040	788040	775083	788040

Note: All models are estimated via PPML. Coefficients are interpreted as changes relative to the baseline of unsanctioned country-pairs. Standard errors are reported in parentheses and clustered by directed dyad. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

1.5.1 Effects of Any Sanction on Foreign Investments

I begin the analysis by estimating the impact of any sanction on bilateral foreign direct investments. The coefficient for $Sanction_{\mathbf{jk},t-2}$ captures the direct effect of sanctions imposed by the origin country on origin-to-destination flows while $Sanction_{\mathbf{kj},t-2}$ captures the impact of sanctions imposed by the destination country on origin-to-destination flows. Including both of these variables allows me to identify any asymmetric effects in the sanctioned investment channel. Table 1.4 presents the impact of any kind of sanction on bilateral FDI. Greenfield investments are significantly reduced by sanctions imposed by the investor's origin country against the host country. In particular, the origin's sanctions reduce the value of these greenfield projects by about 27 percent and the count by about 7 percent. Sanctions imposed by the host country against the investor's origin country do not have a detectable effect on bilateral greenfield investments. The effects of sanctions are asymmetric within the sanctioned dyad.

An example can illustrate these findings. Consider Russia-to-US flows. Within the Russia-to-

US dyad, Russia is the investor origin and US is the host country. In 2014, Russia annexed Crimea, triggering sanctions by the United States. In the Russia-to-US dyad, $Sanction_{kj} = 1$. If the average effects are representative of this dyad, then US-to-Russia sanctions would have no impact on FDI flowing from Russia to the United States. The null effect indicates that the damage and risk brought by sanctions is directional. This asymmetric effect could also be driven by the target country's desire to maintain economic ties wherever possible to minimize damage from sanctions.

Bilateral mergers and acquisitions decline in number, but not in value, after sanctions imposed by the origin country on the host country. Taken together, these results may suggest that M&A deals become larger as the same total value is allocated over a smaller number of transactions. Sanctions imposed by the host country on the origin country continue to have no impact on investments.

Comparing the M&A and greenfield results reveals that the two types of FDI vary in their sensitivity to sanctions. On the intensive margin, greenfield investments are more affected by sanctions than M&A deals. When it comes to the extensive margin, or the incidence of investments, M&A deals are more sensitive to sanctions than greenfield investments. It appears that M&A investors have a greater willingness to cancel or delay investments after sanctions, probably because of the lower costs of doing so. Greenfield investors are less inclined to cancel projects, but they do substantially reduce their size. The strategy of continuing greenfield activity with lower-valued projects may be a means of dealing with uncertainty. Perhaps greenfield investors are deterred from leaving the market altogether due to high entry and negotiation costs spent to get there. Entering the market again later could be difficult or costly.

Table 1.4: Sanctions vs. Bilateral FDI

Independent Variables	**Dependent Variables**			
	$GF\ Value_{jkt}$	$GF\ Count_{jkt}$	$M\&A\ Value_{jkt}$	$M\&A\ Count_{jkt}$
$Sanction_{jk,t-2}$	-0.315***	-0.075***	0.192	-0.153***
	(0.08)	(0.03)	(0.16)	(0.04)
$Sanction_{kj,t-2}$	0.116	0.013	-0.028	-0.033
	(0.11)	(0.03)	(0.14)	(0.05)
$RTA_{jk,t-2}$	-0.043	0.044	-0.041	0.021
	(0.08)	(0.03)	(0.11)	(0.04)
Fixed Effects				
Origin-Year	✓	✓	✓	✓
Destination-Year	✓	✓	✓	✓
Directed Dyad	✓	✓	✓	✓
N	788040	788040	775083	788040

Note: All models are estimated via PPML. Coefficients are relative to the baseline of unsanctioned country-pairs. Standard errors are reported in parentheses and clustered by directed dyad. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

1.5.2 Heterogeneous Effects

I now explore how the effects of sanctions on foreign investments vary across several characteristics, including the type of sanction, the influence wielded by senders and targets, the degree of coordination across sanctioning countries, and the duration of the sanction.

Types of Sanctions

Table 1.5 shows the independent effect of each type of sanction on bilateral FDI. The average effect of any sanction masks the impact of each type of sanction. I unmask these effects by estimating a model that distinguishes each type of sanctions imposed by the investor's origin country and by the destination. The average value and count of all bilateral FDI decline sharply when the origin country bans military assistance to the host country. "Other" sanctions, such as diplomatic and flight restrictions, lead to a surprising increase in the value of bilateral greenfield investments. Travel restrictions and arms embargoes imposed by the destination significantly reduce the value of greenfield flows. On the extensive margin, bilateral greenfield projects decrease after travel sanctions and trade sanctions

imposed by the origin and increased by "other" sanctions imposed by the destination.

The value of bilateral M&A flows is strongly reduced by financial and arms sanctions imposed by the origin and by financial and travel sanctions imposed by the host country. The incidence of bilateral M&A declines after financial sanctions imposed by either the origin or host.

Bilateral M&A is not universally deterred by sanctions though. On average, the value of bilateral mergers and acquisitions increases after trade sanctions imposed by the origin and after arms embargoes imposed by the host country. The fact that positive coefficients are estimated for trade sanctions (an arms embargo is effectively a trade sanction too) should be explored in greater detail. It appears that firms are using foreign direct investments to bypass or otherwise adapt to trade restrictions.

There are several ways firms could circumvent sanctions with FDI. Firms that typically access the destination market via exports could be prompted to establish operations within that country if trade channels become too costly. This decision to access markets via FDI instead of trade described in the now classic exports-versus-FDI theory of Helpman et al., 2004. An analysis of the effects of export sanctions on greenfield FDI is a novel test of this theory. Figure 1.5 illustrates the strategy of export-sanction-jumping.

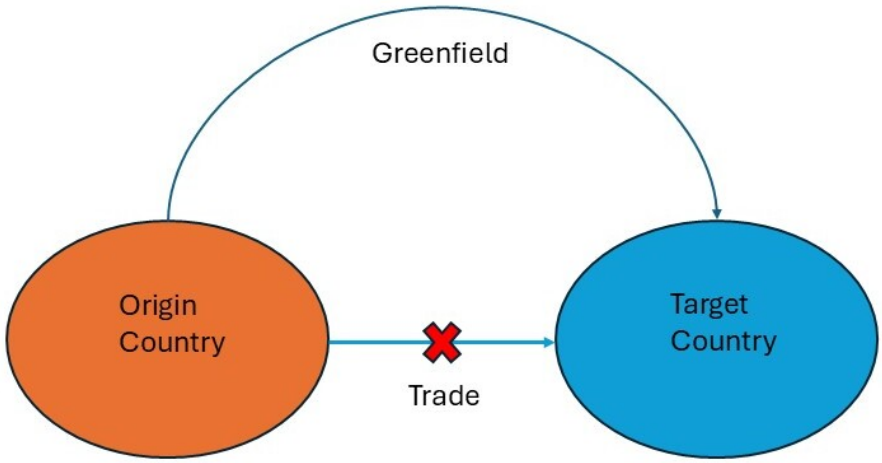

Figure 1.5: Illustration of export-sanction-jumping via greenfield FDI

Firms that import resources and other inputs from the target country may also strategically increase FDI after import restrictions to maintain their supply chains. As I explain in an earlier section, firms can use FDI to bypass import sanctions, secure the resources, export to a third country, and finally re-export them back to the sanctioning state. An illustration of the import-sanction-jumping strategy is presented in figure 1.6.

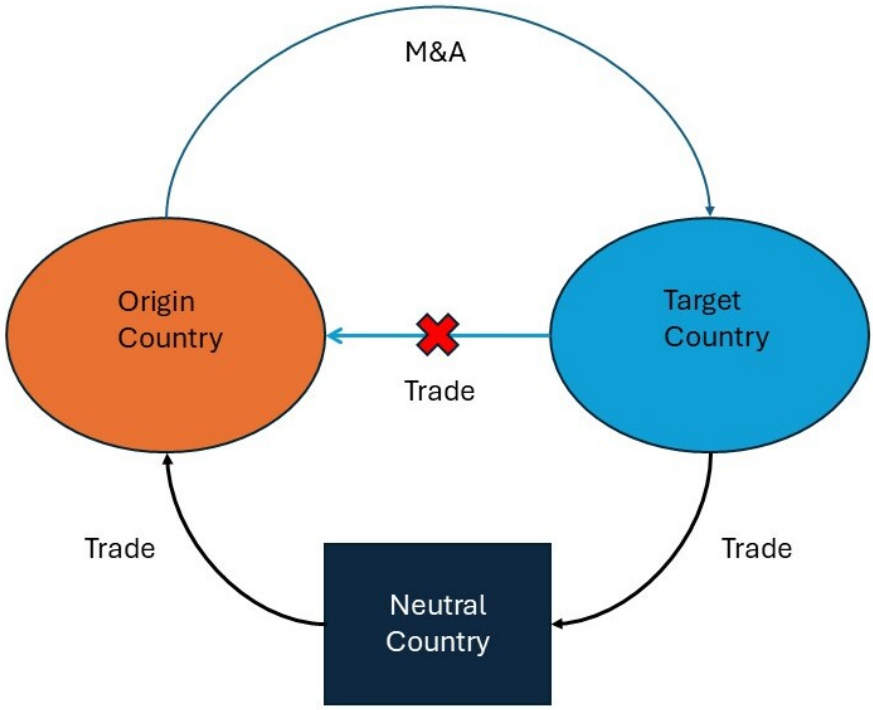

Figure 1.6: Illustration of import-sanction-jumping via M&A and export platform

I test for these possible adaptations to trade sanctions by identifying the impact of import sanctions, export sanctions, and joint import-export sanctions on FDI flows.

It appears that firms use FDI to adapt to import and export restrictions. After the origin country bans exports to the host country, firms from the sanctioning state increase greenfield investments in the host country. This export-sanction-jumping behavior is probably an attempt by firms to maintain access to the target country despite sanctions. Consistent with Helpman et al., 2004, the increased export costs prompt firms to substitute FDI for exports. The increase in greenfield but not M&A after export restrictions is also informative.

Greenfield investments replicate the investing firm's production capabilities in the foreign market while M&A investments acquire the production capabilities of foreign firms. The increase in greenfield investments suggests that firms respond to export sanctions with horizontal integration. See figures 1.5 and 1.6 for illustrations of export-sanction-jumping and import-sanction-jumping. When the origin country bans imports from the destination country, the sanctioning state's firms respond by increasing M&A investments. This increase in M&A suggests that, after losing access to the destination country's resources, the sanctioning state's firms acquire the destination's producers. This might be part of broader strategy to circumvent import restrictions with FDI. Part of this import-sanction evasion mechanism remains unaddressed though. The increase in M&A after import sanctions likely occurs for vertically integrated multinational firms, so their acquired firms must eventually move their output downstream. One way this can happen is by establishing an export platform in the sanctioned host country and diverting trade to a third country. From the third country, the inputs are then re-exported to the downstream producer. This downstream producer may be in the sanctioning state or, due to horizontal FDI, another country entirely. Global value chains are complex networks, so pinning down these exact mechanisms is difficult in a reduced-form model. Structurally modeling import-sanction-jumping decisions in a multi-country model of export platforming and horizontal FDI in a world of sanctions could be the way forward.

I also detect instances of adaptation by firms in response to trade sanctions other than those imposed by the investor's origin country. After the destination country bans exports to the origin country, firms from the sanctioned origin country acquired firms from the destination country. This is effectively the same behavior as the import sanction evasion described earlier because the investor is attempting the maintain the flow of resources from abroad. The key difference is that the sanction is initiated by the host country. A similar behavior occurs after the destination country bans arms exports to the origin country. The investor's country – having lost access to weapons, equipment, and related inputs from the destination country – begins to acquire firms in the destination. This result might indicate that M&A deals are used to bypass arms embargoes imposed against the investor's home country. This form of sanction evasion should be particularly concerning to policymakers who use trade restrictions as an alternative to military intervention. The positive effect of import sanctions on bilateral M&A aligns with existing literature on firm behavior in sanctioned markets. For example, Stępień and Weber, 2019 found using business survey data that some EU firms responded to sanctions against Russia by increasing investments

Table 1.5: Types of Trade Sanctions vs. Bilateral FDI

Independent Variables	**Dependent Variables**			
	$Greenfield\ Value_{jkt}$	$Greenfield\ Count_{jkt}$	$M\&A\ Value_{jkt}$	$M\&A\ Count_{jkt}$
$Export_{jk,t-2}$	0.306*	-0.052	0.267	-0.041
	(0.18)	(0.08)	(0.36)	(0.11)
$Import_{jk,t-2}$	-0.257**	-0.125***	0.681***	-0.042
	(0.11)	(0.04)	(0.17)	(0.05)
$ImpExp_{jk,t-2}$	0.028	-0.043	0.302	-0.039
	(0.19)	(0.09)	(0.37)	(0.14)
$Financial_{jk,t-2}$	-0.322**	-0.007	-0.382	-0.132
	(0.14)	(0.06)	(0.29)	(0.09)
$Travel_{jk,t-2}$	0.027	-0.151*	-0.052	-0.060
	(0.19)	(0.08)	(0.28)	(0.11)
$Military_{jk,t-2}$	-0.289**	-0.079*	-0.588***	-0.199***
	(0.12)	(0.04)	(0.17)	(0.08)
$Arms_{jk,t-2}$	-0.166	0.064	-1.200***	-0.011
	(0.17)	(0.08)	(0.38)	(0.12)
$Other_{jk,t-2}$	0.540**	0.012	-0.572	0.160
	(0.26)	(0.16)	(0.51)	(0.11)
$Export_{kj,t-2}$	-0.791*	-0.144	0.223	0.277**
	(0.45)	(0.16)	(0.43)	(0.13)
$Import_{kj,t-2}$	0.158	0.026	0.126	0.058
	(0.15)	(0.05)	(0.12)	(0.06)
$ImpExp_{kj,t-2}$	-0.344	0.002	0.457	0.040
	(0.40)	(0.16)	(0.41)	(0.13)
$Financial_{kj,t-2}$	0.708*	-0.029	-0.707**	-0.312***
	(0.37)	(0.14)	(0.36)	(0.12)
$Travel_{kj,t-2}$	-1.109**	-0.202*	-0.997**	0.103
	(0.53)	(0.12)	(0.39)	(0.12)
$Military_{kj,t-2}$	0.259	-0.022	-0.182	-0.096
	(0.20)	(0.08)	(0.20)	(0.09)
$Arms_{kj,t-2}$	-0.757**	0.132	1.494***	-0.037
	(0.38)	(0.15)	(0.47)	(0.14)
$Other_{kj,t-2}$	0.743	0.772***	-1.279	0.138
	(0.56)	(0.15)	(0.84)	(0.19)
$RTA_{jk,t-2}$	-0.039	0.043	-0.050	0.029
	(0.08)	(0.03)	(0.12)	(0.04)
Fixed Effects				
Origin-Year	✓	✓	✓	✓
Destination-Year	✓	✓	✓	✓
Directed Dyad	✓	✓	✓	✓
N	788040	788040	775083	788040

Note: All models are estimated via PPML. Coefficients are interpreted as changes relative to the baseline of unsanctioned country-pairs. Standard errors are reported in parentheses and clustered by directed dyad. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

in Russia. This result was particularly true for firms that were heavily dependent on the Russian market when sanctions were imposed. Skovoroda et al., 2019 also found that US oil and gas companies are more likely to initiate FDI in conflict-prone areas to expedite resource extraction before potential losses. While this study doesn't specifically address sanctions, it demonstrates that investments can rise in response to risk. On the other hand, Kohl et al., 2024, examining Dutch exports and FDI following EU sanctions on Russia, found no evidence of the sanctioning states' firms using FDI to bypass export sanctions.

Another source of heterogeneity is the comprehensiveness of trade restrictions. The most comprehensive trade sanction is the complete bilateral embargo. Under a complete embargo, the sanctioning state bans trade with the target country across all industries. I estimate the impacts of complete embargoes on bilateral FDI between sanctioning states and their targets. Tables 1.6 and 1.7 show the impact of complete embargoes. Unlike my previous models, I am also able to estimate the spillover effects of complete embargoes. This is because the set of countries that are neutral to complete embargoes is large and leads to a reference group of country-pairs that can be justified. It should be noted here that all estimated complete embargo coefficients have large standard errors. I attribute the low statistical power to the frequency of embargoes during the sample period. Between the beginning of 2003 and the end of 2022, there were just 16 complete embargoes. My results indicate that complete embargoes imposed by the investor's origin country seldom have a significant impact on FDI into the target country. An exception is greenfield projects, which decrease in value with marginal statistical significance after the imposition of complete embargoes. The lack of significant direct effects could be due to the fact that FDI flows from sanctioning states to their targets are already sparse prior to the complete embargo. Bilateral FDI falls sharply and significantly after the host country bans all trade with the investor's origin country. The strong significant effect of embargoes imposed by the destination and the null effect of those imposed by the origin suggests that there are asymmetries in the economic relationships of investor countries and host countries involved in complete embargoes. An example can clarify these results. Consider the Arab League's complete embargo against Israel. If the estimated results are applicable to this sanction episode, then FDI from the Arab League to Israel should be largely unaffected by the embargo. FDI flows from Israel to the Arab League, on the other hand, would fall sharply. This asymmetric effect implies that only the target country's investors are repelled by complete embargoes. This begs the question: do target countries divert these lost investments to neutral countries? After complete embargoes, M&A between targets and neutral countries declines while M&A

between sanctioning states and neutral countries rises.

Country Influence

This section of the study examines how sanction effects change according to the influence wielded by sanctioning states and their targets. My interest in heterogeneity stemming from influence is motivated by recent sanctions by the United States against Russia and China. Are sanctions involving large and politically influential countries more disruptive to FDI? I answer this question by identifying bilateral sanctions dummies based on whether the origin and/or destination countries are permanent members of the UN Security Council. The model once again includes all sanctions, so the reference group is the set of dyads without active sanction relationships. Table 1.8 presents the effects of sanctions involving UNSC members. The estimation results indicates that sanctions involving UN Security Council members strongly reduce the value of greenfield investments. Sanctions imposed by a non-UNSC investor origin country against a destination country in the UNSC ($UNSC\ Target_{jk,t-2} = 1$) trigger a severe reduction in both the value and count of bilateral greenfield. This effect is notably larger than the reduction in bilateral greenfield that occurs when a UNSC origin country sanctions a UNSC destination country ($UNSC\ Both_{jk,t-2} = 1$) and when a UNSC origin sanctions a non-UNSC destination ($UNSC\ Sender_{jk,t-2} = 1$).

It is important to recognize that the highly disruptive non-UNSC sanctions against UNSC targets are imposed by a small set of countries that includes the remaining European Union countries, the Scandinavian states, Ukraine, Hong Kong, Japan, Taiwan, and the Republic of Korea. Most countries do not participate in these sanctions against UNSC members because sanctions with wide international backing are usually implemented through UN Security Council Resolutions. Since all permanent UNSC members hold veto powers and can immediately end any UN sanctions against themselves, such resolutions have never been enacted. Two facts now become clear. First, the largest impacts on bilateral greenfield investments are driven by sanctions imposed against the UN Security Council members by non-UNSC countries. Second, the most impactful sanctions are not globally coordinated through the United Nations. Despite the lack of global coordination, sanctions imposed by non-UNSC sanctions against Russia and other UNSC targets include some sanctions imposed by the European Union. The EU is a significant sender of sanctions due to its collective economic weight and ability to coordinate policy across its bloc.

Table 1.6: Complete Embargoes vs. Bilateral Greenfield

Independent Variables	**Dependent Variables**					
	$Greenfield\ Value_{jk}$			$Greenfield\ Count_{jk}$		
	(1)	(2)	(3)	(4)	(5)	(6)
$Full\ Embargo_{jk,t-2}$	-1.013	-1.405	-1.145*	-0.345	-0.126	-0.379
	(0.64)	(1.11)	(0.66)	(0.31)	(0.52)	(0.31)
$Less\ Embargo_{jk,t-2}$	-0.119	-0.123	-0.125	-0.101***	-0.096**	-0.097**
	(0.10)	(0.10)	(0.10)	(0.04)	(0.04)	(0.04)
$Financial_{jk,t-2}$	-0.138	-0.135	-0.132	0.031	0.028	0.028
	(0.12)	(0.12)	(0.12)	(0.04)	(0.04)	(0.05)
$Travel_{jk,t-2}$	-0.026	-0.027	-0.029	-0.153**	-0.151*	-0.152**
	(0.19)	(0.19)	(0.19)	(0.08)	(0.08)	(0.08)
$Military_{jk,t-2}$	-0.268**	-0.267**	-0.267**	-0.076*	-0.079*	-0.078*
	(0.12)	(0.12)	(0.12)	(0.04)	(0.04)	(0.04)
$Arms_{jk,t-2}$	-0.092	-0.088	-0.084	0.077	0.072	0.073
	(0.17)	(0.17)	(0.17)	(0.08)	(0.08)	(0.08)
$Other_{jk,t-2}$	0.558**	0.560**	0.562**	0.027	0.026	0.026
	(0.27)	(0.27)	(0.27)	(0.16)	(0.16)	(0.16)
$Full\ Embargo_{kj,t-2}$	-7.941***	-7.935***	-8.024***	-10.339***	-10.347***	-10.368***
	(0.87)	(0.87)	(0.87)	(0.31)	(0.31)	(0.31)
$Less\ Embargo_{kj,t-2}$	0.107	0.103	0.101	0.019	0.025	0.024
	(0.14)	(0.14)	(0.14)	(0.04)	(0.04)	(0.04)
$Financial_{kj,t-2}$	0.219	0.219	0.220	-0.085	-0.089	-0.088
	(0.29)	(0.29)	(0.29)	(0.08)	(0.08)	(0.08)
$Travel_{kj,t-2}$	-1.086**	-1.084**	-1.084**	-0.162	-0.161	-0.162
	(0.51)	(0.51)	(0.51)	(0.11)	(0.11)	(0.11)
$Military_{kj,t-2}$	0.282	0.294	0.301	-0.013	-0.031	-0.028
	(0.19)	(0.19)	(0.19)	(0.08)	(0.08)	(0.08)
$Arms_{kj,t-2}$	-0.870**	-0.873**	-0.874**	0.074	0.075	0.075
	(0.37)	(0.37)	(0.37)	(0.15)	(0.15)	(0.15)
$Other_{kj,t-2}$	0.768	0.771	0.770	0.780***	0.775***	0.777***
	(0.57)	(0.57)	(0.57)	(0.15)	(0.15)	(0.15)
RTA_{t-2}	-0.038	-0.039	-0.040	0.045	0.048	0.047
	(0.08)	(0.08)	(0.08)	(0.03)	(0.03)	(0.03)
$Full\ Embargo\ Diversion_{jk,t-2}$ (Bilateral)		0.036			-0.046	
		(0.11)			(0.05)	
$Full\ Embargo\ Diversion\ w/\ Target_{jk,t-2}$ (Bilateral)		-0.430			0.277	
		(0.94)			(0.42)	
$Full\ Embargo\ Diversion_{jk,t-2}$ (Global)			0.028			-0.020
			(0.06)			(0.03)
$Full\ Embargo\ Diversion\ w/\ Target_{jk,t-2}$ (Global)			-0.202			-0.043
			(0.28)			(0.08)
Fixed Effects						
Origin-Year	✓	✓	✓	✓	✓	✓
Destination-Year	✓	✓	✓	✓	✓	✓
Directed Dyad	✓	✓	✓	✓	✓	✓
N	788040	788040	775083	788040	788040	788040

Note: All models are estimated via PPML. Bilateral diversion identifies unsanctioned dyads that include at least one country that is a sender or target of sanctions elsewhere during the same year. Global diversion identifies unsanctioned dyads that include a country that is globally neutral to all sanctions and another country that is a sender or target of sanctions. In columns 1 and 4, coefficients are interpreted as changes relative to the baseline of unsanctioned country-pairs. In all other columns, coefficients are interpreted relative to the baseline of unsanctioned country-pairs unaffected by diversion. Standard errors are reported in parentheses and clustered by directed dyad. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 1.7: Complete Embargoes vs. Bilateral M&A

Independent Variables	**Dependent Variables**					
	$M\&A\ Value_{jk}$			$M\&A\ Count_{jk}$		
	(1)	(2)	(3)	(4)	(5)	(6)
$Full\ Embargo_{jk,t-2}$	-0.462	-0.536	-1.242	-0.223	-0.298	-0.226
	(1.56)	(1.71)	(1.62)	(0.41)	(0.41)	(0.41)
$Less\ Embargo_{jk,t-2}$	0.653***	0.622***	0.585***	-0.046	-0.065	-0.067
	(0.16)	(0.17)	(0.17)	(0.04)	(0.04)	(0.04)
$Financial_{jk,t-2}$	-0.689***	-0.663***	-0.637***	-0.128*	-0.114	-0.113
	(0.23)	(0.23)	(0.23)	(0.08)	(0.08)	(0.08)
$Travel_{jk,t-2}$	-0.028	-0.031	-0.037	-0.060	-0.060	-0.062
	(0.27)	(0.27)	(0.27)	(0.09)	(0.09)	(0.09)
$Military_{jk,t-2}$	-0.587***	-0.572***	-0.559***	-0.200***	-0.194**	-0.194**
	(0.17)	(0.17)	(0.17)	(0.08)	(0.08)	(0.08)
$Arms_{jk,t-2}$	-1.340***	-1.318***	-1.261***	-0.013	-0.002	0.000
	(0.35)	(0.36)	(0.36)	(0.11)	(0.11)	(0.11)
$Other_{jk,t-2}$	-0.580	-0.562	-0.540	0.160	0.162	0.163
	(0.51)	(0.50)	(0.49)	(0.11)	(0.11)	(0.11)
$Full\ Embargo_{kj,t-2}$	-27.448***	-27.352***	-28.186***	0.254	0.292	0.252
	(0.60)	(0.62)	(0.68)	(1.22)	(1.22)	(1.22)
$Less\ Embargo_{kj,t-2}$	0.143	0.110	0.066	0.066	0.046	0.043
	(0.12)	(0.11)	(0.12)	(0.05)	(0.05)	(0.05)
$Financial_{kj,t-2}$	-0.513**	-0.484**	-0.454**	-0.247***	-0.228***	-0.226***
	(0.22)	(0.22)	(0.22)	(0.08)	(0.08)	(0.08)
$Travel_{kj,t-2}$	-0.857**	-0.858**	-0.866**	0.025	0.023	0.021
	(0.34)	(0.34)	(0.35)	(0.12)	(0.13)	(0.13)
$Military_{kj,t-2}$	-0.181	-0.156	-0.124	-0.105	-0.093	-0.093
	(0.20)	(0.20)	(0.21)	(0.08)	(0.08)	(0.08)
$Arms_{kj,t-2}$	1.539***	1.570***	1.657***	0.032	0.046	0.049
	(0.50)	(0.50)	(0.52)	(0.13)	(0.13)	(0.13)
$Other_{kj,t-2}$	-1.259	-1.257	-1.243	0.156	0.159	0.160
	(0.83)	(0.83)	(0.83)	(0.20)	(0.20)	(0.20)
RTA_{t-2}	-0.051	-0.063	-0.085	0.028	0.023	0.022
	(0.12)	(0.12)	(0.12)	(0.04)	(0.04)	(0.04)
$Full\ Embargo\ Diversion_{jk,t-2}$ (Bilateral)		0.130			0.083	
		(0.16)			(0.05)	
$Full\ Embargo\ Diversion\ w/\ Target_{jk,t-2}$ (Bilateral)		-0.231			-0.195	
		(0.65)			(0.17)	
$Full\ Embargo\ Diversion_{jk,t-2}$ (Global)			0.145*			0.045
			(0.08)			(0.03)
$Full\ Embargo\ Diversion\ w/\ Target_{jk,t-2}$ (Global)			-0.931***			-0.063
			(0.31)			(0.07)
Fixed Effects						
Origin-Year	✓	✓	✓	✓	✓	✓
Destination-Year	✓	✓	✓	✓	✓	✓
Directed Dyad	✓	✓	✓	✓	✓	✓
N	775083	775083	775083	788040	788040	788040

Note: All models are estimated via PPML. Bilateral diversion identifies unsanctioned dyads that include at least one country that is a sender or target of sanctions elsewhere during the same year. Global diversion identifies unsanctioned dyads that include a country that is globally neutral to all sanction and another country that is a sender or target of sanctions. In columns 1 and 4, coefficients are interpreted as changes relative to the baseline of unsanctioned country-pairs. In all other columns, coefficients are interpreted relative to the baseline of unsanctioned country-pairs unaffected by diversion. Standard errors are reported in parentheses and clustered by directed dyad. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

It is also noteworthy that sanctions sent by non-UNSC countries against the world's most influential countries are more disruptive than sanctions between two UNSC members. One would expect sanctions between two large and highly influential economies to greatly impact investment flows, but the estimated negative impact on sender-to-target greenfield flows is smaller than the effect of those imposed against UNSC targets by non-UNSC senders. In the data, UNSC-to-UNSC sanctions are present for just 14 dyads[4]. Even in the case of Western sanctions against Russia, these UNSC-to-UNSC sanctions are never comprehensive in the sense that they fully block economic engagement with all sectors of the target economy. The sanctioning states in these dyads have instead chosen to impose partial trade bans along with a combination of restrictions on military assistance, arms deals, travel, and finance. Thus, it is possible that the observed effect on greenfield investments is smaller than expected due to within-country reallocation. While sanctions reduce investments in one sector, the large UNSC-to-UNSC capital flows are diverted to unrestricted sectors of the target economy – offsetting some of the negative impact at the aggregate. Differences in the effects of $UNSCTarget$ and $UNSCBoth$ might also be attributed to how those sanctions are coordinated across multiple countries. For instance, about 50% of $UNSCBoth$ dyads face unilateral sanctions while only 12% of the $UNSCTarget$ dyads face unilateral sanctions. I formally analyze the role of coordination in the next stage of the analysis.

The idea that firms have a strong incentive to maintain ties despite $UNSC\ Both$ sanctions is reinforced by the effects of sanctions imposed by the host country. After a UNSC host sanctions a UNSC origin, the origin increases investments into the host country. This suggests that investors may use the asymmetric nature of sanctions to make up for economic ties lost by sanctions. For instance, while the US restricts engagement with China, Chinese firms can increase greenfield in the US. Large countries have strong commercial incentives to shift investments to unblocked channels. This adaptive behavior is not detected in dyads with non-UNSC countries, indicating that sanctions impact highly influential countries differently.

Mergers and acquisitions exhibit different responses to sanctions involving UNSC members. All sanctions imposed by the investing country significantly reduce the number of

[4]These dyads are China - France, China - USA, France - China, France - Russia, United Kingdom - China, United Kingdom - France, United Kingdom - Russia, Russia - France, Russia - United Kingdom, Russia - USA, USA - China, USA - France, USA - United Kingdom, and USA - Russia.

bilateral M&A deals regardless of UNSC involvement. However, sanctions imposed by a non-UNSC origin against a UNSC destination increase the value of bilateral M&A deals. This positive coefficient may indicate the sanction-jumping behavior described earlier or an opportunity to reallocate capital to unrestricted sectors in the case of partial sanctions. Sanctions imposed by a UNSC host against a UNSC origin lead to a decrease in the average total value of bilateral M&A.

Coordination with Other Countries

Another source of sanction heterogeneity is the degree to which restrictions are coordinated with other countries. Conventional wisdom and recent research suggest that sanctions are more disruptive to the target when they are imposed by many countries at once. As I demonstrated earlier in the analysis of import and export restrictions, policies that disrupt trade flows can spur investment. In this stage of the analysis, I examine how the effects of sanctions vary by the degree of coordination, or how many countries join the sanctions episode. Following Syropoulos et al., 2023, I estimate separate models for each level of coordination. I first consider unilateral and multilateral sanctions. The unilateral model considers all sanctions imposed by just one country. The reference group in the unilateral model is the set of dyads that do not participate in unilateral sanctions. The multilateral model, on the other hand, considers all sanctions imposed by two or more countries. The reference group in the multilateral model is the set of dyads that do not participate in multilateral sanctions. The most frequent imposer of unilateral sanctions is the United States, so I also separately identify the impact of unilateral US sanctions on bilateral FDI. Multilateral sanctions naturally vary in their degree of coordination. I consider multilateral sanctions imposed by the UN and the European Union. UN sanctions are the most coordinated in terms of the number of participating countries. EU sanctions include fewer countries but a greater ability to coordinate and enforce restrictions.

Are sanctions more disruptive to bilateral FDI when they are highly coordinated? The answer to this question is not always clear. Table 1.9 presents the impact of sanctions with varying levels of coordination. Multilateral trade sanctions are more disruptive to bilateral greenfield investments than are unilateral sanctions. The relationship between FDI reduction and sanction coordination is not monotonic though. Multilateral trade sanctions imposed by the European Union significantly reduce bilateral greenfield investments while the effect of UN sanctions is insignificant. Unilateral trade sanctions *increase* M&A while

Table 1.8: Sanctions Involving UN Security Council Members vs. FDI

Independent Variables	**Dependent Variables**			
	$Greenfield\ Value_{jkt}$	$Greenfield\ Count_{jkt}$	$M\&A\ Value_{jkt}$	$M\&A\ Count_{jkt}$
$UNSC\ Sender_{jk,t-2}$	-0.351***	-0.054	0.145	-0.146***
	(0.10)	(0.04)	(0.20)	(0.06)
$UNSC\ Target_{jk,t-2}$	-0.482***	-0.168***	0.351*	-0.101*
	(0.11)	(0.04)	(0.20)	(0.06)
$UNSC\ Both_{jk,t-2}$	-0.339**	-0.016	-0.097	-0.202***
	(0.13)	(0.05)	(0.20)	(0.07)
$Non-UNSC_{jk,t-2}$	-0.094	-0.083	0.143	-0.202***
	(0.15)	(0.06)	(0.29)	(0.07)
$UNSC\ Sender_{kj,t-2}$	0.185	-0.025	0.024	-0.072
	(0.16)	(0.05)	(0.18)	(0.06)
$UNSC\ Target_{kj,t-2}$	0.179	0.048	0.166	-0.039
	(0.15)	(0.06)	(0.22)	(0.07)
$UNSC\ Both_{kj,t-2}$	0.543***	-0.002	-0.530***	-0.127
	(0.15)	(0.07)	(0.18)	(0.08)
$Non-UNSC_{kj,t-2}$	-0.657**	0.043	0.227	0.199
	(0.31)	(0.06)	(0.33)	(0.14)
$RTA_{jk,t-2}$	-0.057	0.043	-0.045	0.024
	(0.09)	(0.03)	(0.12)	(0.04)
Fixed Effects				
Origin-Year	✓	✓	✓	✓
Destination-Year	✓	✓	✓	✓
Directed Dyad	✓	✓	✓	✓
N	788040	788040	775083	788040

Note: All models are estimated via PPML. Each independent variable except for RTA is a sanction dummy. Coefficients are interpreted as changes relative to the baseline of unsanctioned country-pairs. Standard errors are reported in parentheses and clustered by directed dyad. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

multilaterally imposed trade restrictions reduce M&A. The increase in M&A after unilateral trade sanctions is driven primarily by US investors. It appears that US firms are the sanction-jumpers who substitute trade for FDI.

Financial sanctions have an entirely different pattern of effects. They have no impact on greenfield investments, regardless of their degree of coordination. Mergers and acquisitions are reduced by unilateral financial sanctions and increased by UN financial sanctions. A similar pattern emerges from military sanctions. Arms embargoes do not effect greenfield flows when imposed unilaterally. Multilateral arms embargoes have heterogeneous effects, with UN restrictions decreasing bilateral greenfield and EU restrictions increasing bilateral greenfield. Unilateral arms embargoes continue to have no significant effect on M&A. Multilateral arms embargoes significantly decrease M&A, with these impacts becoming stronger as coordination rises.

In summary, sanctions tend to be more disruptive to bilateral FDI when they are coordinated with other countries. Exceptions where unilateral sanctions are stronger are likely driven by the structure of the systems that enforce those restrictions. That is, certain countries like the US have enough influence over global financial and military relationships to impose damaging unilateral sanctions.

1.5.3 Timing and Duration

The final source of heterogeneity explored in this study is the duration of sanctions. I mentioned earlier that the timing of sanction effects on investment decisions is not a trivial matter. Observing events that often trigger sanctions, firms may adjust their investments prior to sanction imposition. This anticipatory effect would cause the true effect of sanctions on FDI to be underestimated. Another issue missed by the baseline model is the evolution of effects on FDI during the sanction period. Prolonged sanctions events could be perceived by investors as especially risky, prompting them to exit the market or take steps to adapt to the new conditions. The point is that sanction effects averaged across all years miss important dynamics. I now estimate the effects of any sanction on bilateral FDI during 3 years prior to sanction imposition, each year of the sanction episode, and 3 years after the sanctions are lifted.

Table 1.10 and figures 1.7 - 1.10 demonstrate the impact of sanctions on bilateral FDI

Table 1.9: Coordinated Sanctions vs. Bilateral FDI

	Type of Coordination by Senders				
	Unilateral	Multilateral	UN	EU	US
Dep. Var.: $Greenfield\ Value_{jkt}$					
Trade	-0.243** (0.11)	-0.278 (0.25)	0.634 (0.49)	-1.154*** (0.42)	0.102 (0.16)
Financial	0.001 (0.14)	-0.303 (0.25)	-0.538 (0.55)	0.150 (0.30)	-0.238 (0.18)
Travel	0.488* (0.28)	-0.141 (0.31)	0.905** (0.42)	-0.349 (0.35)	0.329 (0.31)
Military	-0.273** (0.12)	0.112 (0.29)	-1.213** (0.56)	0.588* (0.33)	-0.318** (0.12)
Arms	-0.049 (0.21)	0.127 (0.31)	-2.159** (0.99)	0.571* (0.34)	0.064 (0.22)
Other	-1.213** (0.55)	0.880*** (0.26)	1.932*** (0.69)	0.900*** (0.32)	-1.249*** (0.41)
N	788040	788040	788040	788040	788040
Dep. Var.: $Greenfield\ Count_{jkt}$					
Trade	-0.101** (0.04)	-0.267** (0.11)	0.102 (0.20)	-0.579*** (0.19)	-0.069 (0.08)
Financial	0.042 (0.05)	0.075 (0.09)	-0.212 (0.24)	0.137 (0.09)	0.064 (0.08)
Travel	0.003 (0.14)	-0.206* (0.12)	0.242 (0.22)	-0.171 (0.12)	-0.120 (0.14)
Military	-0.097** (0.04)	0.259** (0.11)	0.037 (0.25)	0.396*** (0.13)	-0.120*** (0.04)
Arms	0.120 (0.12)	0.054 (0.11)	0.125 (0.49)	0.138 (0.15)	0.137 (0.12)
Other	-0.031 (0.36)	0.130 (0.15)	1.246*** (0.41)	0.218 (0.15)	-0.198 (0.29)
N	788040	788040	788040	788040	788040
Dep. Var.: $M\&A\ Value_{jkt}$					
Trade	0.719*** (0.16)	0.559 (0.48)	-2.442*** (0.88)	-0.437 (0.87)	1.041*** (0.31)
Financial	-0.833*** (0.25)	-0.103 (0.47)	3.444*** (1.17)	0.165 (0.45)	-1.100*** (0.35)
Travel	0.274 (0.29)	0.031 (0.62)	-0.293 (1.44)	0.101 (0.66)	0.251 (0.31)
Military	-0.446** (0.18)	-1.440** (0.56)	2.724** (1.09)	-0.825 (0.67)	-0.529*** (0.17)
Arms	-0.208 (0.37)	-1.223** (0.54)	-4.703*** (1.59)	-1.394** (0.69)	-0.254 (0.25)
Other	-1.557*** (0.36)	0.187 (0.56)	1.930* (0.99)	0.129 (0.77)	0.824 (0.93)
N	775083	775083	775083	775083	775083
Dep. Var.: $M\&A\ Count_{jkt}$					
Trade	-0.038 (0.04)	0.029 (0.13)	0.177 (0.26)	-0.371** (0.18)	0.125** (0.06)
Financial	-0.122 (0.09)	-0.063 (0.11)	0.559** (0.28)	-0.020 (0.14)	-0.202** (0.09)
Travel	-0.005 (0.13)	-0.110 (0.15)	-0.382 (0.31)	-0.066 (0.17)	-0.097 (0.14)
Military	-0.217*** (0.08)	0.153 (0.18)	1.120*** (0.32)	0.110 (0.16)	-0.256*** (0.08)
Arms	-0.021 (0.15)	-0.125 (0.15)	-0.552 (0.93)	0.146 (0.16)	0.028 (0.19)
Other	0.192 (0.21)	0.186 (0.12)	1.301* (0.69)	0.261 (0.16)	0.517* (0.30)
N	788040	788040	788040	788040	788040

Note: All models are estimated via PPML with directed dyad and country-year fixed effects. Coefficients are interpreted as changes in FDI relative to the baseline of dyads that are not subjected to the set of coordinated sanctions. For instance, the baseline in the unilateral model is the set of dyads without unilateral sanctions. Standard errors are reported in parentheses and clustered by directed dyad. Significance levels: * $p < .10$, ** $p < .05$, *** $p < .01$.

during the pre-sanction, during-sanction, and post-sanction periods. Greenfield investors clearly anticipate sanctions prior to their imposition. I estimate an uptick in the number of new greenfield projects from the sanctioning state in the target country one year prior to sanction imposition. This result is similar to the main result of Biglaiser and Lektzian, 2011, which finds that US investors pull out of the target country before sanctions are imposed. It should be noted here that Biglaiser and Lektzian, 2011 focuses on total FDI without distinguishing between greenfield and M&A. The anticipatory behavior of greenfield investors might be driven by a desire to expedite projects before sanctions worsen conditions in the target market. This seems probable in the case of greenfield projects for resource extraction. Firms might also preemptively build production facilities within the destination market prior to sanctions to maintain market access when they are finally imposed. During the sanction period, greenfield investments from sanctioning states to target countries fall as early as year 3 in the value model and year 5 in the count model. During years 7 and 9 of sanctions, greenfield investors continue to be deterred – reducing the value of their investments. The number of bilateral greenfield projects from sanctioning states in target countries drops sharply in years 8 and 9. The negative impact of sanctions continues to be detected in years 10 and beyond, suggesting that prolonged sanctions are detrimental to bilateral greenfield investments. The delayed impact of sanctions on greenfield projects implies that investors may wait for more information before pulling out of sanctioned markets. This finding makes sense when considering the fact that greenfield projects often entail substantial fixed costs and negotiations. Greenfield investors could also be bound by contractual obligations and regulatory hurdles that prevent an immediate withdrawal from the sanctioned market. The effect of sanctions on greenfield becomes insignificant soon after sanctions are lifted. By year 3 of the post-sanction period, bilateral greenfield investments rise significantly – indicating a recovery.

M&A investors anticipate sanctions before they are imposed too. The count model detects that the number of bilateral M&A deals from the sanctioning state in the target country decline one year before sanctions are imposed. I find an interesting pattern of M&A activity during the sanction period. During year 2 of sanctions, there is a significant increase in bilateral M&A value. In year 3, the value of bilateral M&A plummets. Sanctions do not significantly impact M&A activity again until years 10 and beyond, when M&A increase. The number of bilateral M&A deals is not significantly affected during the early sanction period when values are increasing. In fact, sanctions do not significantly impact the number of M&A deals until year 5. Effects become stronger in year 9 before softening in year 10 and

beyond. The pattern of M&A value rising early in the sanction period before declining later could be described as fire-sale FDI. Due to heightened perceptions of risk by investors, M&A deals offer higher premiums after sanctions – prompting an influx of capital. Once these premiums are exhausted, though, M&A investors flee the sanctioned market. This rise and fall of M&A after sanctions is similar to the theoretical predictions of Kaempfer and Lowenberg, 2007. However, this theory does not account for the influx of M&A investments during the late sanction period. It could be that after many years, much of the uncertainty surrounding sanctions is resolved and investors choose to return before sanctions are actually lifted. During the post-sanction period, there is an immediate recovery in M&A values while counts continue to decline. An increase in M&A values and decline in M&A counts implies that the remaining deals are larger. Another intriguing observation is that M&A values are significantly affected near the onset and removal of sanctions. This might point to speculation or arbitrage in anticipation of policy changes.

1.6 Conclusion

This study sought to determine if the poor success rate of sanctions is explained by firms adapting to sanctions through their capital investments. At first glance, it appears that sanctions are quite disruptive to FDI. M&A and greenfield investments from the sanctioning state to the target countries both fall after restrictions are imposed. These disruptions are driven by bans on military assistance, arms trade, and various financial activities. Trade sanctions, however, can prompt an increase in FDI as firms adapt to export restrictions with greenfield projects and to import restrictions with M&A deals. Export-sanction-jumping is driven by market access reasons while import-sanction-jumping can be explained by the investor's dependence on the target country for inputs. A particularly alarming instance of import-sanction-jumping occurs when firms bypass arms embargoes imposed against their country by the host country. In summary, the sanctioning state's firms can and do bypass trade restrictions by reallocating capital. This probably undermines the effectiveness of sanctions.

In future research, these sanction-jumping behaviors should be explored in a structural model that explicitly predicts how import sanctions affect the FDI and trading decisions of multinational enterprises that depend on the sanctioned market for inputs. A starting point could be a three-country firm-level model with a sanctioning state, a target country,

The Impact of Sanctions on Sender-to-Target FDI Over Time

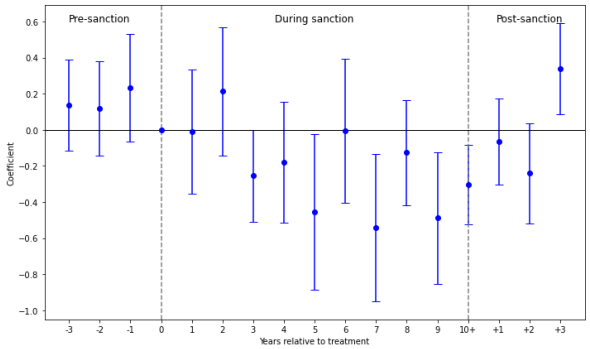

Figure 1.7: Timing - Greenfield Value

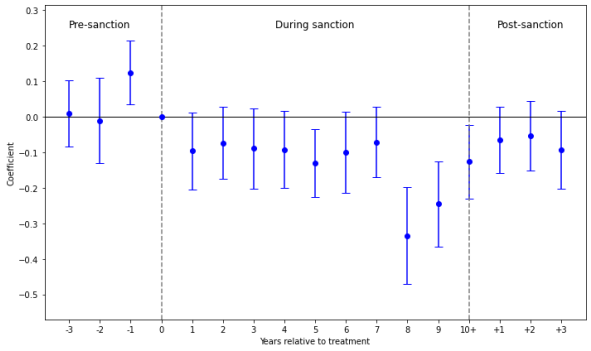

Figure 1.8: Timing - Greenfield Count

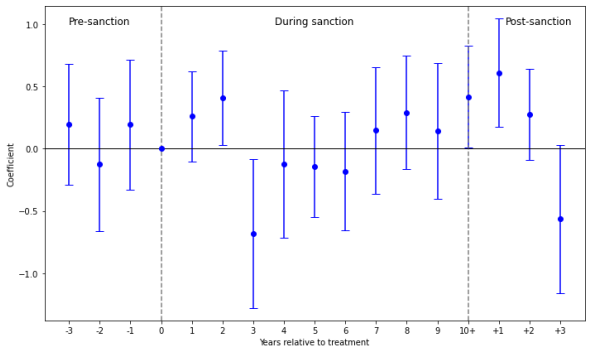

Figure 1.9: Timing - M&A Value

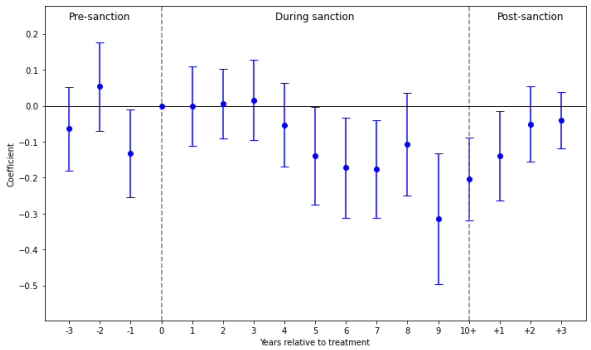

Figure 1.10: Timing - M&A Count

Note: Each figure shows the evolution of effects on FDI during the pre-sanction, during-sanction, and post-sanction periods. Each error band corresponds to a 90 percent confidence interval.

Table 1.10: Sanction Effects on Sender-to-Target FDI Over Time

Independent Variables	**Dependent Variables**			
	$Greenfield\ Value_{jkt}$	$Greenfield\ Count_{jkt}$	$M\&A\ Value_{jkt}$	$M\&A\ Count_{jkt}$
3 years before sanction	0.136	0.010	0.195	-0.063
	(0.13)	(0.05)	(0.25)	(0.06)
2 years before sanction	0.119	-0.010	-0.127	0.053
	(0.13)	(0.06)	(0.27)	(0.06)
1 year before sanction	0.231	0.124***	0.192	-0.133**
	(0.15)	(0.05)	(0.27)	(0.06)
$Sanction_{jk}$ (year 1)	-0.009	-0.096*	0.258	-0.001
	(0.18)	(0.05)	(0.19)	(0.06)
$Sanction_{jk}$ (year 2)	0.214	-0.073	0.408**	0.006
	(0.18)	(0.05)	(0.19)	(0.05)
$Sanction_{jk}$ (year 3)	-0.255**	-0.089	-0.680**	0.016
	(0.13)	(0.06)	(0.31)	(0.06)
$Sanction_{jk}$ (year 4)	-0.181	-0.092*	-0.126	-0.053
	(0.17)	(0.06)	(0.30)	(0.06)
$Sanction_{jk}$ (year 5)	-0.457**	-0.130***	-0.142	-0.139**
	(0.22)	(0.05)	(0.21)	(0.07)
$Sanction_{jk}$ (year 6)	-0.006	-0.101*	-0.182	-0.172**
	(0.20)	(0.06)	(0.24)	(0.07)
$Sanction_{jk}$ (year 7)	-0.542***	-0.072	0.146	-0.176**
	(0.21)	(0.05)	(0.26)	(0.07)
$Sanction_{jk}$ (year 8)	-0.126	-0.334***	0.290	-0.106
	(0.15)	(0.07)	(0.23)	(0.07)
$Sanction_{jk}$ (year 9)	-0.489***	-0.245***	0.142	-0.315***
	(0.19)	(0.06)	(0.28)	(0.09)
$Sanction_{jk}$ (10+ years)	-0.302***	-0.127**	0.417**	-0.203***
	(0.11)	(0.05)	(0.21)	(0.06)
1 year after sanction	-0.064	-0.066	0.609***	-0.139**
	(0.12)	(0.05)	(0.22)	(0.06)
2 years after sanction	-0.240*	-0.054	0.275	-0.051
	(0.14)	(0.05)	(0.19)	(0.05)
3 years after sanction	0.338***	-0.093*	-0.566*	-0.040
	(0.13)	(0.06)	(0.30)	(0.04)
Fixed Effects				
Origin-Year	✓	✓	✓	✓
Destination-Year	✓	✓	✓	✓
Directed Dyad	✓	✓	✓	✓
N	788040	788040	775083	788040

Note: All models are estimated via PPML. Coefficients are interpreted as changes relative to the baseline of unsanctioned country-pairs that are not in the 3-year pre- or post-sanction periods. Standard errors are reported in parentheses and clustered by directed dyad. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

and a neutral country. This model would address how costs stemming from sanctions and resource dependence drive horizontal or export platform FDI.

The analysis on the roles of country influence, coordination, and timing in sanction effects reinforces the idea that sanctions can inadvertently bring economies closer together by spurring investment. Notably, sanctions imposed by a UN Security Council destination against UN Security Council investors increase origin-to-destination greenfield investments. Unilateral trade sanctions, especially those imposed by the United States, lead to increased M&A activity from sanctioning states to target countries. Examining the timing of sanctions indicated that greenfield counts increase 1 year before sanctions are imposed. Mergers and acquisitions rise early on the during the sanction period as investors pursue risk premiums and rise again late in the sanction period due to a resolution of uncertainty or in anticipation of the policy's termination.

It is clear that sanctions can have the unintended effect of increasing FDI flows between sanctioning states and targets. Policymakers intending to isolate the target economy should consider implementing stronger investment controls alongside other restrictions. This opens up a political economy question: are sanctions designed to be evaded through FDI and other substitutions? It could be that the politically optimal set of sanctions rules is not the most damaging to the target country. Leaving FDI unrestricted when trade sanctions are imposed allows the sanctioning state's firms to circumvent sanctions while the government signals disapproval of the target country. Non-comprehensive sanctions policies allow governments to send sanctions for demonstrational purposes while leaving firms with the flexibility to mitigate their costs. A similar rationale may explain the waivers issued to firms by the United States Office of Foreign Asset Control. Future research should explore why sanctioning states choose to impose some restrictions and not others, and whether such decisions reflect strategic flexibility or unintended loopholes in sanction design.

CHAPTER

2

SECTOR BY SECTOR: HOW FOREIGN DIRECT INVESTMENTS RESPOND TO SANCTIONS ACROSS INDUSTRIES

International sanctions remain one of the most widely used tools for governments to signal disapproval or influence the behavior of rival states following political crises and geopolitical events. Between 2001 and 2022, there were 797 distinct sanctions episodes[1]. Despite their widespread use, sanctions rarely result in a complete halt to economic activity between sanctioning states and their targets. In 97 percent of sanctions episodes since 2000, firms and individuals from sanctioning states were free to engage with at least one industry in the target country. This uneven application of sanctions across industries suggests there is significant variation in their economic impact by sector. This study examines the effects of sanctions on bilateral FDI between sanctioning states and their targets within each industry. Additionally, I investigate how these industry-level effects are influenced by global industry characteristics, such as average upstreamness and geographic concentration, and

[1] Based on author's calculations using the Global Sanctions Database

by bilateral industry characteristics, such as trade dependence.

Understanding how sanctions impact industry-level FDI flows from sanctioning countries to their targets is valuable for both policymakers and corporate executives. For example, sanctions on military vehicle manufacturers may divert investment to adjacent sectors like civilian automotive production. In this case, the intended consequence of restricting the defense industry is achieved, but the broader economic damage to the target country may be softened by capital reallocation. Firms in civilian industries could benefit from knowing that sanctions may reshape market structure, opening new opportunities or altering competition.

Unintended consequences may also stem from sanction jumping, where multinational firms respond to trade restrictions by investing directly in the foreign market. For instance, if the United States bans exports of advanced manufacturing equipment to a sanctioned country, firms might establish or acquire local production facilities to maintain their market presence. In such cases, trade flows decline, but FDI rises. The net effect on the target economy becomes ambiguous; restrictions hurt trade but may simultaneously draw in capital.

One of the goals of this study is to identify the sectors where FDI increases under sanctions, helping to pinpoint where sanction jumping or capital reallocation may be occurring. I also identify industries that see declines or no change in investment, using heterogeneity in sectoral characteristics to explain the differing responses. These findings can inform more targeted and effective sanctions design, while helping firms anticipate structural shifts in foreign markets. This study is most similar to Carril-Caccia, 2025 – which finds that sanctions reduce bilateral mergers and acquisitions to different degrees across sectors. However, industry effects are not the main focus in Carril-Caccia, 2025 and the authors focus only on 6 broad sectors without modeling their characteristics. Greenfield FDI is absent from their study.

This study is organized as follows. I first provide an overview of the hypothesized effects, offering mechanisms for sanctions increasing, decreasing, or not impacting FDI flows within each industry. I then move on to the empirical strategy, where I use an industry-level gravity model that is derived from microeconomic theory. Next, I discuss my data sources for sanctions, greenfield investments, cross-border mergers and acquisitions, and

industry characteristics. Finally, I present the effects of sanctions on greenfield projects and cross-border M&A across the different industries.

2.1 Possible Effects of Sanctions on Industry FDI

The effects of sanctions on FDI flows between the sanctioning states and targets should generally be negative due to the increased costs and uncertainty that the restrictions impose on multinational firms (McLean et al., 2024; Carril-Caccia, 2025, Mirkina, 2018; Biglaiser and Lektzian, 2011). However, it is unlikely that the effect of sanctions on bilateral FDI is uniform across all industries since some sectors are explicitly targeted while others receive exemptions. Negative, positive, and null effects are possible.

2.1.1 Outcome I: Sanctions Reduce Bilateral Sector FDI

Sanctions are likely to reduce bilateral FDI in industries that are directly targeted by restrictions in a broad manner. For instance, on October 7, 2022, the U.S. Department of Commerce implemented comprehensive export controls and investment restrictions targeting Chinese semiconductor manufacturers, such as SMIC and YMTC (Bureau of Industry and Security, 2023). These measures aimed to limit China's access to advanced chip technology and deter foreign investment in its semiconductor sector. The decline of American FDI in the Chinese semiconductor sector is a direct outcome of these restrictions. Sanctioned industries tend to be related to the target country's military capabilities. Some sectors that have been directly sanctioned across the globe include semiconductors, energy, chemicals, and defense. A reduction in FDI may also occur in sectors that are not directly sanctioned but rely on inputs from sanctioned industries. For example, sanctions that disrupt investment in China's semiconductor sector can indirectly reduce foreign investment in downstream industries such as automobiles, consumer electronics, and other sectors that depend on advanced chips. There is some evidence that such supply chain linkages can transmit the effects of sanctions beyond their immediate targets. A study of Zimbabwean firms found that sanctions imposed on specific companies also raised costs for non-sanctioned firms operating within the same supply chains, leading to broader economic disruptions (Sun et al., 2022).

2.1.2 Outcome II: Sanctions Increase Bilateral Sector FDI

An increase in foreign direct investment flows from sanctioned states to target countries may seem counterintuitive, but there are numerous mechanisms that can contribute to this outcome. I propose three mechanisms: reallocation within the target country, trade sanction jumping, and opportunistic investments by firms with waivers.

Reallocation Within the Target Country

First, capital that would have flowed to the sanctioned sector may reallocate to unsanctioned sectors within the same targeted country. This effect is similar to squeezing a balloon, where pressure applied to one area leads to an expansion in another. The patterns of this cross-sector reallocation of FDI are likely quite complex. For greenfield investments that replicate the investing firms production technology and comparative advantages in the host country, it might be that the cross-sector reallocation occurs only between sanctioned and unsanctioned sectors with similar technologies. M&A reallocation patterns are similarly constrained by input-output structures, but the production technology is defined by the foreign firms rather than the investing firms. While this study focuses on industry-level FDI, production technology is a firm-level characteristic. Understanding how sanctions reallocate FDI across sectors is best reserved for a firm-level analysis.

Trade Sanction Jumping

Another mechanism that allows FDI to increase under sanctions is sanction jumping. The decision to export to versus invest in the host country ultimately concerns the proximity-concentration trade-off. Exporters can reduce their trade costs by establishing new production centers closer to the destination market, but in doing so, they become less concentrated and lose some of the advantages brought by economies of scale (Helpman et al., 2004). If export costs become large enough though, investing in the destination market may be sensible despite the proximity-concentration tradeoff. Export sanctions attempt to block trade with the sanctioned market through threats of fines and other punishments for violators. Export costs between sanctioning countries and their targets necessarily increase in restricted sectors. However, those same sanctions may also increase trade uncertainty in unrestricted sectors of the target country. The sanctioning state's firms can respond to export sanctions with export-sanction-jumping FDI, a strategy in which the sanctioning country's firms use capital investments to operate from within the sanctioned market.

What is the firm's mode of entry into a sanctioned market? Under heightened policy uncertainty, multinationals tend to shift from greenfield investments to mergers and acquisitions (Dur et al., 2024). However, greenfield investments are more closely tied to the comparative advantages of the investing firm, while M&A deals are typically more reactive to short-term shocks (R. B. Davies et al., 2018). Under the export-sanction-jumping hypothesis, greenfield investment may be a more effective strategy than M&A. By establishing new production facilities, firms can bypass trade restrictions by serving the sanctioned market locally, rather than relying on cross-border exports. This strategy also allows firms to carry over their own production technology, quality standards, and comparative advantages into the foreign market.

In contrast, M&A investments do not necessarily enable this kind of substitution. When a firm acquires a local producer, the technology, processes, and capabilities reflect those of the target, not the investor. While control is transferred, the underlying production structure remains that of the acquired firm. In this way, M&A can be an imperfect substitute for exports, especially if the target firm's production technology or market positioning differs substantially from that of the multinational. The extent to which FDI serves as a workaround for export sanctions will vary across industries and country pairs. Firms with substantial sales in the sanctioned market – say, 30 percent of total revenue versus only 2 percent – face stronger incentives to jump over trade barriers. Export-sanction-jumping is also more likely in cases where sales cannot easily be redirected to other markets, whether due to brand loyalty, regulatory constraints, or the specialized nature of the product.

M&A could also be used by firms in the wake of export restrictions for reasons other than sanction jumping. For instance, suppose a country's firms are banned from exporting products to a sanctioned market. These firms can respond to the export restrictions by acquiring companies within the target country and using their revenue to offset lost export sales. One should note that the M&A adaptation to export restrictions is distinct from the greenfield adaptation to export restrictions. Greenfield investment circumvents the export ban by establishing production facilities in the sanctioned market, whereas M&A provides the multinational firm with new subsidiaries that already exist in the sanctioned market.

Sanction jumping may also emerge as a response to import restrictions. Import sanctions block firms in the sanctioning state from accessing inputs and final goods previously

sourced from the target country. To circumvent these disruptions, sanctioning-state firms may again turn to foreign direct investment. In this scenario, firms could use mergers and acquisitions to acquire suppliers in the sanctioned markets, gaining direct control over at-risk supply chains. The acquired firms' output can then be rerouted through neutral third countries to reach the sanctioning state indirectly or diverted to other locations hosting the firm's production facilities, thus entirely bypassing sanctioned trade routes.

Greenfield investments may also support this export-platform strategy, particularly if firms can replicate the target country's existing productive capacity. This seems especially plausible in extractive or upstream industries, where production is less reliant on proprietary technologies and more dependent on common methods or access to natural resources. Import-sanction-jumping FDI probably occurs when the sanctioning state sources a large share of its consumption from the sanctioned country. It may also be more likely when the imports cannot be easily substituted, due to several factors that limit the ability of firms to replace suppliers or switch inputs. Alternative suppliers are not readily available in sectors that produce customized or proprietary inputs, so switching costs could be prohibitively high. Geographic concentration can also prevent the sanctioning state from finding alternative suppliers in sectors like semiconductors and pharmaceuticals.

Waiver Opportunism

A final consideration is how market structure interacts with sanction waivers or exemptions. Severe sanctions can cause investors to flee the target country due to the nature of the restrictions (i.e., explicit bans on investments) and heightened risk. Sanctions directly restrict the activities of the sanctioning state's firms and citizens, but some countries like the United States can compel entities from outside the United States to comply by threatening them with secondary sanctions. For instance, US sanctions against Russia prohibit American firms from engaging with certain sectors, but they also pressure foreign firms – such as those in Türkiye – by targeting non-US entities that continue doing business with Russia. As a result, sanctions imposed by the U.S. and other large economies can lead to a broad withdrawal of firms from the sanctioned market. Firms who remain in the sanctioned market naturally face less competition. Interestingly, US firms can be granted exemptions to sanctions rules through licenses from the Office of Foreign Asset Control. Exempted from sanctions, firms with waivers are free to engage with the sanctioned market in ways that are illegal for other multinational companies. Firms able to acquire a license to operate in a

sanctioned market may actually increase FDI due to the opportunities brought by reduced competition and favorable prices.

There are many examples of firms entering sanctioned markets with waivers. In 2021, under the Trump Administration, a small oil producer called Delta Crescent Energy received a one-year license from the Office of Foreign Asset Control that allowed the company to extract and ship oil from Syria despite the country facing one of the United States' most comprehensive sanctions programs (Seligman and Lefebvre, 2020). The practice of giving licenses to U.S. firms continued under the Biden Administration when SLB, an American oilfield operator, expanded operations in Russia in 2022 after competitors exited due to sanctions (Hampton, 2023). During the same year, Chevron invested in the heavily sanctioned Venezuelan oil sector after acquiring a waiver from the Office of Foreign Asset Control (Gilroy et al., 2022). Thus, while sanctions are designed to isolate target economies, they can also create strategic openings for firms that secure exemptions. By reducing competition and limiting market access to a select group of licensed firms, sanction waivers can increase FDI flows from specific firms into sanctioned markets, reshaping investment patterns in ways that differ from the broader withdrawal of multinational companies.

How frequently sanction waivers are issued likely varies across sectors. Sanctions exemptions are often broadly issued to industries that produce food, medicine, and electricity on humanitarian grounds. However, sanctioning governments can also use waivers to mitigate unintended consequences that harm their interests. Sanctions targeting upstream industries can cascade into downstream disruptions that unintentionally harm economic activity in unsanctioned countries and the sanctioning state. Similarly, sanctions against industries that are geographically concentrated, produce highly customized goods, or have poor substitutes could be very costly for the sanctioning state's firms. Waivers may also be more common in industries with politically connected firms that can lobby for exemptions. In all these cases, waivers serve as a tool for governments to reduce the economic recoil of sanctions.

2.1.3 Outcome III: Sanctions Have No Impact on Bilateral Sector FDI

On the other hand, waivers may simply result in a null effect rather than a detectable increase in FDI. It is possible that these exemptions and null effects are found in upstream and geographically concentrated industries whose disruption would have costly consequences

for sanctioning countries and their friends. Sanctions could also fail to impact FDI if firms decide to ignore sanctions in those sectors – perhaps because the cost of reorganizing the supply chain exceeds the cost of sanction penalties. Sanction violation as a rational business decision is an avenue worth exploring in another study.

2.2 Empirical Strategy

The analysis will proceed in the following steps. First, I estimate the effects of sanctions on cross-border bilateral M&A and greenfield investments within each sector using a gravity model. I consider any sanction as well as each type of sanction. Second, I explore why effects vary across industries by estimating an industry-level gravity model sanctions variables and industry-level characteristics. I consider several industry characteristics to test the possible effects explained in the previous section. I explore the role of upstreamness, geographic concentration, and trade dependency. Other industry characteristics, such as the volume of sanctions waivers, similarity to sanctioned sectors, and potential for military applications, are omitted from this analysis due to a lack of data for most countries.

All sector-level gravity models are estimated with Poisson pseudo-maximum likelihood (PPML) using the PPMLHDFE Stata command introduced in Correia et al., 2020b. Poisson regression with multi-way fixed effects is currently the gold standard for estimating gravity models because it is suitable for zero-valued outcomes, of which there are many in bilateral international trade and financial flows (Santos Silva and Tenreyro, 2011) and controls for heteroskedasticity that is unaccounted for in a log-linearized gravity model (Silva and Tenreyro, 2006). Poisson models often require the strict assumption that the conditional mean and variance of the distribution are the same. Many researchers working with Poisson gravity model often use negative binomial models as a robustness check to allay any doubts about these assumptions. However, the Poisson pseudo-maximum likelihood is consistent as long as the conditional mean is properly specified. Gourieroux et al., 1984 established that consistent and asymptotically normal estimators are obtained via Poisson pseudo-maximum likelihood without making any assumptions about the variance as described by probability density function. This is a convenient and critical feature of PPML because international flow models often suffer from overdispersion[2] due to a large mass of zero values and infrequent large positive values.

[2] the variance exceeds the conditional mean

2.2.1 Any Sanction vs. Bilateral Industry FDI

The first model to be estimated is the sector-level gravity model of bilateral foreign direct investments. The basic model is below.

$$FDI_{ijkt} = \exp\left(\beta_1 \text{Sanction}_{jk,t-\ell} + \gamma_{ikt} + \gamma_{ijt} + \mu_{jk}\right) \times \epsilon_{ijkt} \tag{2.1}$$

The dependent variable FDI_{ijkt} represents foreign direct investments in industry i from investor in country j to host country k at year t. FDI is either greenfield or M&A investments, depending on the specification. Additionally, these investments are measured as either the total number (count) or total value of investments for the given country-pair, industry, and year. The independent variables are sanction variables and fixed effects. $Sanction_{jk,t-\ell}$ is a binary variable that indicates whether the investor's home country j sanctioned the host country k during year $t-\ell$. The sanction variable is lagged because there is a non-trivial amount of time that passes between the initial investment decision and the observed transaction. Investors make decisions based on the information available to them at some time prior to the transaction – allowing transactions at year t to be influenced by sanctions from prior years. γ_{ikt} and γ_{ijt} are year-varying industry-origin and industry-destination fixed effects. These fixed effects control for the multilateral resistance terms of Anderson and van Wincoop, 2003 as well as time-varying industry-country characteristics like industrial policy and size. They also control for macroeconomic trends that affect foreign direct investments. μ_{jk} is a directed dyad fixed effect that controls for the standard set of gravity variables (i.e., distance, common language, religion, etc.) and other time invariant characteristics associated with each investment channel. Four versions[3] of equation 1 are estimated via Poisson pseudo-maximium likelihood using an industry-partitioned sample of cross-border bilateral M&A and greenfield transactions.

2.2.2 Types of Sanctions vs. Bilateral Industry FDI

I explore how different types of sanctions impact investments by replacing $Sanction_{jk,t-\ell}$ with a set of dummies that identify each type of restriction. These sanctions types include restrictions on trade, finance, military assistance, arms deals, travel, and other activities not captured by the previous categories. I discuss the sanctions data in greater detail in the data section of this study. The industry-level model of the effects of sanction types on

[3]One version for each measure of FDI_{jkt}: M&A Count, M&A Value, Greenfield Count, and Greenfield Value

bilateral FDI is as follows:

$$FDI_{ijkt} = \exp\left(\sum_m \beta_m \text{Sanction}^m_{jk,t-\ell} + \gamma_{ikt} + \gamma_{ijt} + \mu_{jk}\right) \times \epsilon_{ijkt} \tag{2.2}$$

Each type of sanction is indexed by m. All other variables are the same as in equation 1. My main motivation for estimating equation 2 is to identify industries where investors increase FDI in response to trade sanctions. These industries with positive coefficients for import sanctions or export sanctions are potentially where reallocation, sanction-jumping, or other forms of strategic FDI occur. In the case of M&A, an increase could also indicate that investors are purchasing assets distressed by sanctions.

2.2.3 Sources of Heterogeneity

After using the previous models to determine how each sector is impacted by sanctions, I attempt to explain how those results can be explained by each industry's characteristics. Specifically, I consider the role of geographic concentration, upstreamness, and bilateral trade dependence. As I explained in my discussion of the possible effects of sanctions on industry FDI, sanctioning governments probably want to minimize harm to themselves and their friends when they sanction a target. The risk of the sanction's damage spilling over to non-targets could be higher when restrictions target industries that are upstream or concentrated in few locations. Sanctioning states may issue waivers to firms in these sectors, resulting in no effect or even an increase in bilateral FDI. Bilateral trade dependence can explain why certain industries experience an increase in FDI after trade restrictions. My hypothesis asserts that FDI will increase in industries where the sanctioning state sources a large share of its total consumption from the sanction target. Similarly, FDI will increase in industries where the sanctioning state sells a large share of its output to the sanction target.

I test these predictions by estimating separate models with each industry characteristic interacted with the sanction variables. Critically, the trade dependence variables are interacted with the trade sanction indicators to further explore the possibility of sanction-jumping. It is important to note that this model requires one to use a pooled (and necessarily large) dataset with all industries, years, and pairs of countries. The full sample model for

the concentration and upstreamness variable is as follows:

$$FDI_{ijkt} = \exp\Big(\beta_1 \text{Sanction}_{jk,t-\ell} + \beta_2 \text{Trait}_i + \beta_3 (\text{Sanction}_{jk,t-\ell} \times \text{Trait}_i) + \gamma_{ikt} + \gamma_{ijt} + \mu_{jk}\Big) \times \epsilon_{ijkt} \tag{2.3}$$

Trait_i is the industry characteristic of interest. It is important to note the lack of j, k, and t subscripts. In the data section, I explain that upstreamness and concentration variables are constructed as averages for each industry across all years of data. Trade dependence is a different case. Trade dependence is a bilateral relationship between countries, so I do not treat it as global average. I instead use the level of trade dependence observed at $t-\ell$ for each pair of countries. The model exploring how sanctions interact with trade dependence is below.

$$\begin{aligned} FDI_{ijkt} = \exp\Big(&\beta_1 \text{Sanction}_{jk,t-\ell} + \beta_2 \text{Trade Dependence}_{ijk,t-\ell} \\ &+ \beta_3 (\text{Sanction}_{jk,t-\ell} \times \text{Trade Dependence}_{ijk,t-\ell}) + \gamma_{ikt} + \gamma_{ijt} + \mu_{jk}\Big) \times \epsilon_{ijkt} \end{aligned} \tag{2.4}$$

2.3 Setting and Data

The sample consists of every possible origin-destination-industry investment channel from 2003 until 2022. 2003 is selected as the first year of the study because that is the first of the greenfield dataset. For example, the total M&A value from China to the United States in the semiconductors sector in 2005 is one observation in the sample. Despite recommendations in the gravity literature to include domestic transactions (Yotov, 2022), this sample includes only cross-border investment flows due to limitations in the greenfield data. I include as many industries as possible, but the number of industries varies across models due to the different industrial classification systems used by the underlying datasets.

I require data from many sources to estimate the models presented in the previous section. For the total counts and values of bilateral sector FDI, I use greenfield data from fDi Markets and mergers and acquisitions data from SDC. Sanctions indicators come from the Global Sanctions Database. Measures of industry upstreamness are sourced from the Positioning in Global Value Chains database. Finally, measures of geographic concentration and trade dependence are manually constructed from the International Trade and Production Database for Estimation (ITPD-E).

2.3.1 Cross-Border Mergers and Acquisitions

Cross-border mergers and acquisitions are investments in which a firm purchases all or a share of the ownership rights of an existing company in a foreign country. Over four decades of mergers and acquisitions data are available at the transaction level. I source the M&A data from SDC, a data platform by Refinitive. I trim the M&A data to the 2003 - 2022 period to match the coverage of other datasets. Each observation in SDC contains rich information about a given M&A deal. This information includes the date of the deal's announcement, the date of the transaction, the name of the acquiring company, the name of the target company, the acquiring company's origin country, the target's country (i.e., the host or destination country), the deal ID, the target's SIC industry code, and the deal value. Information is also available on the parent companies of the investor and the target (SDC, n.d.).

I ultimately need to match the industry where the M&A deal occurred to its characteristics, which are found in other datasets using different industrial classification systems. Data from all sources except fDi Markets (greenfield data) can be merged with two-digit ISIC codes and some manual matching, so I convert the SIC codes in the M&A data to ISIC codes. Doing so requires using crosswalk files to convert SIC to NAICS and NAICS to ISIC[4]. I then trim each ISIC code to its first two digits, which represent broad industry groups like "Mining of metal ores". With SIC codes replaced with two-digit ISIC codes, it is now possible to merge the M&A data to the upstreamness, geographic concentration, and trade data despite their different industrial classification systems. For the partitioned industry models (equations 1 and 2), I map ISIC to OECD's trade-in-value-added (TiVA) industry codes. This distinctly categorizes M&A deals into 45 industries.

I aggregate M&A transactions to the TiVA industry level. I calculate the total value of M&A deals belonging to each directed dyad in a given industry by summing the deal value. I calculate the total count of M&A deals belonging to each directed dyad in a given industry per year by counting the deal IDs within each unique year-dyad-industry.

[4]I used ISIC revision 3.

2.3.2 Greenfield Projects

Greenfield projects are foreign investments in newly constructed physical capital like production facilities, warehouses, and office buildings. fDi Markets, a database by Financial Times, n.d., has comprehensively tracked greenfield investments in most countries since 2003. fDi Markets is regarded as the most complete source on greenfield projects and is used to construct UNCTAD's World Investment Report. The database contains information about each greenfield project, including the announcement date, the investing company, the investing company's parent company, the origin country, the target country, the industry, and the value of the capital expenditure.

fDi Markets imposes a daily download limit of 500 projects. Downloading the entire universe of greenfield projects is not feasible under these restrictions, but the platform provides pivot tables to construct aggregate datasets. I used the pivot tables to construct the total value and count of greenfield projects for each country-pair, industry, and year.

fDi Markets uses a proprietary industrial classification system that can be approximately matched to the ISIC system. However, differing levels of aggregation across fDi Markets and ISIC create opportunities for error. For instance, the ISIC divisions 05 (mining of coal and lignite), 06 (extraction of crude petroleum and natural gas), 09 (mining support service activities), and 19 (manufacture of coke and refined petroleum products) are captured by a single industry aggregate "Coal, Oil, and Gas" in fDi Markets. It is not clear if other ISIC divisions are contained within the "Coal, Oil, and Gas" industry though. I use the fDi Markets industries when estimating the models with partitioned data to avoid misclassification. In later stages of the analysis, I carefully map fDi Markets to ISIC to use the data sources on industry characteristics.

2.3.3 International Sanctions

Sanctions data come from the Global Sanctions Database, a source that tracks bilateral restrictions on economic and non-economic activities between countries. The Global Sanctions Database was introduced in Felbermayr, Kirilakha, et al., 2020 and expanded in Kirilakha et al., 2021, Syropoulos et al., 2023, and Yalcin et al., 2025. The Global Sanctions Database has become one of the most widely used sources on sanctions among economics and international relations researchers because of its rich information on restriction types

and convenient dyadic structure. The Global Sanction Database has been used to study many sanctions topics, such as the timing of sanction effects on trade (Dai et al., 2021), heterogeneous effects on trade stemming from industries and sanctioning states (Felbermayr et al., n.d., Larch et al., 2022, Larch et al., 2024), and their effects on bilateral trade with Russia (Yalcin et al., 2025).

The Global Sanctions Database provides information on all international sanctions imposed since 1949. Release 3, the version of the database used for this study, identifies 1,325 unique sanctions episodes from the beginning of 1949 until the end of 2022. The sanctions data are available in two forms: case structure and dyadic structure. The case structure is useful for identifying a sanction episode, when it was active, its participants, and whether it fulfilled the sanctioning party's stated objectives. The case structure is quite informative about specific sanction episodes, but it is not suitable for bilateral modeling. Fortunately, the dyadic version of the Global Sanctions Database was designed specifically for gravity modeling and represents each sanction episode as a set of bilateral relationships between sanctioning states and their targets.

Every observation in the dyadic version of the dataset belongs to a unique origin country, destination country, and year. For instance, China-US and US-China are different dyads. Beginning in 1949, the dataset uses a dummy variable to identify sanctions imposed by the origin country against the destination country. Additional dummy variables identify restrictions on trade, finance, travel, military assistance, arms deals, and other activities not captured in the other categories. Trade sanctions are also categorized according to whether they are complete or apply only to select industries and also whether they block imports, exports, or all trade flows. The Global Sanctions Database does not identify which industries are targeted under partial trade sanctions. That is, all sanctions indicators are available only at the dyad level. The lack of industry-level sanctions directly limits the analysis. It could be informative to see how sanctions against a particular industry affects capital flows into unrestricted sectors, but this type of question cannot be answered without industry-level sanctions data. Future research should explore the impacts of industry-level sanctions on the cross-sector reallocation of capital using a new sanctions dataset.

2.3.4 Upstreamness

Industry upstreamness, or the distance of an industry's production from the end user, is taken from the Positioning in Global Value Chains dataset introduced in Mancini et al., 2024. The Positioning in Global Value Chains dataset provides positioning indicators for many industries and countries using inter-country input-output tables. The upstreamness indicator is available for each country-sector-year from 1995 until 2020. I use the upstreamness indicators calculated using OECD Trade-in-Value-Added (TiVA) inter-country input-output tables because the TiVA sector codes are easily mapped to 2-digit ISIC codes before matching to the M&A and greenfield investments data.

$Global\ Upstreamness_i$ is a measure of a sector's distance from the final consumer averaged all countries and years. It is constructed by calculating the average value of $Upstreamness_{ikt}$, where i is the sector, k is the country, and t is the year.

Figure 2.1 summarizes the average upstreamness of the TiVA sectors. Upstreamness values in the data range from 1.00 for household activities to 3.39 for mining and quarrying of energy-producing products. Downstream sectors like food products, motor vehicles, pharmaceuticals, retail, and air transport are closer to end users. Sanctions on these industries likely result in more localized impacts. Upstream sectors such as mining, basic metals, chemicals, and petroleum supply essential inputs across many industries. Sanctions here can generate system-wide disruptions and force firms to reconfigure supply chains or secure alternative inputs.

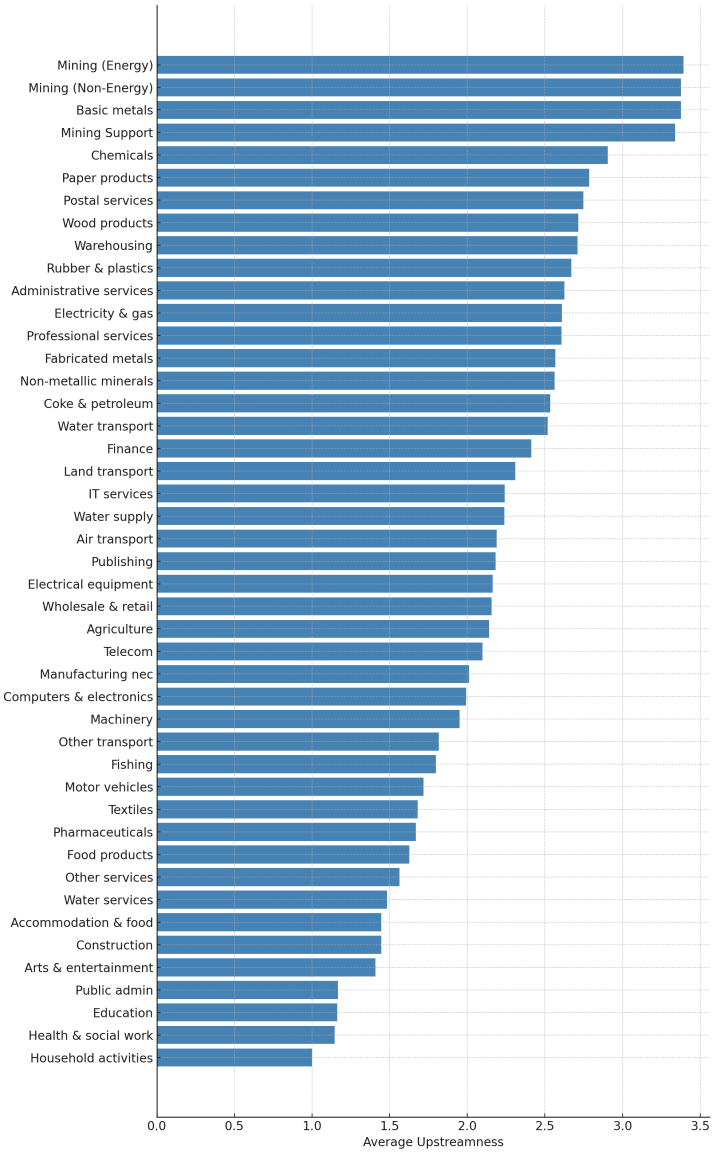

Figure 2.1: Average Sectoral Upstreamness Across TiVA Sectors

2.3.5 Geographic Concentration

Geographic concentration, or the degree to which an industry's production is concentrated in certain areas of the globe, is constructed using the Industrial Trade and Production Database for Estimation (ITPD-E). I will discuss ITPD-E before explaining the geographic concentration measure.

ITPD-E is a dyadic dataset of industry-level trade flows introduced in Borchert et al., 2021 and expanded in Larch et al., 2025. Release 2 of ITPD-E, the version used for this study, covers the 1986-2022 period and contains over 72 million dyad-sector-year observations. ITPD-E includes both domestic sales and cross-border trade for 170 distinct sectors. This allows for easy calculation of imports, exports, consumption, and production within any sector for any country or pair of countries. The 170 ITPD-E sectors are mapped to 4-digit ISIC codes in a crosswalk file. I converted the 4-digit ISIC codes to 2-digit ISIC codes, which are then matched to the M&A and greenfield data.

I use the trade flow data to construct a version of the Herfindahl-Hirschman Index (HHI) for each industry. HHI is traditionally used to measure the competitiveness of a market by summing the square of each firm's market share. I apply HHI to geographic concentration by summing the square of each country's share of global production. The HHI calculation is below.

$$HHI_i = \sum_k (Share_{ik})^2 = \sum_k (\frac{Production_{ik}}{\sum_k Production_{ik}})^2 \tag{2.5}$$

$\sum_k Production_{ik}$ is the value of global production in sector i. $Production_{ik}$ is the value of production in sector i by country k. $Production_{ik}$ includes domestic sales and exports. Squaring sectoral production shares emphasizes larger producers, yielding higher HHI values when fewer countries dominate sector output. Larger HHI values correspond to sectors whose production is more geographically concentrated while smaller HHI values correspond to sectors whose production is more geographically dispersed.

Figures 2.2 and 2.3 below report production-based Herfindahl-Hirschman Index (HHI) values for the industries captured in the greenfield and M&A investment datasets. In both cases, concentration varies widely across sectors. Among greenfield industries, business machines and equipment and consumer electronics are the most concentrated, with HHI values exceeding 1,000, while sectors like electricity and gas, construction, and textiles and

apparel exhibit far lower levels of geographic concentration. In the M&A sample, wholesale and retail, leather products, and metal ores top the list, with concentration levels above 900, while crop and animal production and food manufacturing remain among the least concentrated industries globally.

While these patterns highlight meaningful variation in the global geography of production, concentration levels cannot be compared across the greenfield and M&A charts. The two datasets reflect different sets of industries, and the level of aggregation differs substantially. For example, the M&A sample includes narrowly defined sectors like printing, furniture, and rubber, while the greenfield sample groups these under broader industry categories. These differences mechanically affect the HHI: broader categories dilute concentration, while narrower ones inflate it.

In future versions of this study, I will reconstruct the greenfield sample from the project-level data to match the more granular industry definitions used in the M&A data. Until then, cross-sample comparisons should be avoided.

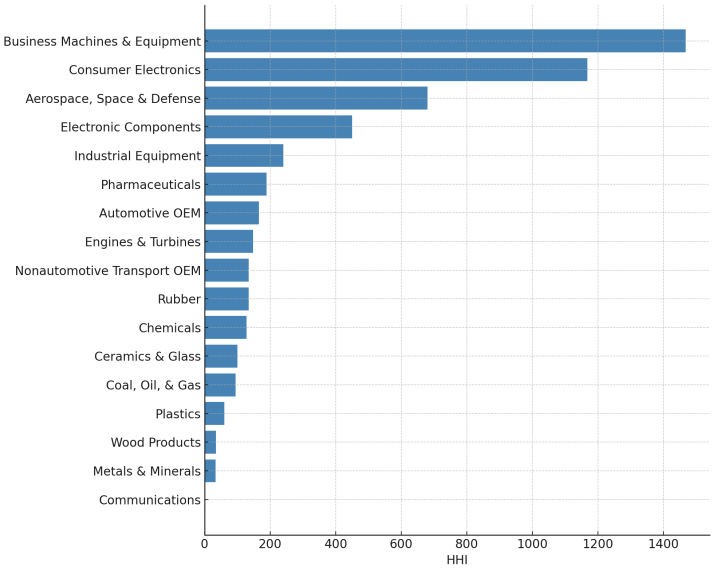

Figure 2.2: Geographic concentration of production by industries with greenfield data

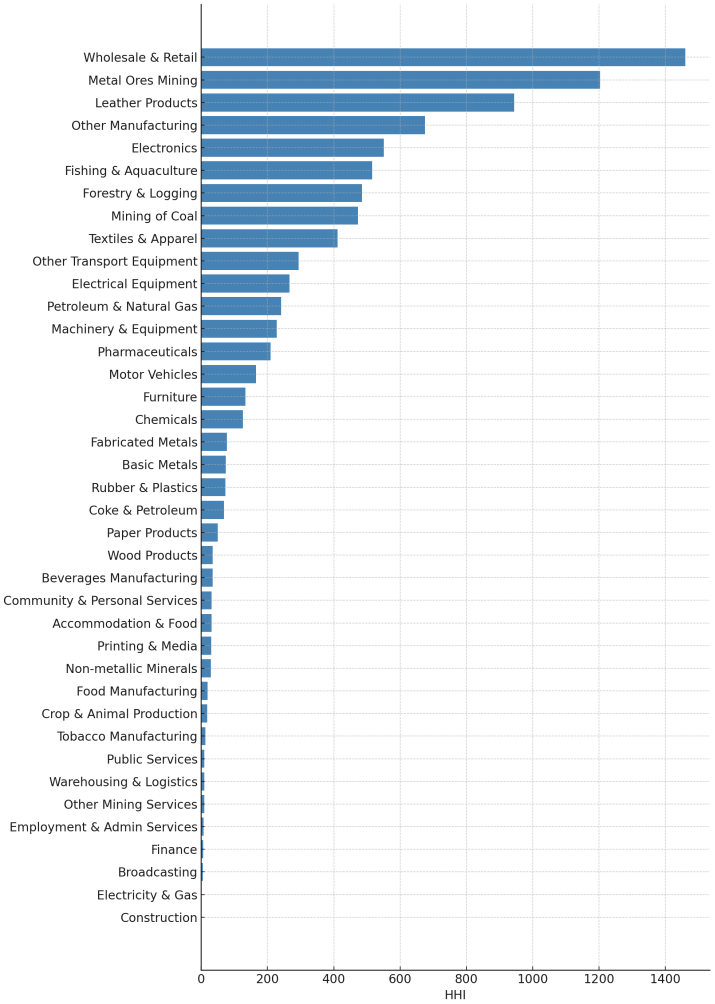

Figure 2.3: Geographic concentration of production by industries with M&A data

Geographic concentration and upstreamness variables are mean-centered prior to estimation to improve interpretation of the interaction coefficients. Traditional mean-centering involves subtracting the variable's mean from each observed value, but this approach can be problematic when variables are log-transformed in a PPML gravity model. Subtracting the mean directly can create negative values, which are undefined in a log transformation and would be dropped from the estimation. To avoid this issue, I subtract the log of the variable's mean from its log-transformed values. In summary, I mean-center continuous independent variables with $log(x) - \overline{log(x)}$, where x is the independent variable. This shifts the mean of the transformed variable to zero while preserving the underlying distribution. With mean-centering, the interaction coefficients are relative to the set of observations with the average value of the variable rather than when the variable equals zero (which is outside of the support of the data).

2.3.6 Trade Dependence

I construct two trade dependence variables from ITPD-E: import dependence and export dependence. Both measures are bilateral in nature. Country j's dependence on country k for sectoral imports is measured as country j's fraction of total consumption in sector i sourced from country k during the year t. The import dependence variable is constructed as follows:

$$Import\ Dependence_{ijkt} = \frac{Sectoral\ Imports}{Total\ Sectoral\ Consumption} = \frac{Imports_{ijkt}}{Domestic_{ijt} + \sum_k Imports_{ijkt}} \tag{2.6}$$

$Imports_{ijkt}$ is the total value of sector i imports to country j from country k during year t. $Domestic_{ijt}$ is the total value of domestic sales in sector i by country j during year t. $\sum_k Imports_{ijkt}$ is country j's sector i imports from all countries.

Country j's dependence on country k for sectoral sales (export dependence) is measured as the fraction of total sales in sector i attributed to foreign market k during year t. It is constructed as shown below:

$$Export\ Dependence_{ijkt} = \frac{Sectoral\ Exports}{Total\ Sectoral\ Sales} = \frac{Exports_{ijkt}}{Domestic_{ijt} + \sum_k Exports_{ijkt}} \tag{2.7}$$

$Exports_{ijkt}$ is the total value of sector i exports to country k from country j during year t. $Domestic_{ijt}$ is the total value of domestic sales in sector i by country j during year t. $\sum_k Exports_{ijkt}$ is the total value of country j's sector i exports to all countries.

For estimation, I lag the trade dependence variables by the same number of years as the sanctions variable to reflect that each investment decision is based on information available during a past period. That is, sanctions in place at the time of the initial investment decision will impact observed transactions later on. Similarly, investments that strategically reroute supply networks will be shaped by the state of trade dependence when those sanctions were observed.

Table 2.1 summarizes the trade dependence measures used in the analysis. There are 2,245,914 unique dyad-industries in the full sample. The mean export and import dependence of these dyad-industries is close to zero. However, trade dependence is fairly dispersed and some origin countries are extremely dependent on certain destination countries for sectoral sales and consumption. Looking at just trade-sanctioned dyads, the average level of trade dependence becomes smaller. Still, there are origin countries that depend on the sanctioned country for almost all sectoral sales and consumption.

Figures 2.4 through 2.7 reveal substantial variation in trade dependence across the top 40 dyad-industries, both in the full sample and among trade-sanctioned pairs. In the unrestricted sample, many dyad-industries exhibit extremely high trade dependence, often exceeding 0.8, particularly between geographically close countries. Among sanctioned dyads, most fall below the 0.8 threshold, suggesting that sanctions often affect relationships with moderate or even substantial trade ties. This variation reinforces the idea that the disruptive effects of sanctions are not uniform: industries with stronger pre-sanction trade linkages may experience more significant adjustment pressures and may be more likely to respond through investment substitution or rerouting strategies.

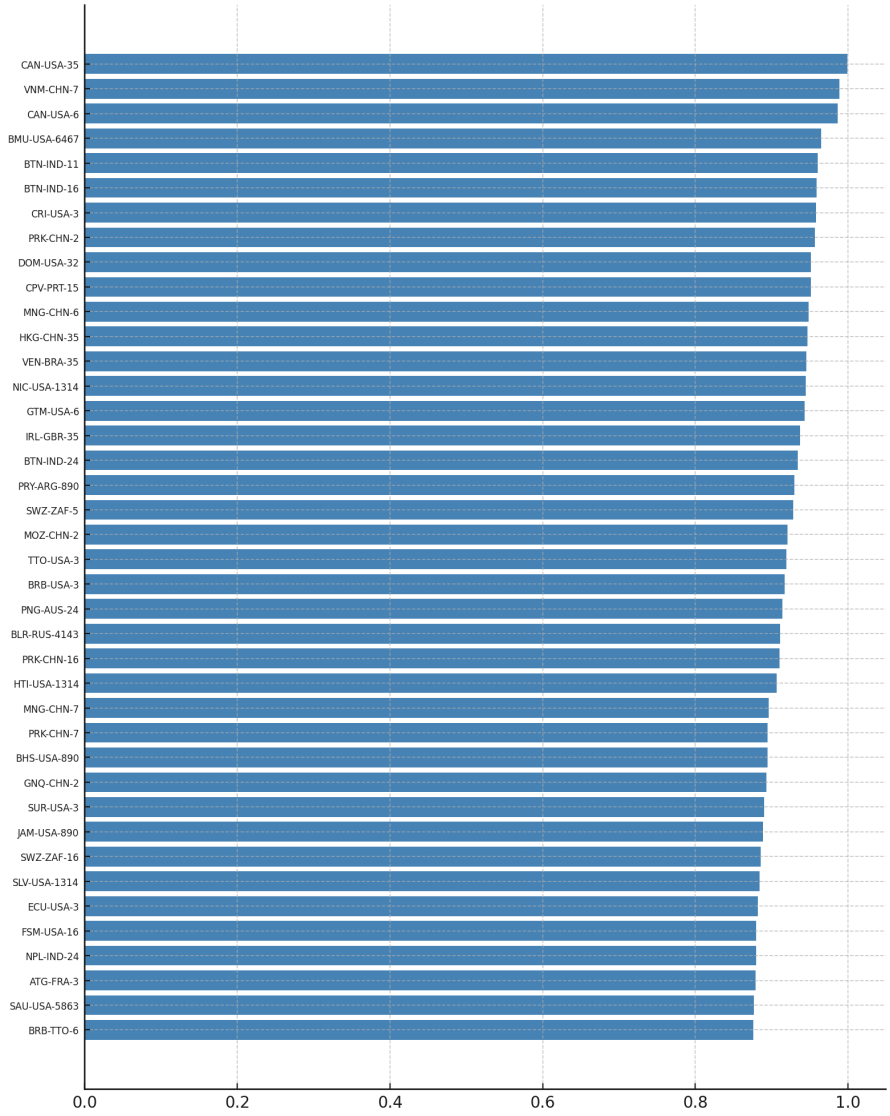

Figure 2.4: Top 40 dyad-industries by average export dependence

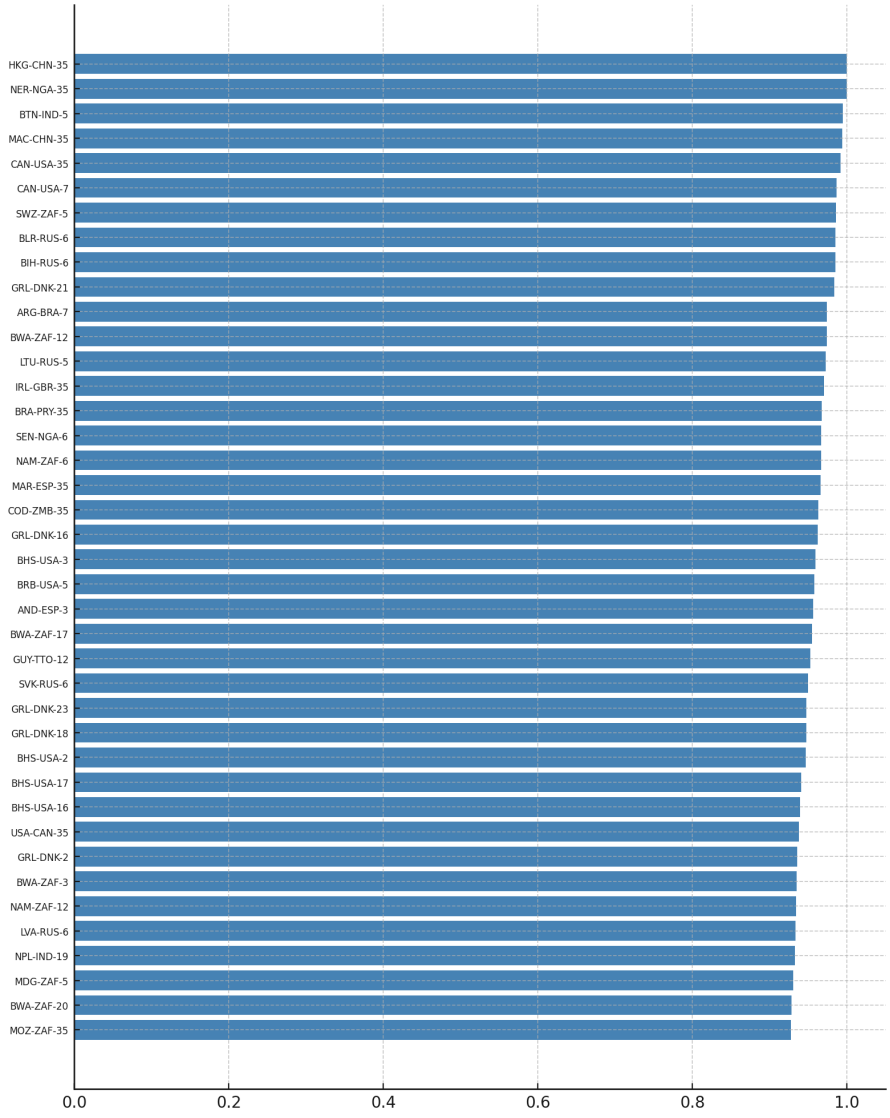

Figure 2.5: Top 40 dyad-industries by average import dependence

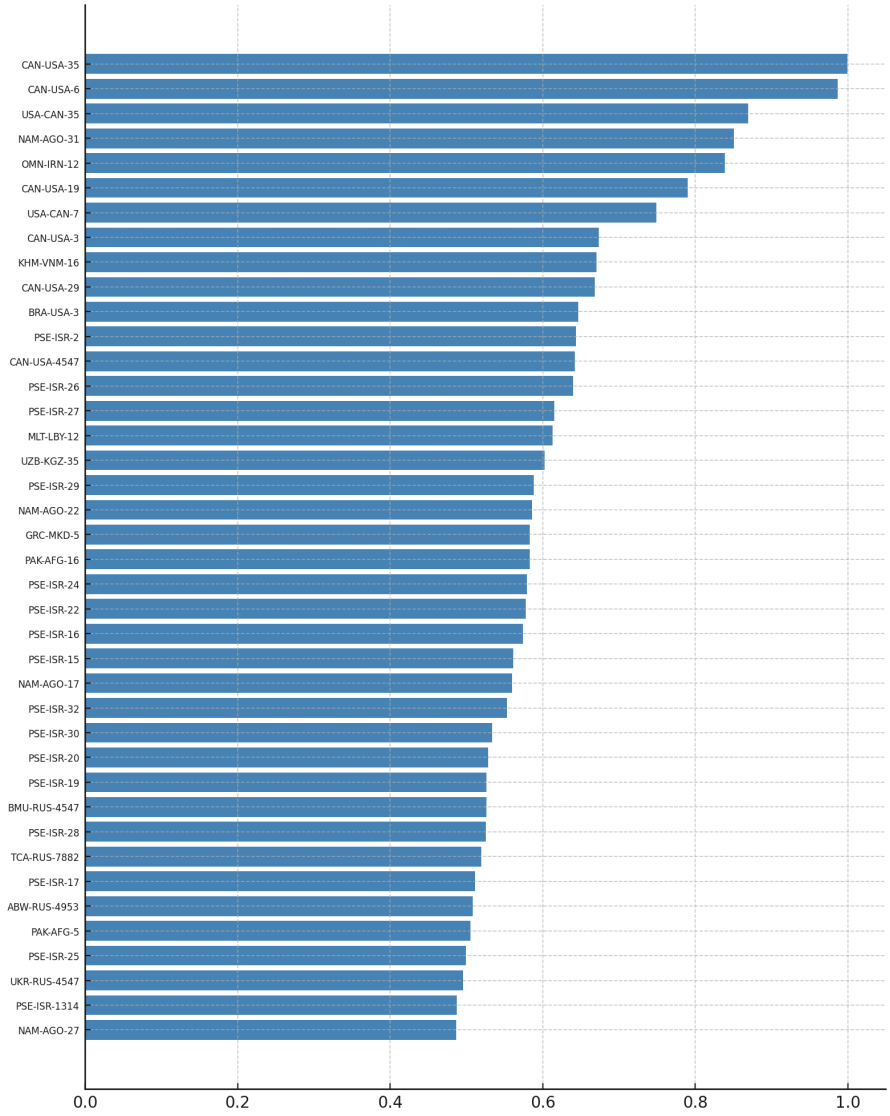

Figure 2.6: Top 40 trade sanctioned dyad-industries by average export dependence

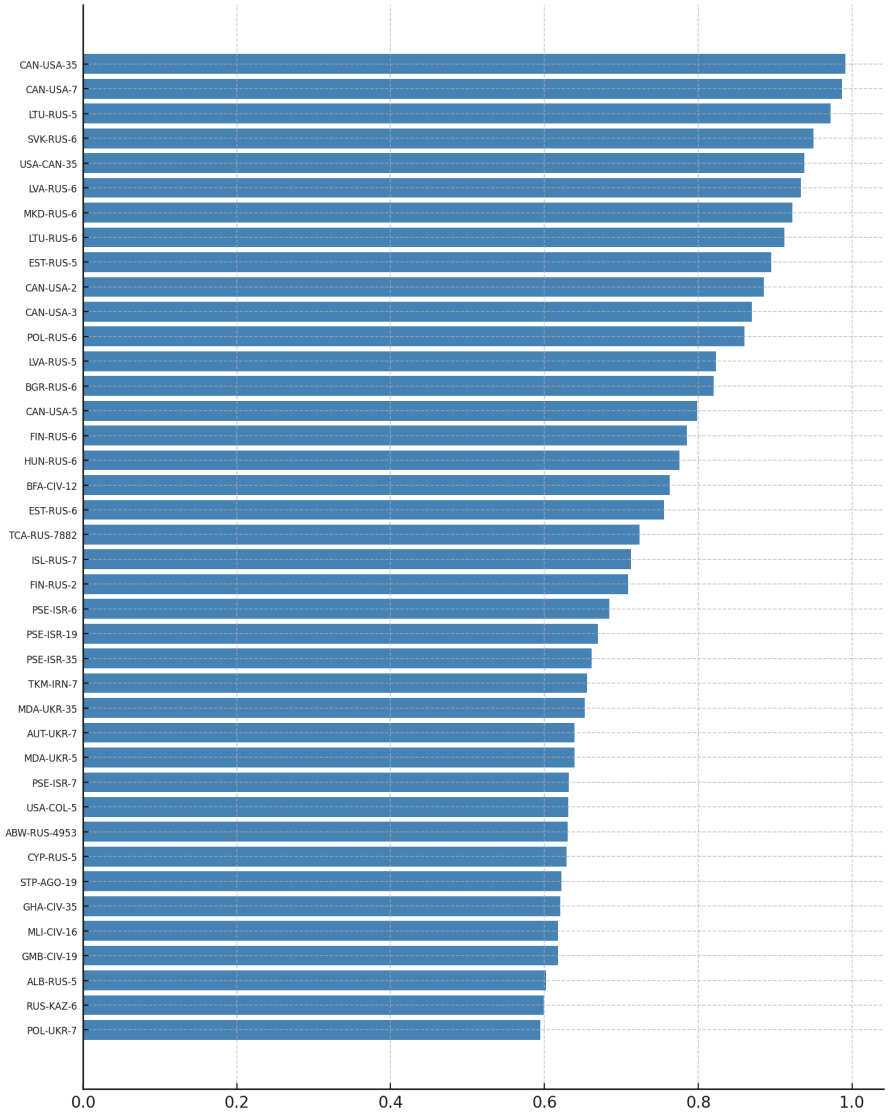

Figure 2.7: Top 40 trade sanctioned dyad-industries by average import dependence

Table 2.1: Summary Statistics of Trade Dependence Across Dyad-Industries

Partition	Measure	Dyad-Industries	Mean	Std. Dev.	Min	Max
Full Sample						
	Export Dependence	2,245,914	0.00210	0.01917	0.0000	0.9993
	Import Dependence	2,245,914	0.00230	0.02274	0.0000	0.99997
Trade-Sanctioned Dyads						
	Export Dependence	176,415	0.00143	0.01531	0.0000	0.9993
	Import Dependence	176,415	0.00116	0.01733	0.0000	0.9915

Note: This table reports summary statistics for average dyad-industry-level export and import dependence, measured across all dyad-year observations from 2003–2022. The lower panel restricts the sample to dyads involved in trade sanctions.

2.3.7 Industry Classification

I am able to create one-to-one or one-to-many industry mappings to merge the datasets used in this study. M&A, upstreamness, and trade data are combined by mapping ISIC 2-digit codes to TiVA sector codes and ITPD-E sector codes. Greenfield, upstreamness, and trade data are combined by mapping fDi Markets sectors to TiVA and ITPD-E sector codes. The original ISIC and fDi Markets industries do not always have unique matches in the industry datasets. I fix this problem by collapsing some sectors into a single industry code. For instance, ISIC divisions 8 and 9 both map to ITPD sector 33. I create a one-to-one mapping by collapsing 8 and 9 into a new sector 89. A similar problem occurs with the fDi Markets sectors. "Aerospace" maps to ITPD sector 144 and "Space and Defense" maps to ITPD sectors 121 and 144. I combine "Aerospace" and "Space and Defense" into one fDi Markets sector and map it to ITPD sectors 121 and 144. The regrouped industries are used for the upstreamness and trade dependence analysis only. The industries and their concordances across classification systems are presented in tables 2.9 and 2.10.

2.4 Results

The analysis begins by estimating the effects of sanctions on foreign direct investments from the sanctioning state to the target country two years later across all available industries. The lag accounts for the time gap between the initial investment decision and the observed transaction. In Chapter I of this dissertation, I determined that a two-year lag is appropriate because some of the effects of sanctions on FDI do not become apparent until at least two

years after the sanction episode. As in equation 1, I estimate the industry-level impact of Sanction$_{jk,t-2}$ on four key measures of FDI: the total annual count of greenfield investments from origin country j to host country k (Greenfield Count$_{ijkt}$), the total annual value of these investments (Greenfield Value$_{ijkt}$), the total annual count of M&A transactions from j to k (M&A Count$_{ijkt}$), and the total annual value of these transactions (M&A Value$_{ijkt}$). I then estimate those models with indicators for each type of sanction as in equation 2. All of the industry-partitioned models include origin-year, host-year, and dyadic fixed effects. All models are estimated via Poisson pseudo-maximum likelihood with the PPMLHDFE command in Stata.

2.4.1 Sanctions vs. Greenfield Investments by Industry

The effects of any sanction on industry-level bilateral greenfield investments are presented in table 2.2 and figures 2.8 and 2.9. The sanctions are unsurprisingly heterogeneous across the 22 fDi Markets sectors. In value terms, the sanctioning country's greenfield investments in the target country fall substantially in building materials (sector 4); coal, oil, and gas, (sector 8); electronic components (sector 11); nonautomotive transportation OEM (sector 16); semiconductors (sector 20); and space and defense (sector 21). Many of these sectors that suffer falling greenfield investments are strategic in the sense that they raise significant revenue for sanctioned countries (e.g., oil sales by Russia, Syria, and Venezuela) or have high potential for military applications. Indeed, sanctions reduce greenfield FDI by a massive 89 percent in the space and defense sector. Effects are smaller in sectors with less obvious military applications. Sanctions reduce the number of greenfield projects in the coal, oil, and gas (sector 8), industrial equipment (sector 13), pharmaceuticals (sector 17), and space and defense (sector 21). Once again, the negative impact of sanctions on greenfield FDI is most apparent in the military-focused space and defense sector.

More intriguing are the positive impacts of sanctions on greenfield FDI in several sectors. In value terms, sanctions increase bilateral FDI from the sanctioning state to the target country in automotive OEM (sector 3), plastics (sector 18), and rubber (sector 19). Increased greenfield FDI in these sectors could indicate sanction-jumping FDI or a reallocation of capital from sanctioned to unsanctioned sectors. Sanction waivers might also explain how firms are able to increase their greenfield investments despite sanctions. As I explained earlier in this study, these waivers may be an effort to reduce the downstream costs brought by disrupting upstream sectors like plastic and rubber. Sanctions increase the number of

greenfield projects in only the automotive components sector.

Null effects are abound. Sectors that do not experience a statistically significant change in greenfield investments in either value or count include aerospace, business machines and equipment, ceramics and glass, consumer electronics, engines and turbines, metals, minerals, and wood products. Waivers or the simple fact that these sectors are rarely exposed to sanctions could explain the lack of significant effects.

Table 2.3 presents a deeper dive of the sanction impacts on greenfield investments, this time distinguishing by the type of restriction. Figures 2.10 and 2.11 are coefficient plots of these results. The purpose of this stage of the analysis is to identify sectors that might experience sanction jumping in response to trade restrictions. Recall from earlier that firms might engage in export-sanction-jumping if export restrictions increase trade costs such that is better to operate locally in the target market. $Export_{jk,t-2}$ should have a positive coefficient in sectors where investors engage in export-sanction-jumping FDI. In value terms, export sanctions lead to an increase in greenfield investments by the sanctioning state's firms in the target country in business machines and equipment (sector 5); coal, oil, and gas (sector 8); communications (sector 9); and engines and turbines (sector 12). In terms of count, export sanctions increase bilateral greenfield investments in automotive OEM (sector 3), business machines and equipment (sector 5), and communications (sector 9). Firms may opt to jump the export sanction with greenfield FDI in these sectors because diverting trade to alternative markets is difficult. For instance, business machines, engines, and turbines may be highly customized to meet the specific demands of customers in the sanctioned country, making them less suitable for reallocation elsewhere. In the case of coal, oil, and gas, the target country may possess the necessary infrastructure to process these raw resources. As a result, firms from the sanctioning state that previously exported these resources may instead scale up extraction within the target country to bypass restricted trade channels.

Export restrictions also lead to sharp declines in greenfield investments some sectors. Industries that experience a significant decrease in the value of bilateral greenfield investments after export sanctions include ceramics and glass (sector 6), metals (sector 14), minerals (sector 15), plastics (sector 18), and wood products (sector 22). The products of these sectors are often upstream inputs and raw materials that have not yet been refined. It may be easier for firms to shift their exports to an alternative market instead of jumping

the trade restriction with investments in these upstream sectors.

Import restrictions alone never have a positive impact on bilateral greenfield FDI. They do, however, significantly reduce the total value of bilateral greenfield FDI for business machines and equipment (sector 5); coal, oil, and gas (sector 8); communications (sector 9); and electronic components (sector 11). In these industries, the sanctioning state's firms reduce greenfield investments in the target country when they can no longer source imports from there. For instance, a US oil company that relied on importing crude oil from Venezuela might reduce its refinery investments in Venezuela if it can no longer access that crude due to sanctions.

Import and export restrictions that are jointly imposed typically decrease greenfield investments. These two-way trade restrictions reduce the total value of bilateral greenfield investments in automotive components (sector 2), ceramics and glass (sector 6), chemicals (sector 7), pharmaceuticals (sector 17), rubber (sector 19), and wood products (sector 22). These restrictions increase the value of bilateral greenfield FDI in business machines and equipment (sector 5), engines and turbines (sector 12), and metals (sector 14).

2.4.2 Sanctions vs. M&A Investments by Industry

Figures 2.12 and 2.13 and table 2.4 show the effect of any sanction on industry-level M&A investments. Like their greenfield counterparts, mergers and acquisitions are heterogeneously impacted by sanctions across industries. Sanctions reduce the total value of bilateral M&A investments in 9 of the 44 TiVA sectors. These sectors include mining and quarrying of energy-producing products (sector 3), wood and products of wood and cork (sector 8), coke and refined petroleum products (sector 10), chemicals (sector 11), other non-metallic mineral products (sector 14), other manufacturing (sector 22), air transport (sector 29), professional, scientific, and technical activities (sector 38), and education (sector 41). Sanctions reduce the number of bilateral M&A deals in even more industries, including fishing (sector 2), wood and products of wood and cork (sector 8), other non-metallic mineral products (sector 14), metals (sectors 15 and 16), electronics and electrical equipment (sectors 17 and 18), water supply (sector 24), construction (sector 25), and education (sector 41). Many of these sectors are likely to be directly targeted by sanctions due to their economic importance to the sanctioned country (sectors 3, 10, and 14) or their potential for military applications (sectors 15, 16, 17, 18, 29, and 38).

Sanctions increase the total value of bilateral M&A deals in mining support services (sector 5), pharmaceuticals (sector 12), rubber and plastics (sector 13), motor vehicles (sector 20), accommodation and food service activities (sector 32), and administrative and support service activities (sector 39). The number of bilateral M&A deals increases after sanctions in air transport (sector 29) and other services (sector 44). These results might be driven by supply chain adjustments, cross-sector reallocation of capital, or economic opportunism.

Table 2.5 shows how bilateral M&A activity responds to each type of sanction. A graphical representation of the effects is presented by figures 2.14 and 2.15. Multinational companies can in theory use mergers and acquisitions to adapt to trade sanctions. Positive coefficients on $Import_{jk,t-2}$ may suggest firms are using M&A to secure alternative supply routes and maintain access to restricted imports, while positive coefficients on $Export_{jk,t-2}$ indicate firms are acquiring assets in the target market to generate sales after losing export access. It could also be that investors are opportunistically acquiring assets that are uniquely distressed by trade sanctions (e.g., firms highly dependent on trade).

Several industries experience an increase in the value of bilateral M&A deals after import restrictions. These sectors include food products (sector 6), pharmaceuticals (sector 12), fabricated metals (sector 16), electrical equipment (sector 18), other machinery and equipment (sector 19), other transport equipment (sector 21), accommodation and food services (sector 32), telecommunications (sector 34), and administrative and support services (sector 39). The number of bilateral M&A deals increases after import restrictions in mining and quarrying of energy-producing products (sector 3) and telecommunications (sector 34).

Bilateral M&A value declines after import sanctions in wood products (sector 8); air transport (sector 29); professional, scientific, and technical activities (sector 38); and education (sector 41). The number of bilateral M&A deals does not significantly change in any sector after import restrictions.

Export restrictions increase the total value of bilateral M&A deals in mining and quarrying of energy-producing products (sector 3), paper products (sector 9), electricity, gas, steam and air conditioning supply (sector 23), and professional, scientific and technical activities (sector 38). They increase the number of bilateral M&A deals in mining and quarrying of energy-producing products (sector 3), wood products (sector 8), coke and refined

petroleum products (sector 10), fabricated metals (sector 16), motor vehicles (sector 20), and electricity, gas, steam and air conditioning supply (sector 23).

The value of bilateral M&A does not significantly change in response to export sanctions in any sector. However, export restrictions reduce the number of bilateral M&A deals in pharmaceuticals (sector 12), basic metals (sector 15), electrical equipment (sector 18), other machinery and equipment (sector 19), wholesale and retail trade (sector 26), accommodations and food service activities (sector 32), and human health and social work activities (sector 43).

The effects of sanctions within each industry clearly demonstrate that investment strategies can widely vary across sectors. In the next sections, I examine how several industry characteristics interact with sanctions to influence bilateral FDI.

2.4.3 The Role of Industry Characteristics

I now see how several industry characteristics shape FDI patterns between sanctioning states and target countries. I use a pooled sample of industry-level cross-border investments, which allows for for variation in industry characteristics and lends more statistical power due to the larger sample size. The reference group for this stage of the analysis is the set of industry-dyad-year observations that are not treated with sanctions. As before, the models are estimated with Poisson pseudo-maximum likelihood. I include origin-year, destination-year, industry-year, and directed country-pair fixed effects. Robust standard errors are clustered by direct country-pair, which is the level of treatment variation.

Geographic Concentration

How does the spatial distribution of industries across the globe influence the effect of sanctions on FDI? Recall from earlier that I hypothesize that highly concentrated sectors are more difficult to substitute, so firms might have strong incentives to circumvent sanctions rules. Alternatively, sanctioning governments could issue exemptions that allow firms to continue operations in those concentrated industries. In other words, highly concentrated sectors should experience either an increase or no change in FDI in target countries.

Table 2.6 shows the impact of sanctions at high and low levels sector concentration. Export

restrictions increase the value of greenfield investments in industries with an average measure of concentration. In more geographically concentrated sectors, the effect of export sanctions is small and insignificant. This result does not contradict the hypothesis, but neither does it support the hypothesis. This could suggest an alternative mechanism in which firms increase greenfield projects to maintain market access in less concentrated sectors while they continue business as usual in highly concentrated sectors, possibly due to waivers. Import and joint import-export sanctions have no significant impact on greenfield values at any level of concentration.

The number of greenfield investments decreases in industries with high levels of concentration after export bans. It also appears that less concentrated industries could see an increase in greenfield counts after export bans. Due to mean-centering, the interacted effect of export bans and concentration is $-0.12(ln(\overline{HHI})-4.92)$, where 4.92 is the sample mean of logged concentration. An industry with below-average concentration would see an increase in the number of greenfield projects after export bans due to the sign reversal. Export restrictions have no significant effect on greenfield counts in industries with the average level of concentration. This set of results contradicts the hypothesis that concentrated sectors should see positive or null effects. The increase in greenfield investments after export bans is once again driven by less concentrated sectors.

Import restrictions are associated with a reduction in the number of greenfield projects in sectors with average levels of geographic concentration. Import bans do not significantly impact greenfield counts at higher than average levels of concentration. The lack of significant negative effects in highly concentrated sectors could again reflect the stabilizing role of exemptions or entrenched supply chain dependencies that prevent further contraction. It could also be that highly concentrated sectors like business machines, consumer electronics, and defense are not exposed to import sanctions because they are consumer-facing or strategic.

Comparing the effects of export and import bans on greenfield counts reveals distinct patterns. The hypothesis that highly concentrated sectors are less susceptible to declines in FDI appears to hold primarily under import restrictions. This may reflect the nature of the restrictions themselves. Firms in sanctioning states may depend on inputs produced in highly concentrated industries, where substitution is difficult. As a result, import bans that interfere with access to these inputs may be waived or selectively enforced, leading to

no significant change in investment. Export bans are different. They usually target goods with military, dual-use, or other strategic value. Allowing firms to bypass export restrictions through investment would defeat the purpose of the sanction by continuing to supply the targeted goods. Import bans, on the other hand, may be easier to justify when bypassed. They can keep consumer goods and inputs flowing to the sanctioning country through transit countries while placing capital under the control of the sanctioning state's firms.

In the mergers and acquisitions analysis, export restrictions have no significant effect on deal values at any level of geographic concentration. Import bans increase the value of M&A deals in industries with average levels of concentration, but this effect disappears in more concentrated sectors. In contrast, joint import-export bans raise the value of M&A flows in highly concentrated sectors. It appears that the double shock from both import and export bans creates powerful incentives to restructure or bypass trade altogether.

On the extensive margin, export bans reduce the number of M&A deals in highly concentrated industries, but have no effect at the average level of concentration. Import bans slightly increase M&A counts in highly concentrated sectors, with no effect at the mean. These results are consistent with the greenfield investment findings. Highly concentrated sectors tend to experience a decline in FDI counts after export sanctions and a modest increase or no change after import sanctions. This again suggests that firms in concentrated sectors are more likely to adapt or be granted exemptions when faced with import restrictions but are constrained by the strategic nature of export controls.

Upstreamness

Upstreamness can influence FDI responses to sanctions if firms use investment to stabilize supply chains and avoid disruptions that would harm downstream producers. Sanctioning governments can issue exemptions for upstream sectors to avoid ripple effects that would impact domestic firms. If this mechanism is at play, then trade sanctions should not reduce FDI in upstream industries.

Table 2.7 presents the impact of sanctions on FDI at high and low levels of sector upstreamness. In value terms, greenfield investments do not significantly change after export sanctions at any level of sectoral upstreamness. However, import sanctions reduce greenfield investment values in more upstream sectors. This contradicts the hypothesis that

upstream industries are insulated from investment declines due to their role in the broader production network.

On the extensive margin, export sanctions have no effect on greenfield project counts at any level of upstreamness. Import bans reduce project counts in sectors at the average level of upstreamness, and this effect becomes more negative in more upstream sectors. At the same time, sectors with below-average upstreamness experience an *increase* in greenfield counts after import sanctions.[5]

When imposed separately, import and export bans do not lead to increased greenfield investment in upstream sectors. But when import and export bans are imposed together, there is a large and significant increase in both the value and count of greenfield projects in these upstream industries. This indicates that more severe disruptions to trade lead the sanctioning state's firms to increase their physical presence in the target country, possibly due to waivers, rushed extraction projects, or reduced competition from other multinational companies.

The mergers and acquisitions results follow a similar pattern. Export restrictions have no effect on M&A activity at any level of upstreamness. Import bans increase the value of M&A deals in sectors with average upstreamness but have no effect in more upstream sectors. M&A counts respond only to joint import-export sanctions, which raise deal activity in more upstream sectors.

Overall, the hypothesis that upstreamness shields sectors from investment losses, or even attracts more FDI, only holds under joint import-export restrictions.

Trade Dependence

One explanation for the increase in FDI from sanctioning countries to targets is sanction jumping. When sanctions raise the cost of cross-border trade, firms may bypass the affected channels through capital investment. The form this takes depends on the nature of the trade restriction.

[5]This is due to the interaction term turning positive for sectors with $\log(\overline{\text{upstream}}) < 0.79$, where 0.79 is the sample mean.

Import bans make it more difficult for firms in the sanctioning country to source goods from the target. In response, firms may invest directly in the target country to secure access to sanctioned supplies and reroute them to downstream users. This strategy can involve mergers and acquisitions (M&A), which assume control of existing capacity, or greenfield investments, which build new facilities. These adaptations are most likely when the sanctioning state is highly dependent on the target country for sector-specific inputs. Based on this logic, I hypothesize that import sanctions will increase FDI in sectors with high import dependence.

Export bans pose a different challenge. If a firm loses access to an important destination market, it may respond by establishing a local presence in the target country. This can take the form of greenfield investment or M&A and allows the firm to preserve its customer base by operating within the restricted market. This type of sanction jumping should be more common when the sanctioning country exports a large share of an industry's output to the target. Accordingly, I expect export sanctions to increase FDI in sectors with high export dependence.

Table 2.8 shows the impact of sanctions on bilateral FDI at high and low levels of sector-level trade dependence between sanctioning states and target countries. I find some support for the idea that trade dependence shapes FDI responses, though the results vary by sanction type and suggest more complex mechanisms than initially expected. For instance, the value of greenfield investment increases in dyad-industries with average levels of trade dependence[6]. This pattern suggests that greenfield projects initiated after export bans are not primarily aimed at preserving existing market access. Rather, firms may be responding to new opportunities created by the withdrawal of other multinationals. In effect, sanctions may reduce competition in the target market, enabling new entry or expansion even in sectors where the investor previously had limited trade exposure.

More surprisingly, export sanctions lead to larger greenfield projects in sectors where the sanctioning country is highly dependent on the target for imports. This result does not align neatly with the original hypothesis but may reflect the disruption of complex supply chains. If the sanctioning country exports intermediate goods that are used in the target country to produce final goods that are then re-exported, an export ban could interrupt the entire loop.

[6]The average levels of log(export dependence$ijkt-2$) and log(import dependence$ijkt-2$) are approximately zero.

In this case, greenfield FDI may be used to replace the interrupted export with local production, helping firms maintain access to the final product and protect downstream operations.

Import and joint import-export sanctions do not significantly affect greenfield values at any level of trade dependence. Nor do export restrictions affect the number of greenfield projects when trade dependence is near its average. However, when export dependence is high, export sanctions reduce the number of greenfield projects. This contradicts the original hypothesis. If a sector sells primarily to the target country, one might expect that firms would build new facilities in the target to bypass the ban. Instead, these findings suggest that the anticipated benefits of greenfield FDI may be outweighed by the political risks and financial uncertainty introduced by the sanctions themselves.

Similarly, import bans reduce the number of greenfield projects in sectors with average trade dependence, but have no significant effect in sectors with high dependence. Joint import-export bans do not significantly affect greenfield entry at any level of trade dependence.

My analysis of mergers and acquisitions reveals several interesting patterns. Export sanctions do not significantly impact M&A activity, regardless of trade dependence. However, import sanctions prompt notable adjustments. At average levels of trade dependence, import sanctions significantly increase the value of M&A deals, with even larger increases when the sanctioning country is highly dependent on the target country for industry-specific exports. This finding again points to the complexity of modern supply chains. When a country exports upstream inputs to the target, and those inputs are used to produce final goods that are then imported back, import sanctions can disrupt the return flow of the finished product. In such cases, firms may turn to M&A to protect the integrity of the supply chain and preserve demand for their own inputs.

Consider, for example, a chemical producer in the sanctioning country that exports industrial compounds to the target country, where they are used to manufacture pharmaceuticals. Those pharmaceuticals are then exported back and sold to consumers in the sanctioning state. If an import ban blocks the return of these pharmaceuticals, the target's producers may reduce their purchases of the upstream chemical inputs. To prevent this, the chemical firm may acquire a pharmaceutical facility in the target country. By doing so, it assumes control over the final stage of production and ensures that the finished product still reaches

consumers—through legal exemptions, rerouted channels, or regulatory compliance. In this way, M&A is a tool for preserving a vertically integrated supply chain that spans borders and industries.

At the same time, import sanctions reduce the value of M&A deals in sectors with high import dependence. This may suggest that sourcing a large share of industrial inputs from the target country is not sufficient on its own to motivate sanction jumping. Instead, FDI responses may only occur when cross-border production loops are disrupted. That would explain why investment increases when export sanctions interact with import dependence, and vice versa.

Joint import-export sanctions have no significant effect on M&A values, and M&A counts are unaffected by any kind of trade sanctions at any level of trade dependence.

The two most important findings from this analysis show that export sanctions increase greenfield investment when the sanctioning country is highly dependent on the target for imports, and that import sanctions raise M&A values when the sanctioning country is highly dependent on the target for exports. These effects suggest that firms respond not merely to disrupted trade flows, but to breaks in vertically integrated production loops. Sanction-jumping through FDI may only occur when supply chains are sufficiently complex that sanctions threaten both upstream and downstream operations. Otherwise, firms may be able to reroute trade without new capital investments.

2.5 Conclusion

This study examined how international sanctions affect industry-level foreign direct investment flows from sanctioning states to sanctioned targets. The analysis reveals that sanctions do not uniformly suppress investment. Their effects vary with industry characteristics, the type of sanction imposed, and the structure of global production networks.

Estimating the effect of any sanction on foreign direct investments two years later revealed that investment responses vary across sectors. Sectors with clear military applications, such as defense and semiconductors, experience the largest decline in FDI. Sanctions reduce FDI to a lesser degree in the energy sectors and industries with less explicit ties to military

activities. Increased FDI occurs after sanctions in a narrow set of sectors. Greenfield activity tends to increase in upstream sectors while M&A increases a more diversified set of industries.

Trade restrictions shape industry-level FDI in ways that suggest firms replace targeted trade channels with capital investments. Export bans lead to increased greenfield activity in industries that are capital-intensive and produce highly custom inputs for the target market. Greenfield activity declines in upstream sectors that are less refined and perhaps easily substituted. Import bans do not significantly increase greenfield activity in any sector.

Export bans increase mergers and acquisitions activity in several sectors that are often explicitly targeted by export controls, such as mining of energy-producing products, refined petroleum, and scientific activities. M&A deals allow firms to maintain market access without violating export control rules. Sectors targeted by export controls might also see an increase in M&A activity because assets are discounted. Import restrictions notably increase mergers and acquisitions activity in sectors that produce essential goods (e.g., food) and in downstream sectors that produce customized inputs.

These sector-level responses suggest that firms adapt to sanctions in ways that preserve market access or protect supply chains. To understand when such adaptations are most likely, I proposed three hypotheses rooted in the idea that sanctions are less likely to disrupt investment when they risk blowback to the sanctioning country or its partners. If restrictions threaten to sever supply chains, raise input costs, or harm downstream industries, governments may issue waivers or firms may adjust in ways that mitigate these effects. Based on this logic, I expected sanctions to increase investment when bilateral trade dependence is high, to leave upstream sectors relatively unaffected, and to spare geographically concentrated industries due to their strategic importance.

The evidence offers partial support for all three hypotheses. Export sanctions increase greenfield activity in sectors where the sanctioning country is highly dependent on the target for imports, and import sanctions raise M&A values in sectors where the sanctioning country exports heavily to the target. These patterns suggest that firms are not simply replacing lost trade, but responding to disruptions in vertically integrated production networks. When sanctions interrupt cross-border loops, such as when inputs are exported to the target, processed abroad, and re-imported as final goods, firms may invest directly in

the target to maintain supply chain continuity.

In upstream sectors, results diverge depending on the scope of the sanctions. Import sanctions reduce both the value and count of greenfield projects in upstream sectors, and export sanctions have no measurable effect. However, when import and export bans are imposed together, upstream sectors see a significant increase in both greenfield and M&A activity. This supports the idea that waivers, urgency, or strategic repositioning may lead firms to reinvest in critical input-producing industries, but only when trade disruptions are severe.

A similar pattern holds for geographically concentrated industries. Export bans reduce investment in these highly concentrated sectors, and import bans do not significantly affect them. Under joint import-export sanctions, M&A activity rises in highly concentrated sectors. This aligns with the idea that such industries are too strategically important to cut off entirely and may attract targeted exemptions or defensive investments under extreme conditions.

In sum, sanctions reshape investment patterns in ways that reflect the structure of global production. Firms are most likely to invest when sanctions disrupt supply chains that are both highly integrated and difficult to replace. Where disruption is limited or trade can be rerouted, investment remains unchanged or declines.

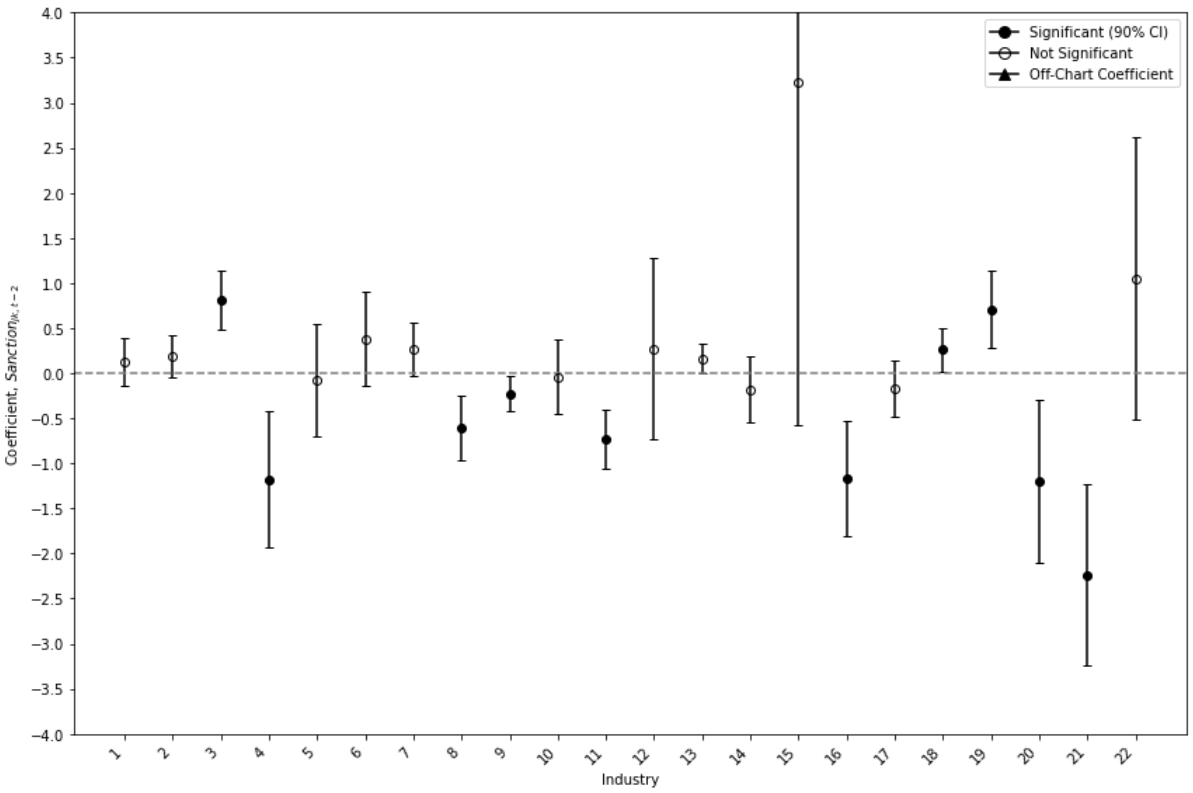

Figure 2.8: Any Sanction vs. Greenfield Value in Target Country Industries

Note: Coefficients are estimated from separate regressions run on each industry. Significant estimates are indicated by shaded icons. The dependent variable is the total capital expenditure of greenfield projects in the target country. All models include origin-year, destination-year, and directed dyad fixed effects. Coefficients represent the change in greenfield investment value relative to unsanctioned country-pairs within each industry. Vertical lines represent 90% confidence intervals.

Industry Key (1–22):

1. Aerospace
2. Auto Components
3. Auto OEM
4. Building Materials
5. Business Machines & Equipment
6. Ceramics & Glass
7. Chemicals
8. Coal, Oil, Gas
9. Communications
10. Consumer Electronics
11. Electronic Components
12. Engines & Turbines
13. Industrial Equipment
14. Metals
15. Minerals
16. Non-Auto Transportation OEM
17. Pharmaceuticals
18. Plastics
19. Rubber
20. Semiconductors
21. Space & Defense
22. Wood Products

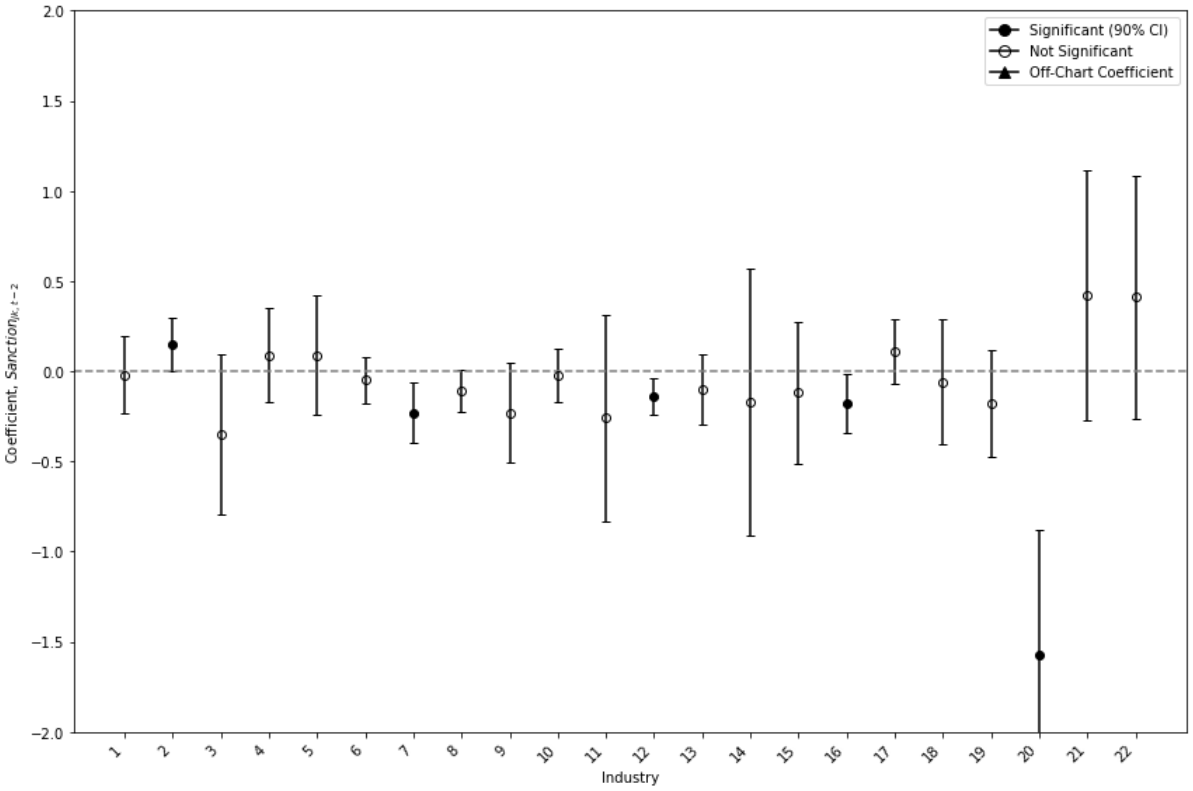

Figure 2.9: Any Sanction vs. Greenfield Count in Target Country Industries

Note: Each estimate is based on a regression restricted to a single industry. Significant estimates are indicated by shaded icons. The dependent variable is the number of announced greenfield projects in the target country. All regressions include origin-year, destination-year, and directed dyad fixed effects. Coefficients reflect changes in project count relative to the baseline of unsanctioned country-pairs within each industry. Vertical lines represent 90% confidence intervals.

Industry Key (1–22):

1. Aerospace
2. Auto Components
3. Auto OEM
4. Building Materials
5. Business Machines & Equipment
6. Ceramics & Glass
7. Chemicals
8. Coal, Oil, Gas
9. Communications
10. Consumer Electronics
11. Electronic Components
12. Engines & Turbines
13. Industrial Equipment
14. Metals
15. Minerals
16. Non-Auto Transportation OEM
17. Pharmaceuticals
18. Plastics
19. Rubber
20. Semiconductors
21. Space & Defense
22. Wood Products

Table 2.2: Any Sanction vs. Industry-Level Greenfield Investments

fDi Markets Sector (i)	$Greenfield\ Value_{ijkt}$	$Greenfield\ Count_{ijkt}$
Aerospace	0.13 (0.16)	-0.02 (0.13)
Auto Components	0.19 (0.14)	0.15* (0.09)
Auto OEM	0.81*** (0.20)	0.16 (0.13)
Building Materials	-1.18*** (0.46)	-0.35 (0.27)
Business Machines & Equipment	-0.08 (0.38)	0.09 (0.16)
Ceramics & Glass	0.38 (0.32)	0.09 (0.20)
Chemicals	0.26 (0.18)	-0.05 (0.08)
Coal, Oil, Gas	-0.61*** (0.22)	-0.23** (0.10)
Communications	-0.23* (0.12)	-0.11 (0.07)
Consumer Electronics	-0.04 (0.25)	-0.23 (0.17)
Electronic Components	-0.73*** (0.20)	-0.02 (0.09)
Engines & Turbines	0.27 (0.61)	-0.26 (0.35)
Industrial Equipment	0.16 (0.10)	-0.14** (0.06)
Metals	-0.18 (0.22)	-0.10 (0.12)
Minerals	3.22 (2.31)	-0.17 (0.45)
Non-Auto Transportation OEM	-1.17*** (0.39)	-0.12 (0.24)
Pharmaceuticals	-0.17 (0.19)	-0.18* (0.10)
Plastics	0.26* (0.15)	0.11 (0.10)
Rubber	0.71*** (0.26)	-0.06 (0.21)
Semiconductors	-1.20** (0.55)	-0.18 (0.14)
Space & Defense	-2.24*** (0.61)	-1.57*** (0.42)
Wood Products	1.05 (0.95)	0.17 (0.41)
N	788,040	788,040

Note: Each reported coefficient is the average effect of any type of sanction on greenfield FDI in the given industry i. All models are estimated using Poisson pseudo-maximum likelihood with multi-way fixed effects (origin-year, target-year, industry-year, and directed dyad). Industries correspond to the fDi Markets classification system. Standard errors clustered by directed dyad are reported in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

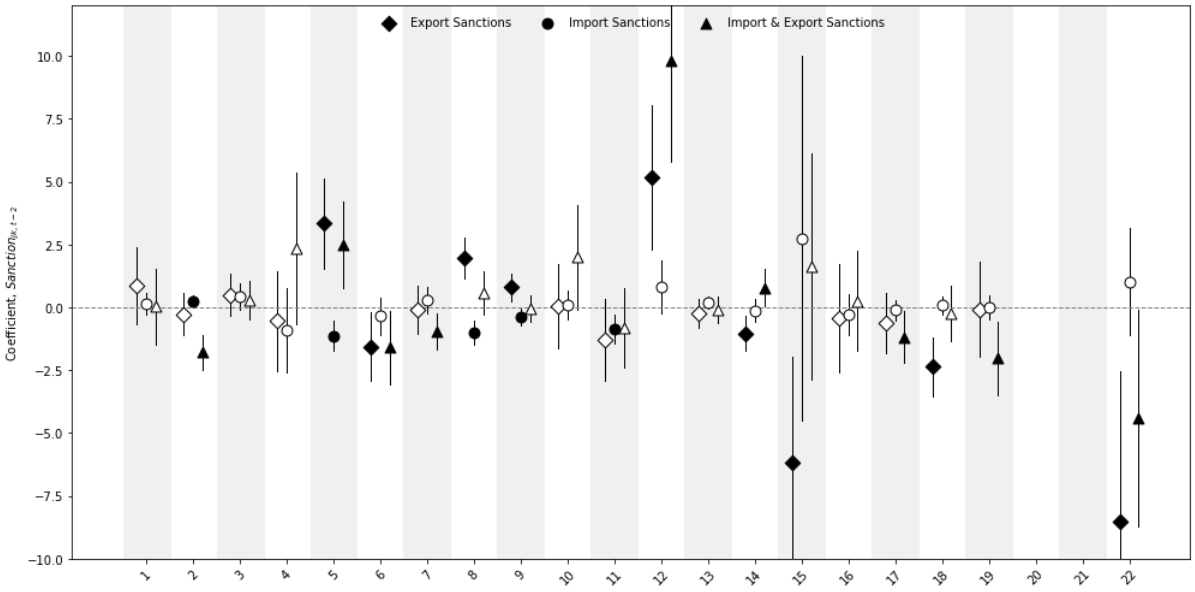

Figure 2.10: Types of Sanctions vs. Greenfield Value in Target Country Industries

Note: Coefficients are estimated from industry-specific regressions with separate indicators for export sanctions, import sanctions, and sanctions that restrict both. Significant estimates are indicated by shaded icons. The dependent variable is the total capital expenditure of greenfield projects in the target country. All models include origin-year, destination-year, and directed dyad fixed effects. Coefficients represent the change in investment value relative to unsanctioned dyads within the same industry. Vertical lines represent 90% confidence intervals.

Industry Key (1–22):

1. Aerospace
2. Auto Components
3. Auto OEM
4. Building Materials
5. Business Machines & Equipment
6. Ceramics & Glass
7. Chemicals
8. Coal, Oil, Gas
9. Communications
10. Consumer Electronics
11. Electronic Components
12. Engines & Turbines
13. Industrial Equipment
14. Metals
15. Minerals
16. Non-Auto Transportation OEM
17. Pharmaceuticals
18. Plastics
19. Rubber
20. Semiconductors
21. Space & Defense
22. Wood Products

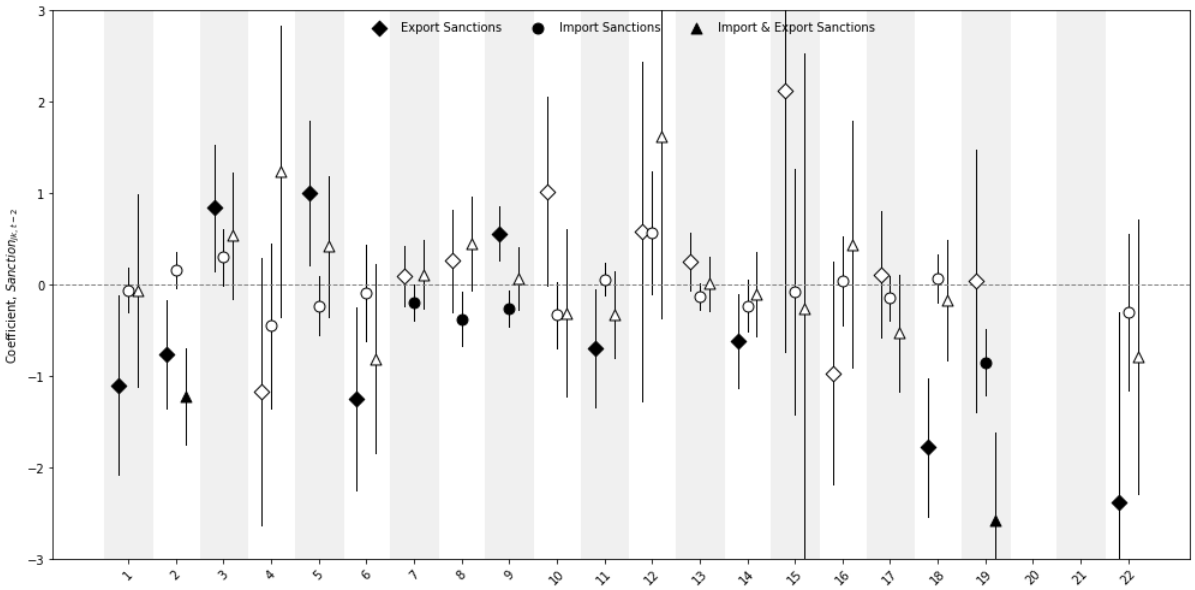

Figure 2.11: Types of Sanctions vs. Greenfield Count in Target Country Industries

Note: Each coefficient is estimated from a regression restricted to a single industry. Significant estimates are indicated by shaded icons. Sanction types (export, import, both) are entered as separate indicators. The dependent variable is the number of greenfield projects announced in the target country. All regressions include origin-year, destination-year, and directed dyad fixed effects. Coefficients reflect changes relative to unsanctioned dyads within each industry. Vertical lines represent 90% confidence intervals.

Industry Key (1–22):

1. Aerospace
2. Auto Components
3. Auto OEM
4. Building Materials
5. Business Machines & Equipment
6. Ceramics & Glass
7. Chemicals
8. Coal, Oil, Gas
9. Communications
10. Consumer Electronics
11. Electronic Components
12. Engines & Turbines
13. Industrial Equipment
14. Metals
15. Minerals
16. Non-Auto Transportation OEM
17. Pharmaceuticals
18. Plastics
19. Rubber
20. Semiconductors
21. Space & Defense
22. Wood Products

Table 2.3: Sanction Types vs. Industry-Level Greenfield Investments

fDi Markets Sector (i)	Sanction Variable	Greenfield Value	Greenfield Count
Aerospace	$Export_{jk,t-2}$	0.87 (0.93)	-1.10* (0.60)
	$Import_{jk,t-2}$	0.14 (0.25)	-0.06 (0.15)
	$ImpExp_{jk,t-2}$	0.03 (0.92)	-0.07 (0.64)
	$Financial_{jk,t-2}$	-0.80 (0.80)	0.08 (0.57)
	$Travel_{jk,t-2}$	0.99 (0.75)	0.13 (0.54)
	$Military_{jk,t-2}$	0.42* (0.25)	0.45** (0.21)
	$Arms_{jk,t-2}$	-1.26 (0.98)	0.06 (0.98)
	$Other_{jk,t-2}$	2.40** (1.10)	0.55 (0.87)
Auto Components	$Export_{jk,t-2}$	-0.27 (0.52)	-0.76** (0.36)
	$Import_{jk,t-2}$	0.25 (0.15)	0.16 (0.12)
	$ImpExp_{jk,t-2}$	-1.79*** (0.42)	-1.23*** (0.32)
	$Financial_{jk,t-2}$	0.84* (0.45)	1.06*** (0.32)
	$Travel_{jk,t-2}$	-0.45 (0.58)	-1.50*** (0.37)
	$Military_{jk,t-2}$	-0.12 (0.21)	0.01 (0.14)
	$Arms_{jk,t-2}$	0.68* (0.40)	1.39*** (0.28)
	$Other_{jk,t-2}$	1.10** (0.46)	1.35*** (0.33)
Auto OEM	$Export_{jk,t-2}$	0.48 (0.51)	0.84** (0.42)
	$Import_{jk,t-2}$	0.43 (0.31)	0.30 (0.19)
	$ImpExp_{jk,t-2}$	0.27 (0.47)	0.54 (0.42)
	$Financial_{jk,t-2}$	-0.14 (0.38)	-0.13 (0.30)
	$Travel_{jk,t-2}$	0.68 (0.59)	0.12 (0.39)
	$Military_{jk,t-2}$	1.08*** (0.22)	0.08 (0.19)
	$Arms_{jk,t-2}$	0.14 (0.40)	-0.11 (0.30)
	$Other_{jk,t-2}$	2.00* (1.17)	0.71 (0.70)
Building Materials	$Export_{jk,t-2}$	-0.55 (1.21)	-1.17 (0.89)
	$Import_{jk,t-2}$	-0.93 (1.02)	-0.45 (0.55)
	$ImpExp_{jk,t-2}$	2.34 (1.83)	1.24 (0.97)
	$Financial_{jk,t-2}$	-2.13** (0.91)	-0.73 (0.63)
	$Travel_{jk,t-2}$	-0.43 (0.61)	-0.72 (0.50)
	$Military_{jk,t-2}$	-0.94 (0.78)	-0.16 (0.49)
	$Arms_{jk,t-2}$	0.78 (1.17)	0.02 (0.64)
	$Other_{jk,t-2}$	-4.03** (1.85)	0.37 (0.91)
Business Machines & Equipment	$Export_{jk,t-2}$	3.33*** (1.10)	1.00** (0.48)
	$Import_{jk,t-2}$	-1.13*** (0.36)	-0.23 (0.20)
	$ImpExp_{jk,t-2}$	2.48** (1.04)	0.42 (0.47)
	$Financial_{jk,t-2}$	-2.68*** (0.82)	-0.12 (0.36)
	$Travel_{jk,t-2}$	-1.98* (1.18)	-0.79 (0.52)
	$Military_{jk,t-2}$	0.73 (0.46)	0.05 (0.23)
	$Arms_{jk,t-2}$	-0.05 (1.02)	0.32 (0.41)
	$Other_{jk,t-2}$	-15.09*** (1.39)	-17.55*** (0.83)
Ceramics & Glass	$Export_{jk,t-2}$	-1.57* (0.83)	-1.25** (0.61)
	$Import_{jk,t-2}$	-0.36 (0.45)	-0.09 (0.32)
	$ImpExp_{jk,t-2}$	-1.59* (0.89)	-0.81 (0.63)
	$Financial_{jk,t-2}$	1.83*** (0.71)	1.24** (0.51)
	$Travel_{jk,t-2}$	-1.33 (0.87)	-0.88 (0.76)

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Table 2.3 (continued)

fDi Markets Sector (i)	Sanction Type	$Greenfield\ Value_{ijkt}$	$Greenfield\ Count_{ijkt}$
	$Military_{jk,t-2}$	0.56 (0.58)	-0.21 (0.46)
	$Arms_{jk,t-2}$	0.81 (0.52)	0.46 (0.40)
	$Other_{jk,t-2}$	-4.81*** (1.84)	-1.54 (1.14)
Chemicals	$Export_{jk,t-2}$	-0.11 (0.58)	0.09 (0.20)
	$Import_{jk,t-2}$	0.29 (0.33)	-0.20* (0.12)
	$ImpExp_{jk,t-2}$	-0.96** (0.43)	0.11 (0.23)
	$Financial_{jk,t-2}$	0.38 (0.36)	-0.19 (0.18)
	$Travel_{jk,t-2}$	-0.09 (0.47)	0.17 (0.20)
	$Military_{jk,t-2}$	0.46* (0.28)	0.12 (0.10)
	$Arms_{jk,t-2}$	-0.74 (0.57)	0.05 (0.22)
	$Other_{jk,t-2}$	1.69** (0.82)	0.88*** (0.34)
Coal, Oil, Gas	$Export_{jk,t-2}$	1.95*** (0.50)	0.26 (0.34)
	$Import_{jk,t-2}$	-0.99*** (0.29)	-0.38** (0.18)
	$ImpExp_{jk,t-2}$	0.56 (0.53)	0.45 (0.31)
	$Financial_{jk,t-2}$	-0.73* (0.39)	-0.19 (0.21)
	$Travel_{jk,t-2}$	-1.13 (0.74)	-0.14 (0.30)
	$Military_{jk,t-2}$	-0.55* (0.29)	-0.04 (0.14)
	$Arms_{jk,t-2}$	-0.58* (0.34)	-0.27 (0.22)
	$Other_{jk,t-2}$	1.13 (0.92)	0.09 (0.44)
Communications	$Export_{jk,t-2}$	0.80** (0.33)	0.56*** (0.18)
	$Import_{jk,t-2}$	-0.38* (0.21)	-0.26** (0.12)
	$ImpExp_{jk,t-2}$	-0.06 (0.32)	0.07 (0.21)
	$Financial_{jk,t-2}$	0.06 (0.28)	0.07 (0.15)
	$Travel_{jk,t-2}$	-0.51 (0.59)	-0.54** (0.24)
	$Military_{jk,t-2}$	-0.63*** (0.19)	-0.26*** (0.09)
	$Arms_{jk,t-2}$	0.21 (0.30)	-0.16 (0.19)
	$Other_{jk,t-2}$	0.22 (0.55)	-0.11 (0.33)
Consumer Electronics	$Export_{jk,t-2}$	0.05 (1.01)	1.02 (0.63)
	$Import_{jk,t-2}$	0.07 (0.35)	-0.33 (0.22)
	$ImpExp_{jk,t-2}$	1.99 (1.26)	-0.31 (0.56)
	$Financial_{jk,t-2}$	-1.26*** (0.42)	-0.45 (0.38)
	$Travel_{jk,t-2}$	-2.24** (0.97)	-1.06 (0.72)
	$Military_{jk,t-2}$	-0.20 (0.33)	-0.06 (0.25)
	$Arms_{jk,t-2}$	1.81* (1.05)	0.57 (0.45)
	$Other_{jk,t-2}$	2.07 (1.69)	1.39 (1.01)
Electronic Components	$Export_{jk,t-2}$	-1.29 (1.00)	-0.70* (0.39)
	$Import_{jk,t-2}$	-0.88** (0.35)	0.06 (0.11)
	$ImpExp_{jk,t-2}$	-0.82 (0.95)	-0.33 (0.29)
	$Financial_{jk,t-2}$	0.68 (0.85)	0.28 (0.29)
	$Travel_{jk,t-2}$	-2.15** (0.90)	-0.38 (0.26)
	$Military_{jk,t-2}$	-0.35 (0.39)	0.04 (0.14)
	$Arms_{jk,t-2}$	0.08 (0.48)	-0.13 (0.26)
	$Other_{jk,t-2}$	1.70* (0.96)	0.63 (0.53)
Engines & Turbines	$Export_{jk,t-2}$	5.16*** (1.75)	0.58 (1.13)
	$Import_{jk,t-2}$	0.81 (0.65)	0.57 (0.41)
	$ImpExp_{jk,t-2}$	9.80*** (2.44)	1.62 (1.21)

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Table 2.3 (continued)

fDi Markets Sector (i)	Sanction Type	$Greenfield\ Value_{ijkt}$	$Greenfield\ Count_{ijkt}$
	$Financial_{jk,t-2}$	-5.06*** (1.80)	-1.51 (1.23)
	$Travel_{jk,t-2}$	-20.13*** (1.51)	-17.84*** (1.21)
	$Military_{jk,t-2}$	0.63 (0.91)	0.38 (0.50)
	$Arms_{jk,t-2}$	-0.86 (1.42)	0.20 (0.75)
	$Other_{jk,t-2}$	35.07*** (1.49)	35.75*** (1.64)
Industrial Equipment	$Export_{jk,t-2}$	-0.22 (0.35)	0.25 (0.19)
	$Import_{jk,t-2}$	0.20 (0.15)	-0.13 (0.09)
	$ImpExp_{jk,t-2}$	-0.08 (0.32)	0.01 (0.18)
	$Financial_{jk,t-2}$	-0.03 (0.27)	-0.27 (0.17)
	$Travel_{jk,t-2}$	0.30 (0.22)	0.19 (0.15)
	$Military_{jk,t-2}$	0.23 (0.18)	-0.10 (0.11)
	$Arms_{jk,t-2}$	0.29 (0.35)	0.19 (0.16)
	$Other_{jk,t-2}$	-0.35 (0.49)	0.02 (0.34)
Metals	$Export_{jk,t-2}$	-1.05** (0.42)	-0.62** (0.31)
	$Import_{jk,t-2}$	-0.14 (0.28)	-0.23 (0.17)
	$ImpExp_{jk,t-2}$	0.78* (0.46)	-0.11 (0.28)
	$Financial_{jk,t-2}$	0.16 (0.34)	0.17 (0.23)
	$Travel_{jk,t-2}$	-0.76 (0.55)	0.07 (0.32)
	$Military_{jk,t-2}$	-0.64** (0.33)	-0.16 (0.17)
	$Arms_{jk,t-2}$	0.08 (0.44)	-0.27 (0.31)
	$Other_{jk,t-2}$	-0.82 (1.08)	0.70 (0.45)
Minerals	$Export_{jk,t-2}$	-6.17** (2.55)	2.12 (1.74)
	$Import_{jk,t-2}$	2.75 (4.42)	-0.08 (0.82)
	$ImpExp_{jk,t-2}$	1.64 (2.74)	-0.26 (1.70)
	$Financial_{jk,t-2}$	5.98** (2.40)	0.31 (1.78)
	$Travel_{jk,t-2}$	-7.44* (4.24)	-1.37 (1.30)
	$Military_{jk,t-2}$	1.99 (2.02)	-0.21 (0.74)
	$Arms_{jk,t-2}$	-12.67*** (4.89)	-1.57 (1.61)
	$Other_{jk,t-2}$	3.38 (2.89)	1.46 (1.55)
Non-Auto Transportation OEM	$Export_{jk,t-2}$	-0.43 (1.30)	-0.97 (0.74)
	$Import_{jk,t-2}$	-0.30 (0.49)	0.04 (0.30)
	$ImpExp_{jk,t-2}$	0.25 (1.21)	0.44 (0.82)
	$Financial_{jk,t-2}$	-1.08 (1.11)	0.06 (0.65)
	$Travel_{jk,t-2}$	-1.70 (1.27)	-1.31* (0.70)
	$Military_{jk,t-2}$	-1.35 (1.02)	-0.49 (0.44)
	$Arms_{jk,t-2}$	-0.60 (0.95)	-0.07 (0.69)
	$Other_{jk,t-2}$	-4.49*** (1.66)	-0.46 (0.81)
Pharmaceuticals	$Export_{jk,t-2}$	-0.61 (0.73)	0.11 (0.42)
	$Import_{jk,t-2}$	-0.11 (0.25)	-0.15 (0.15)
	$ImpExp_{jk,t-2}$	-1.19* (0.63)	-0.53 (0.39)
	$Financial_{jk,t-2}$	1.25** (0.57)	0.06 (0.36)
	$Travel_{jk,t-2}$	-0.10 (0.48)	0.27 (0.32)
	$Military_{jk,t-2}$	0.11 (0.30)	-0.03 (0.14)
	$Arms_{jk,t-2}$	-0.43 (0.59)	0.11 (0.34)
	$Other_{jk,t-2}$	0.89 (0.68)	1.34* (0.70)
Plastics	$Export_{jk,t-2}$	-2.36*** (0.71)	-1.78*** (0.46)

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Table 2.3 (continued)

fDi Markets Sector (i)	Sanction Type	$Greenfield\ Value_{ijkt}$	$Greenfield\ Count_{ijkt}$
	$Import_{jk,t-2}$	0.08 (0.22)	0.07 (0.16)
	$ImpExp_{jk,t-2}$	-0.23 (0.67)	-0.17 (0.40)
	$Financial_{jk,t-2}$	0.86 (0.63)	0.51 (0.45)
	$Travel_{jk,t-2}$	-0.92** (0.39)	-0.56 (0.34)
	$Military_{jk,t-2}$	0.12 (0.29)	-0.00 (0.15)
	$Arms_{jk,t-2}$	-0.97 (0.78)	0.11 (0.44)
	$Other_{jk,t-2}$	2.03*** (0.57)	0.44 (0.39)
Rubber	$Export_{jk,t-2}$	-0.09 (1.15)	0.04 (0.87)
	$Import_{jk,t-2}$	-0.02 (0.29)	-0.85*** (0.22)
	$ImpExp_{jk,t-2}$	-2.03** (0.88)	-2.58*** (0.58)
	$Financial_{jk,t-2}$	1.41 (0.92)	1.35** (0.64)
	$Travel_{jk,t-2}$	2.62** (1.09)	0.56 (1.20)
	$Military_{jk,t-2}$	0.38 (0.37)	0.49* (0.26)
	$Arms_{jk,t-2}$	0.09 (1.09)	-1.03 (0.84)
	$Other_{jk,t-2}$	3.27*** (1.05)	0.90 (0.68)
Semiconductors	$Export_{jk,t-2}$	—	—
	$Import_{jk,t-2}$	—	—
	$ImpExp_{jk,t-2}$	—	—
	$Financial_{jk,t-2}$	—	—
	$Travel_{jk,t-2}$	—	—
	$Military_{jk,t-2}$	—	—
	$Arms_{jk,t-2}$	—	—
	$Other_{jk,t-2}$	—	—
Space & Defense	$Export_{jk,t-2}$	—	—
	$Import_{jk,t-2}$	—	—
	$ImpExp_{jk,t-2}$	—	—
	$Financial_{jk,t-2}$	—	—
	$Travel_{jk,t-2}$	—	—
	$Military_{jk,t-2}$	—	—
	$Arms_{jk,t-2}$	—	—
	$Other_{jk,t-2}$	—	—
Wood Products	$Export_{jk,t-2}$	-8.54** (3.66)	-2.38* (1.26)
	$Import_{jk,t-2}$	1.02 (1.29)	-0.30 (0.52)
	$ImpExp_{jk,t-2}$	-4.43* (2.62)	-0.79 (0.91)
	$Financial_{jk,t-2}$	-0.14 (2.83)	1.52 (1.10)
	$Travel_{jk,t-2}$	-0.44 (0.76)	-2.17 (1.39)
	$Military_{jk,t-2}$	0.89 (1.71)	0.37 (0.79)
	$Arms_{jk,t-2}$	4.96*** (1.86)	0.45 (0.87)
	$Other_{jk,t-2}$	—	—
N		788,040	788,040

Note: All models are estimated using Poisson pseudo-maximum likelihood with multi-way fixed effects (origin-year, target-year, industry-year, and directed dyad). Standard errors clustered by directed dyad are reported in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

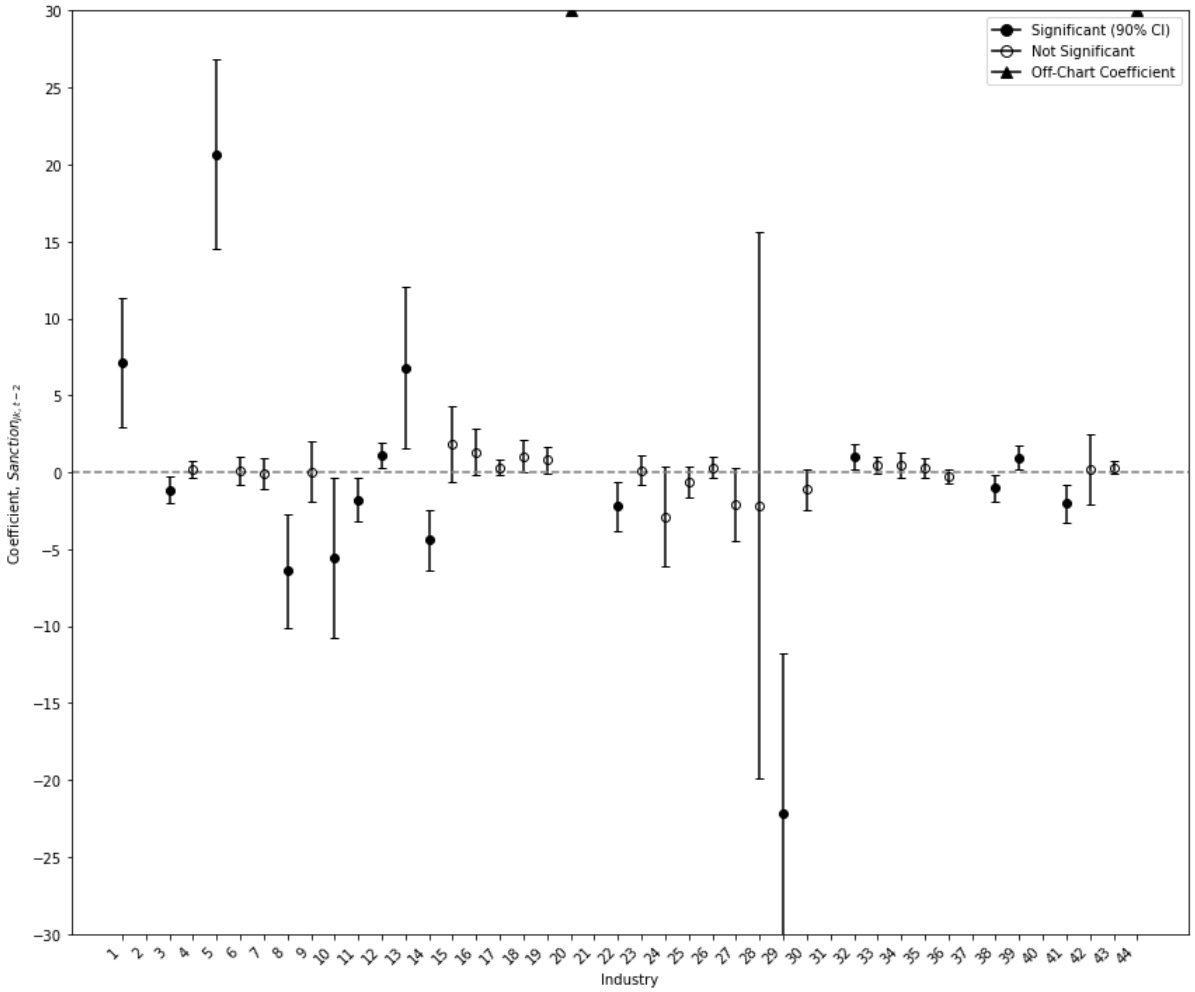

Figure 2.12: Any Sanction vs. M&A Value in Target Country Industries

Note: Each coefficient is estimated from a separate regression by industry. Significant estimates are indicated by shaded icons. The dependent variable is the total value of M&A deals into the target country industry. All models include origin-year, destination-year, and directed dyad fixed effects. Coefficients reflect the change in M&A value relative to the reference group of unsanctioned dyads within each industry. Vertical lines represent 90% confidence intervals.

Industry Key (1–44): 1 – Agriculture; 2 – Fishing; 3 – Mining (energy); 4 – Mining (non-energy); 5 – Mining Support; 6 – Food, Beverages, Tobacco; 7 – Textiles; 8 – Wood & Cork; 9 – Paper & Printing; 10 – Petroleum Products; 11 – Chemicals; 12 – Pharmaceuticals; 13 – Rubber & Plastics; 14 – Non-metallic Minerals; 15 – Basic Metals; 16 – Fabricated Metals; 17 – Electronics & Optics; 18 – Electrical Equipment; 19 – Machinery (n.e.c.); 20 – Motor Vehicles; 21 – Other Transport Equipment; 22 – Manufacturing n.e.c.; 23 – Electricity & Gas; 24 – Water & Waste; 25 – Construction; 26 – Trade & Repair; 27 – Land Transport; 28 – Water Transport; 29 – Air Transport; 30 – Warehousing & Support Transport; 31 – Postal Services; 32 – Accommodation & Food; 33 – Media & Publishing; 34 – Telecommunications; 35 – IT Services; 36 – Finance & Insurance; 37 – Waste & Remediation; 38 – Professional Services; 39 – Admin & Support; 40 – Public Admin & Defense; 41 – Education; 42 – Health & Social Work; 43 – Arts & Entertainment; 44 – Other Services.

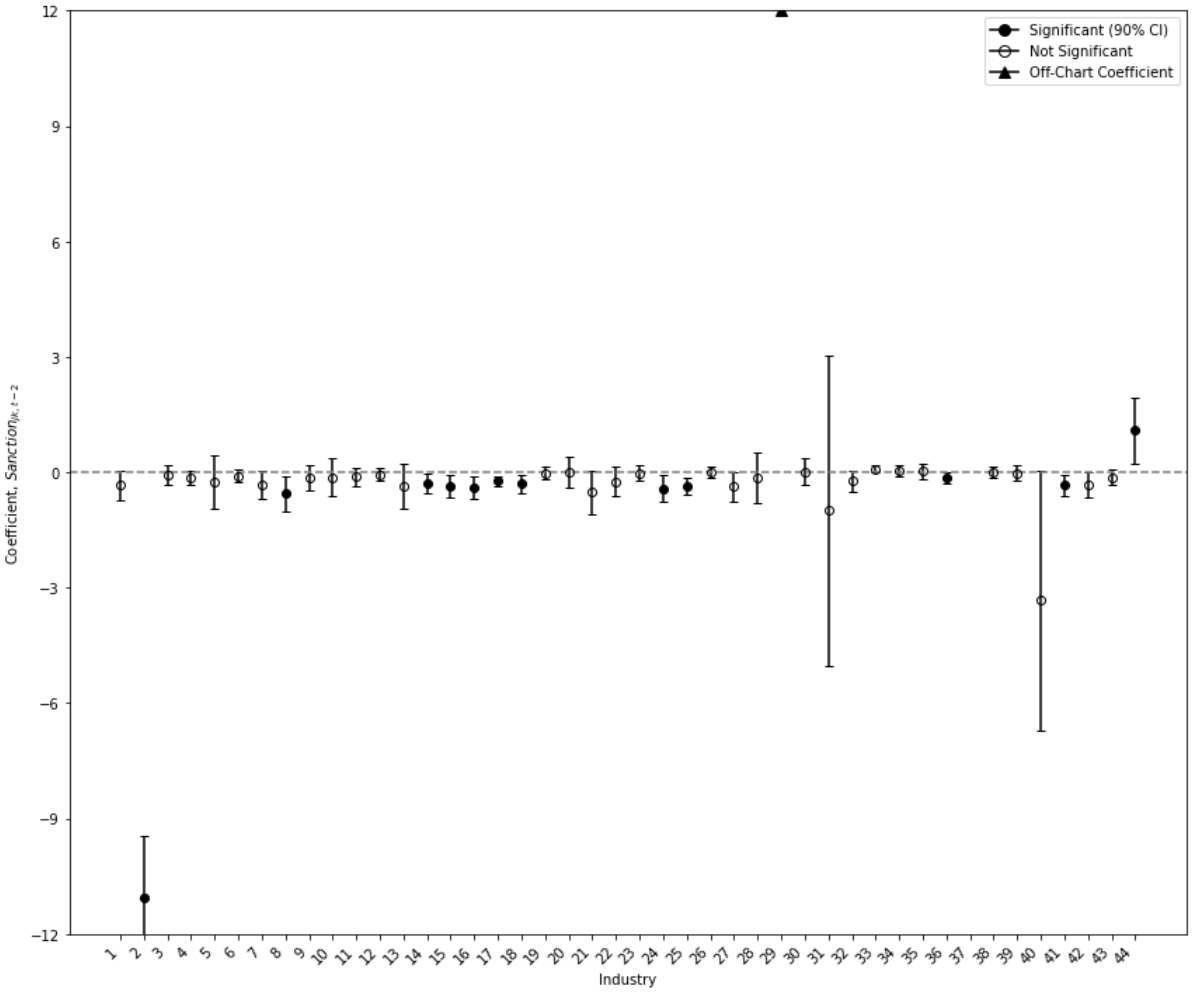

Figure 2.13: Any Sanction vs. M&A Deal Count in Target Country Industries

Note: Each coefficient is estimated from a separate regression by industry. Significant estimates are indicated by shaded icons. The dependent variable is the number of M&A deals into the target country. All models include origin-year, destination-year, and directed dyad fixed effects. Coefficients reflect the change in M&A deal count relative to the reference group of unsanctioned dyads within each industry. Vertical lines represent 90% confidence intervals.

Industry Key (1–44): 1 – Agriculture; 2 – Fishing; 3 – Mining (energy); 4 – Mining (non-energy); 5 – Mining Support; 6 – Food, Beverages, Tobacco; 7 – Textiles; 8 – Wood & Cork; 9 – Paper & Printing; 10 – Petroleum Products; 11 – Chemicals; 12 – Pharmaceuticals; 13 – Rubber & Plastics; 14 – Non-metallic Minerals; 15 – Basic Metals; 16 – Fabricated Metals; 17 – Electronics & Optics; 18 – Electrical Equipment; 19 – Machinery (n.e.c.); 20 – Motor Vehicles; 21 – Other Transport Equipment; 22 – Manufacturing n.e.c.; 23 – Electricity & Gas; 24 – Water & Waste; 25 – Construction; 26 – Trade & Repair; 27 – Land Transport; 28 – Water Transport; 29 – Air Transport; 30 – Warehousing & Support Transport; 31 – Postal Services; 32 – Accommodation & Food; 33 – Media & Publishing; 34 – Telecommunications; 35 – IT Services; 36 – Finance & Insurance; 37 – Waste & Remediation; 38 – Professional Services; 39 – Admin & Support; 40 – Public Admin & Defense; 41 – Education; 42 – Health & Social Work; 43 – Arts & Entertainment; 44 – Other Services.

Table 2.4: Effects of Any Sanction on Industry-Level M&A Investments

TiVA Sector (i)	**M&A Value**$_{ijkt}$	**M&A Count**$_{ijkt}$
Agriculture	7.13*** (2.53)	-0.34 (0.24)
Fishing	—	-11.05*** (0.96)
Mining and Quarrying, energy producing products	-1.14** (0.51)	-0.08 (0.15)
Mining and Quarrying, non-energy producing products	0.20 (0.34)	-0.16 (0.11)
Mining Support Service Activities	20.67*** (3.73)	-0.25 (0.42)
Food products, beverages, tobacco products	0.09 (0.54)	-0.09 (0.11)
Textiles	-0.10 (0.62)	-0.33 (0.23)
Wood and products of wood and cork	-6.42*** (2.24)	-0.55* (0.28)
Paper products and printing	0.04 (1.19)	-0.15 (0.20)
Coke and refined petroleum products	-5.57* (3.16)	-0.13 (0.30)
Chemical and chemical products	-1.79** (0.85)	-0.12 (0.14)
Pharmaceuticals	1.08** (0.51)	-0.07 (0.10)
Rubber and plastic products	6.80** (3.21)	-0.36 (0.36)
Other non-metallic mineral products	-4.40*** (1.18)	-0.30* (0.16)
Basic metals	1.80 (1.49)	-0.36** (0.18)
Fabricated metal products	1.31 (0.92)	-0.40** (0.18)
Computer, electronic, and optical equipment	0.31 (0.32)	-0.23*** (0.08)
Electrical equipment	1.04 (0.64)	-0.30** (0.14)
Machinery and equipment, n. e. c.	0.79 (0.53)	-0.02 (0.10)
Motor vehicles, trailers, and semi-trailers	36.01*** (1.53)	0.01 (0.24)
Other transport equipment	—	-0.52 (0.34)
Manufacturing nec; repair and installation of machinery and equipment	-2.23** (0.99)	-0.24 (0.24)
Electricity, gas, steam and air conditioning supply	0.12 (0.59)	-0.02 (0.13)
Water supply; sewerage, waste management and remediation activities	-2.89 (1.97)	-0.42** (0.21)
Construction	-0.63 (0.59)	-0.37*** (0.14)
Wholesale and retail trade; repair of motor vehicles	0.32 (0.43)	-0.01 (0.09)
Land transport and transport via pipelines	-2.09 (1.45)	-0.38 (0.24)
Water transport	-2.14 (10.77)	-0.15 (0.40)
Air transport	-22.17*** (6.33)	14.80*** (1.15)
Warehousing and support activities for transportation	-1.13 (0.81)	0.02 (0.20)
Postal and courier activities	—	-1.00 (2.45)
Accommodation and food service activities	1.05** (0.50)	-0.23 (0.16)
Publishing, audiovisual and broadcasting activities	0.49 (0.33)	0.09 (0.06)
Telecommunications	0.45 (0.49)	0.04 (0.09)
IT and other information services	0.26 (0.40)	0.03 (0.12)
Financial and insurance activities	-0.28 (0.26)	-0.15 (0.09)
Water supply; sewerage, waste management and remediation activities	—	—
Professional, scientific and technical activities	-1.02** (0.52)	-0.00 (0.09)
Administrative and support services	0.96** (0.49)	-0.03 (0.12)
Public administration and defence; compulsory social security	—	-3.33 (2.05)
Education	-2.04*** (0.75)	-0.34** (0.16)
Human health and social work activities	0.21 (1.40)	-0.32 (0.20)
Arts, entertainment and recreation	0.32 (0.24)	-0.14 (0.12)

Continued on next page

Table 2.4 (continued)

TiVA Sector (i)	**M&A Value**$_{ijkt}$	**M&A Count**$_{ijkt}$
Other service activities	7,768.93 (72,303.92)	1.08** (0.53)
N	775,083	788,040

Note: Estimates are from Poisson pseudo-maximum likelihood regressions with origin-year, target-year, industry-year, and directed country-pair fixed effects. Standard errors clustered by directed dyad are reported in parentheses. Sector fixed effects are based on TiVA industry classifications. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

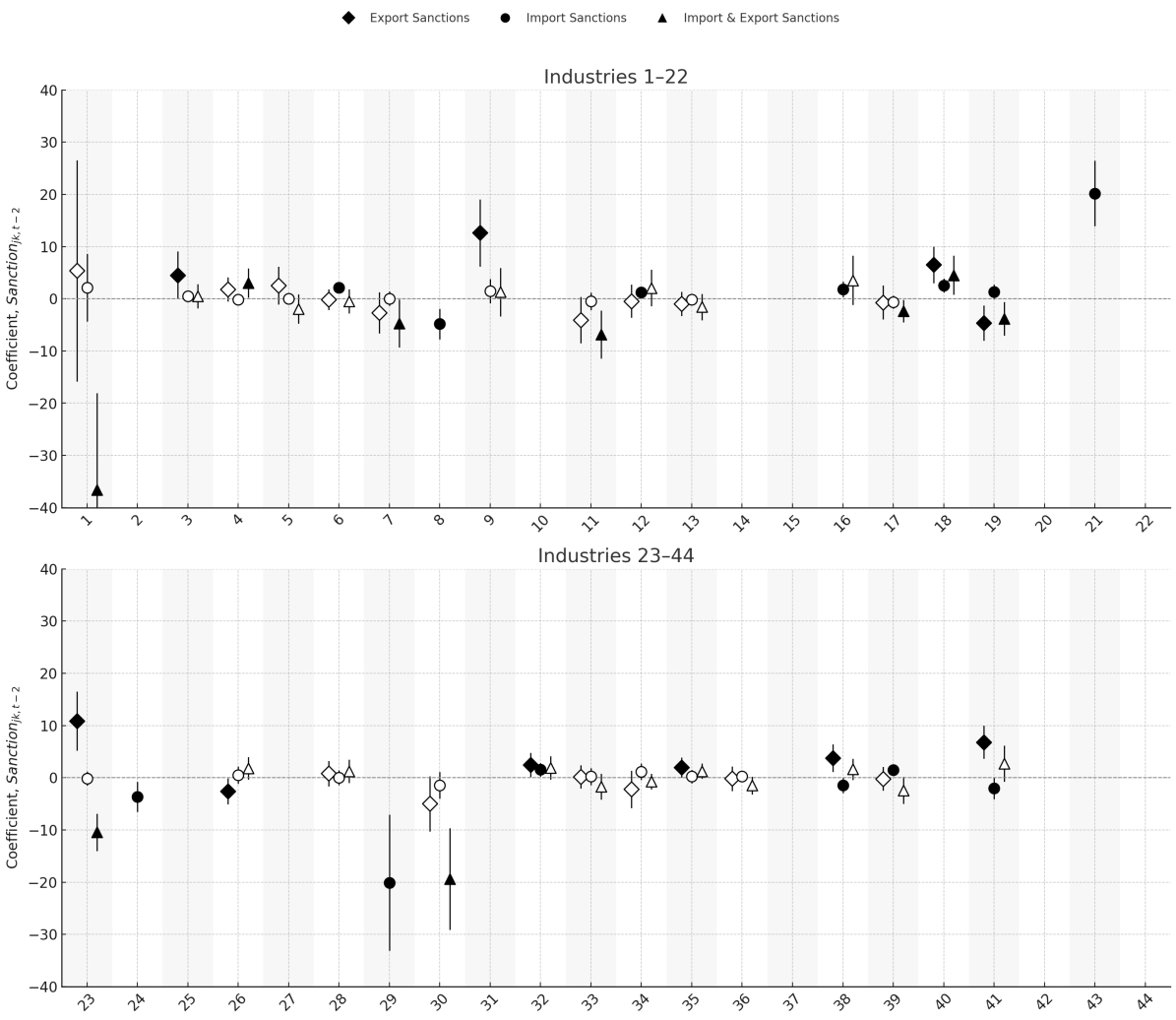

Figure 2.14: Types of Sanctions vs. M&A Value in Target Country Industries

Note: Each coefficient is estimated from a separate industry-partitioned regression and represents the change in M&A value relative to unsanctioned dyads in the same industry. Significant estimates are indicated by shaded icons. All regressions include origin-year, destination-year, and directed dyad fixed effects. Vertical lines show 90% confidence intervals.

Industry Key (1–44): 1 – Agriculture; 2 – Fishing; 3 – Mining (energy); 4 – Mining (non-energy); 5 – Mining Support; 6 – Food, Beverages, Tobacco; 7 – Textiles; 8 – Wood & Cork; 9 – Paper & Printing; 10 – Petroleum Products; 11 – Chemicals; 12 – Pharmaceuticals; 13 – Rubber & Plastics; 14 – Non-metallic Minerals; 15 – Basic Metals; 16 – Fabricated Metals; 17 – Electronics & Optics; 18 – Electrical Equipment; 19 – Machinery (n.e.c.); 20 – Motor Vehicles; 21 – Other Transport Equipment; 22 – Manufacturing n.e.c.; 23 – Electricity & Gas; 24 – Water & Waste; 25 – Construction; 26 – Trade & Repair; 27 – Land Transport; 28 – Water Transport; 29 – Air Transport; 30 – Warehousing & Support Transport; 31 – Postal Services; 32 – Accommodation & Food; 33 – Media & Publishing; 34 – Telecommunications; 35 – IT Services; 36 – Finance & Insurance; 37 – Waste & Remediation; 38 – Professional Services; 39 – Admin & Support; 40 – Public Admin & Defense; 41 – Education; 42 – Health & Social Work; 43 – Arts & Entertainment; 44 – Other Services.

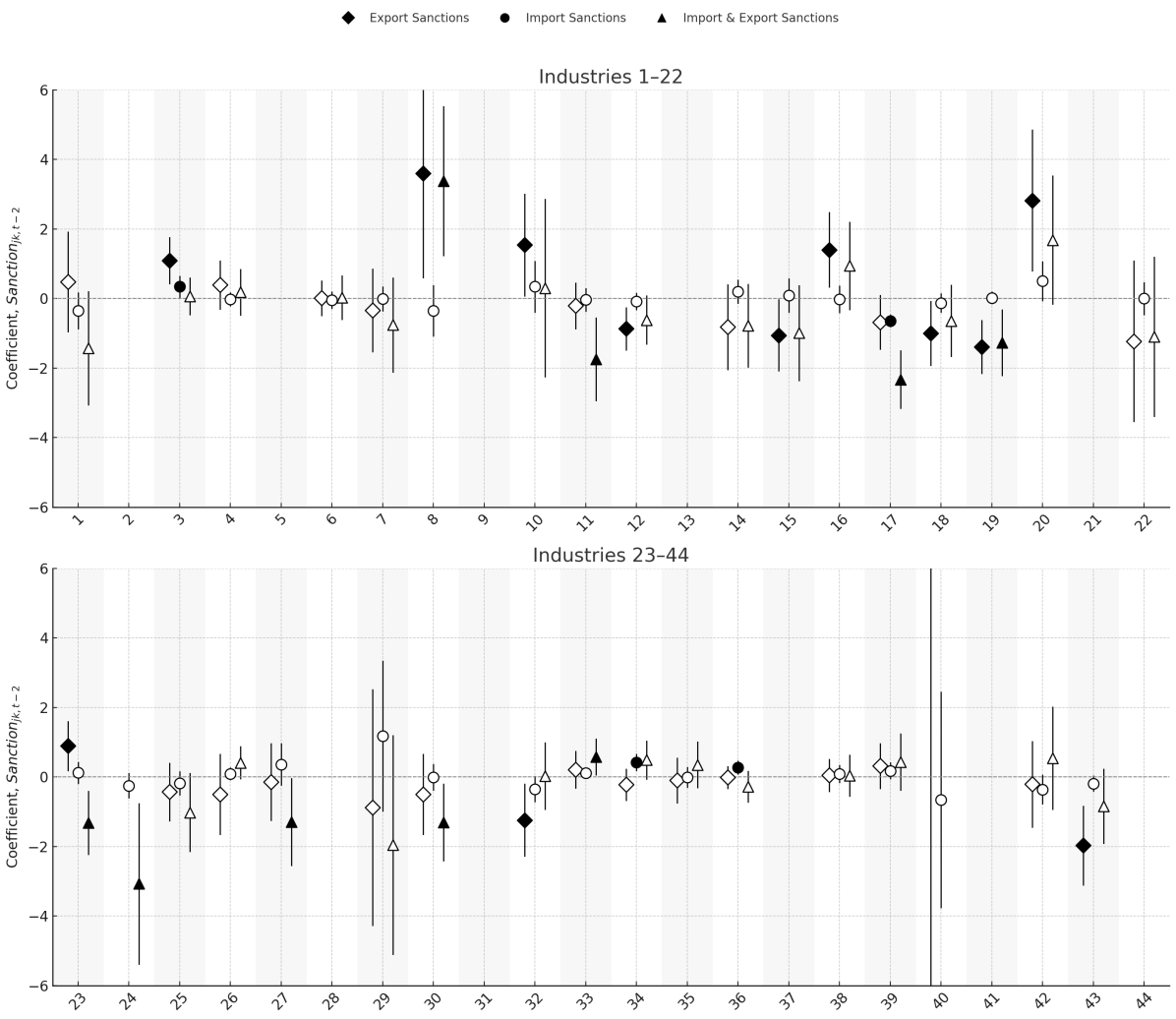

Figure 2.15: Types of Sanctions vs. M&A Deal Count in Target Country Industries

Note: Each coefficient is estimated from a separate industry-partitioned regression and represents the change in the number of M&A deals relative to unsanctioned dyads in the same industry. Significant estimates are indicated by shaded icons. All regressions include origin-year, destination-year, and directed dyad fixed effects. Vertical lines show 90% confidence intervals.

Industry Key (1–44): 1 – Agriculture; 2 – Fishing; 3 – Mining (energy); 4 – Mining (non-energy); 5 – Mining Support; 6 – Food, Beverages, Tobacco; 7 – Textiles; 8 – Wood & Cork; 9 – Paper & Printing; 10 – Petroleum Products; 11 – Chemicals; 12 – Pharmaceuticals; 13 – Rubber & Plastics; 14 – Non-metallic Minerals; 15 – Basic Metals; 16 – Fabricated Metals; 17 – Electronics & Optics; 18 – Electrical Equipment; 19 – Machinery (n.e.c.); 20 – Motor Vehicles; 21 – Other Transport Equipment; 22 – Manufacturing n.e.c.; 23 – Electricity & Gas; 24 – Water & Waste; 25 – Construction; 26 – Trade & Repair; 27 – Land Transport; 28 – Water Transport; 29 – Air Transport; 30 – Warehousing & Support Transport; 31 – Postal Services; 32 – Accommodation & Food; 33 – Media & Publishing; 34 – Telecommunications; 35 – IT Services; 36 – Finance & Insurance; 37 – Waste & Remediation; 38 – Professional Services; 39 – Admin & Support; 40 – Public Admin & Defense; 41 – Education; 42 – Health & Social Work; 43 – Arts & Entertainment; 44 – Other Services.

Table 2.5: Sanction Types vs. Industry-Level M&A Investments

TiVA Sector	Sanction Variable	M&A Value	M&A Count
Agriculture	$Export_{jk,t-2}$	5.36 (12.81)	0.48 (0.87)
	$Import_{jk,t-2}$	2.13 (3.86)	-0.35 (0.31)
	$ImpExp_{jk,t-2}$	-36.61*** (11.22)	-1.43 (0.99)
	$Financial_{jk,t-2}$	-6.54 (13.37)	-0.19 (0.76)
	$Travel_{jk,t-2}$	40.32** (19.84)	0.04 (0.88)
	$Military_{jk,t-2}$	7.75*** (2.01)	0.48 (0.52)
	$Arms_{jk,t-2}$	-8.41 (10.09)	0.10 (0.72)
	$Other_{jk,t-2}$	61.14*** (18.18)	-0.26 (1.04)
Fishing	$Export_{jk,t-2}$	—	—
	$Import_{jk,t-2}$	—	—
	$ImpExp_{jk,t-2}$	—	—
	$Financial_{jk,t-2}$	—	—
	$Travel_{jk,t-2}$	—	—
	$Military_{jk,t-2}$	—	—
	$Arms_{jk,t-2}$	—	—
	$Other_{jk,t-2}$	—	—
Mining and Quarrying, energy producing products	$Export_{jk,t-2}$	4.54* (2.72)	1.09*** (0.40)
	$Import_{jk,t-2}$	0.52 (0.49)	0.34* (0.18)
	$ImpExp_{jk,t-2}$	0.54 (1.34)	0.06 (0.32)
	$Financial_{jk,t-2}$	-0.61 (0.97)	-0.56* (0.30)
	$Travel_{jk,t-2}$	-5.91*** (1.66)	-0.45 (0.46)
	$Military_{jk,t-2}$	-1.92* (1.04)	-0.44** (0.19)
	$Arms_{jk,t-2}$	-0.25 (1.96)	-0.11 (0.34)
	$Other_{jk,t-2}$	5.43*** (1.37)	0.99* (0.60)
Mining and Quarrying, non-energy producing products	$Export_{jk,t-2}$	1.83 (1.35)	0.39 (0.42)
	$Import_{jk,t-2}$	-0.14 (0.37)	-0.02 (0.11)
	$ImpExp_{jk,t-2}$	3.05* (1.65)	0.18 (0.40)
	$Financial_{jk,t-2}$	-2.81** (1.25)	-0.51 (0.31)
	$Travel_{jk,t-2}$	-0.43 (0.88)	-0.35 (0.37)
	$Military_{jk,t-2}$	-1.21 (1.00)	-0.56** (0.25)
	$Arms_{jk,t-2}$	3.92*** (1.02)	0.89*** (0.34)
	$Other_{jk,t-2}$	6.20*** (2.11)	1.35*** (0.50)
Mining Support Service Activities	$Export_{jk,t-2}$	2.54 (2.15)	—
	$Import_{jk,t-2}$	0.05 (0.59)	—
	$ImpExp_{jk,t-2}$	-1.93 (1.63)	—
	$Financial_{jk,t-2}$	1.08 (1.71)	—
	$Travel_{jk,t-2}$	43434.37*** (8683.07)	—
	$Military_{jk,t-2}$	-0.47 (0.81)	—
	$Arms_{jk,t-2}$	-112.13*** (8.05)	—
	$Other_{jk,t-2}$	—	—
Food products, beverages, tobacco products	$Export_{jk,t-2}$	-0.12 (1.14)	0.01 (0.30)

Continued on next page

Table 2.5 (continued)

TiVA Sector	Sanction Variable	M&A Value	M&A Count
	$Import_{jk,t-2}$	2.17*** (0.50)	-0.05 (0.14)
	$ImpExp_{jk,t-2}$	-0.47 (1.34)	0.03 (0.38)
	$Financial_{jk,t-2}$	3.42*** (1.21)	0.05 (0.25)
	$Travel_{jk,t-2}$	-1.86 (1.85)	-0.34 (0.34)
	$Military_{jk,t-2}$	-2.05*** (0.70)	-0.13 (0.23)
	$Arms_{jk,t-2}$	-2.08 (1.50)	0.04 (0.30)
	$Other_{jk,t-2}$	0.15 (2.17)	-0.55 (0.46)
Textiles	$Export_{jk,t-2}$	-2.68 (2.31)	-0.34 (0.72)
	$Import_{jk,t-2}$	0.04 (0.76)	-0.01 (0.21)
	$ImpExp_{jk,t-2}$	-4.71* (2.71)	-0.76 (0.82)
	$Financial_{jk,t-2}$	2.17 (1.81)	0.08 (0.62)
	$Travel_{jk,t-2}$	-14.48*** (3.78)	-0.24 (1.06)
	$Military_{jk,t-2}$	0.96 (1.47)	-0.60 (0.45)
	$Arms_{jk,t-2}$	-13.11*** (3.01)	-2.41** (1.11)
	$Other_{jk,t-2}$	—	0.60 (1.37)
Wood and products of wood and cork	$Export_{jk,t-2}$	—	3.60** (1.82)
	$Import_{jk,t-2}$	-4.83*** (1.70)	-0.35 (0.44)
	$ImpExp_{jk,t-2}$	—	3.38*** (1.30)
	$Financial_{jk,t-2}$	—	-1.09 (1.29)
	$Travel_{jk,t-2}$	—	-1.28 (1.13)
	$Military_{jk,t-2}$	-7.90** (3.41)	-1.08** (0.42)
	$Arms_{jk,t-2}$	—	1.22 (0.91)
	$Other_{jk,t-2}$	—	-58.26*** (12.94)
Paper products and printing	$Export_{jk,t-2}$	12.62*** (3.82)	—
	$Import_{jk,t-2}$	1.46 (1.34)	—
	$ImpExp_{jk,t-2}$	1.31 (2.75)	—
	$Financial_{jk,t-2}$	-5.02*** (1.93)	—
	$Travel_{jk,t-2}$	4.81** (2.15)	—
	$Military_{jk,t-2}$	-2.66** (1.09)	—
	$Arms_{jk,t-2}$	-38.96 (11533.04)	—
	$Other_{jk,t-2}$	—	—
Coke and refined petroleum products	$Export_{jk,t-2}$	—	1.54* (0.89)
	$Import_{jk,t-2}$	—	0.34 (0.44)
	$ImpExp_{jk,t-2}$	—	0.30 (1.55)
	$Financial_{jk,t-2}$	—	-1.51 (1.01)
	$Travel_{jk,t-2}$	—	-0.78 (1.33)
	$Military_{jk,t-2}$	—	0.23 (0.47)
	$Arms_{jk,t-2}$	—	0.42 (0.76)
	$Other_{jk,t-2}$	—	-27.03*** (1.29)
Chemical and chemical products	$Export_{jk,t-2}$	-4.08 (2.62)	-0.21 (0.40)
	$Import_{jk,t-2}$	-0.46 (0.94)	-0.04 (0.20)
	$ImpExp_{jk,t-2}$	-6.85** (2.72)	-1.75** (0.72)

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Table 2.5 (continued)

TiVA Sector	Sanction Variable	M&A Value	M&A Count
	$Financial_{jk,t-2}$	0.61 (2.00)	0.43 (0.35)
	$Travel_{jk,t-2}$	6.97*** (2.03)	0.19 (0.47)
	$Military_{jk,t-2}$	-2.19* (1.21)	0.26 (0.22)
	$Arms_{jk,t-2}$	3.20 (3.36)	0.09 (0.41)
	$Other_{jk,t-2}$	—	-0.95 (1.26)
Pharmaceuticals	$Export_{jk,t-2}$	-0.44 (1.86)	-0.87** (0.37)
	$Import_{jk,t-2}$	1.20** (0.53)	-0.08 (0.14)
	$ImpExp_{jk,t-2}$	2.08 (2.06)	-0.62 (0.42)
	$Financial_{jk,t-2}$	0.45 (1.96)	0.56* (0.34)
	$Travel_{jk,t-2}$	1.04 (0.86)	0.75** (0.31)
	$Military_{jk,t-2}$	-1.38** (0.65)	-0.13 (0.21)
	$Arms_{jk,t-2}$	2.35 (2.10)	0.21 (0.38)
	$Other_{jk,t-2}$	15.36*** (3.22)	2.16* (1.14)
Rubber and plastic products	$Export_{jk,t-2}$	-0.93 (1.34)	—
	$Import_{jk,t-2}$	-0.14 (0.41)	—
	$ImpExp_{jk,t-2}$	-1.54 (1.46)	—
	$Financial_{jk,t-2}$	1.62 (1.19)	—
	$Travel_{jk,t-2}$	-0.98 (1.34)	—
	$Military_{jk,t-2}$	-1.14** (0.57)	—
	$Arms_{jk,t-2}$	-0.09 (0.89)	—
	$Other_{jk,t-2}$	—	—
Other non-metallic mineral products	$Export_{jk,t-2}$	—	-0.82 (0.74)
	$Import_{jk,t-2}$	—	0.20 (0.20)
	$ImpExp_{jk,t-2}$	—	-0.78 (0.72)
	$Financial_{jk,t-2}$	—	0.10 (0.64)
	$Travel_{jk,t-2}$	—	-0.35 (0.54)
	$Military_{jk,t-2}$	—	-0.42 (0.28)
	$Arms_{jk,t-2}$	—	0.15 (0.62)
	$Other_{jk,t-2}$	—	-0.61 (0.74)
Basic metals	$Export_{jk,t-2}$	—	-1.06* (0.62)
	$Import_{jk,t-2}$	—	0.09 (0.29)
	$ImpExp_{jk,t-2}$	—	-0.99 (0.83)
	$Financial_{jk,t-2}$	—	0.60 (0.63)
	$Travel_{jk,t-2}$	—	-0.80 (0.67)
	$Military_{jk,t-2}$	—	0.07 (0.38)
	$Arms_{jk,t-2}$	—	-0.72 (0.81)
	$Other_{jk,t-2}$	—	0.95 (1.20)
Fabricated metal products	$Export_{jk,t-2}$	—	1.40** (0.65)
	$Import_{jk,t-2}$	1.81* (1.07)	-0.02 (0.23)
	$ImpExp_{jk,t-2}$	3.56 (3.76)	0.94 (0.76)
	$Financial_{jk,t-2}$	-4.95 (3.19)	-0.49 (0.62)
	$Travel_{jk,t-2}$	4.42 (2.71)	1.61** (0.65)

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Table 2.5 (continued)

TiVA Sector	Sanction Variable	M&A Value	M&A Count
	$Military_{jk,t-2}$	1.02 (2.00)	-1.05*** (0.31)
	$Arms_{jk,t-2}$	-10.77*** (3.74)	-0.56 (0.83)
	$Other_{jk,t-2}$	—	-2.69 (1.72)
Computer, electronic, and optical equipment	$Export_{jk,t-2}$	-0.68 (1.77)	-0.13 (0.47)
	$Import_{jk,t-2}$	-0.64 (0.45)	-0.11 (0.10)
	$ImpExp_{jk,t-2}$	-2.33 (1.86)	-0.18 (0.50)
	$Financial_{jk,t-2}$	1.23 (1.85)	-0.21 (0.48)
	$Travel_{jk,t-2}$	2.49*** (0.76)	0.47* (0.28)
	$Military_{jk,t-2}$	1.87*** (0.55)	-0.22* (0.13)
	$Arms_{jk,t-2}$	-0.32 (1.61)	0.34 (0.38)
	$Other_{jk,t-2}$	—	—
Electrical equipment	$Export_{jk,t-2}$	6.50 (4.55)	-1.00* (0.56)
	$Import_{jk,t-2}$	2.53*** (0.69)	-0.13 (0.16)
	$ImpExp_{jk,t-2}$	4.52 (4.07)	-0.64 (0.62)
	$Financial_{jk,t-2}$	-7.78** (3.92)	0.56 (0.53)
	$Travel_{jk,t-2}$	-2.21 (2.07)	-0.69 (0.65)
	$Military_{jk,t-2}$	-1.63* (0.89)	-0.52*** (0.18)
	$Arms_{jk,t-2}$	-8.49*** (2.09)	0.59 (0.65)
	$Other_{jk,t-2}$	—	-0.36 (1.22)
Machinery and equipment, n. e. c.	$Export_{jk,t-2}$	-4.65 (3.57)	-1.39*** (0.46)
	$Import_{jk,t-2}$	1.32*** (0.50)	0.02 (0.10)
	$ImpExp_{jk,t-2}$	-3.83 (3.47)	-1.27** (0.57)
	$Financial_{jk,t-2}$	3.80 (3.47)	0.85* (0.50)
	$Travel_{jk,t-2}$	-0.66 (2.41)	0.44 (0.59)
	$Military_{jk,t-2}$	-2.57*** (0.83)	-0.09 (0.25)
	$Arms_{jk,t-2}$	0.34 (3.74)	0.14 (0.50)
	$Other_{jk,t-2}$	-1.43 (3.25)	-0.85 (1.08)
Motor vehicles, trailers, and semi-trailers	$Export_{jk,t-2}$	—	2.82** (1.23)
	$Import_{jk,t-2}$	—	0.50 (0.34)
	$ImpExp_{jk,t-2}$	—	1.68 (1.12)
	$Financial_{jk,t-2}$	—	-2.86** (1.19)
	$Travel_{jk,t-2}$	—	1.30** (0.55)
	$Military_{jk,t-2}$	—	-0.01 (0.47)
	$Arms_{jk,t-2}$	—	0.39 (0.82)
	$Other_{jk,t-2}$	—	19.87*** (1.92)
Other transport equipment	$Export_{jk,t-2}$	—	—
	$Import_{jk,t-2}$	20.18*** (7.52)	—
	$ImpExp_{jk,t-2}$	—	—
	$Financial_{jk,t-2}$	—	—
	$Travel_{jk,t-2}$	—	—
	$Military_{jk,t-2}$	23.43 (62.69)	—
	$Arms_{jk,t-2}$	-54.70 (42.43)	—

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Table 2.5 (continued)

TiVA Sector	Sanction Variable	M&A Value	M&A Count
	$Other_{jk,t-2}$	—	—
Manufacturing nec; repair and installation of machinery and equipment	$Export_{jk,t-2}$	—	-1.23 (1.40)
	$Import_{jk,t-2}$	—	-0.00 (0.28)
	$ImpExp_{jk,t-2}$	—	-1.10 (1.39)
	$Financial_{jk,t-2}$	—	0.70 (1.23)
	$Travel_{jk,t-2}$	—	0.67 (0.73)
	$Military_{jk,t-2}$	—	-0.02 (0.32)
	$Arms_{jk,t-2}$	—	-0.97 (0.64)
	$Other_{jk,t-2}$	—	-0.29 (1.39)
Electricity, gas, steam and air conditioning supply	$Export_{jk,t-2}$	10.89** (4.40)	0.89** (0.43)
	$Import_{jk,t-2}$	-0.15 (0.64)	0.12 (0.18)
	$ImpExp_{jk,t-2}$	-10.43*** (2.45)	-1.32** (0.55)
	$Financial_{jk,t-2}$	-7.07 (4.32)	-0.14 (0.39)
	$Travel_{jk,t-2}$	10.60** (4.48)	0.99* (0.58)
	$Military_{jk,t-2}$	-1.01 (1.45)	-0.08 (0.28)
	$Arms_{jk,t-2}$	8.49*** (2.51)	0.93** (0.40)
	$Other_{jk,t-2}$	6.21*** (1.55)	2.15*** (0.62)
Water supply; sewerage, waste management and remediation activities	$Export_{jk,t-2}$	—	—
	$Import_{jk,t-2}$	-3.64* (2.14)	-0.25 (0.21)
	$ImpExp_{jk,t-2}$	—	-3.07** (1.40)
	$Financial_{jk,t-2}$	—	-10.96*** (1.35)
	$Travel_{jk,t-2}$	—	-0.19 (0.87)
	$Military_{jk,t-2}$	48.31*** (15.29)	1.39** (0.65)
	$Arms_{jk,t-2}$	38.69 (1138.01)	14.04*** (1.29)
	$Other_{jk,t-2}$	—	—
Construction	$Export_{jk,t-2}$	—	-0.43 (0.50)
	$Import_{jk,t-2}$	—	-0.18 (0.20)
	$ImpExp_{jk,t-2}$	—	-1.02 (0.68)
	$Financial_{jk,t-2}$	—	0.20 (0.46)
	$Travel_{jk,t-2}$	—	-0.50 (0.56)
	$Military_{jk,t-2}$	—	-0.52** (0.23)
	$Arms_{jk,t-2}$	—	0.92* (0.52)
	$Other_{jk,t-2}$	—	0.86 (0.72)
Wholesale and retail trade; repair of motor vehicles	$Export_{jk,t-2}$	-2.60* (1.35)	-0.50* (0.26)
	$Import_{jk,t-2}$	0.50 (0.55)	0.09 (0.10)
	$ImpExp_{jk,t-2}$	1.80 (1.50)	0.41 (0.28)
	$Financial_{jk,t-2}$	-1.27 (1.58)	0.01 (0.23)
	$Travel_{jk,t-2}$	-1.57 (1.05)	-0.93*** (0.22)
	$Military_{jk,t-2}$	-0.13 (0.52)	0.02 (0.18)
	$Arms_{jk,t-2}$	-1.48 (0.95)	-0.01 (0.26)
	$Other_{jk,t-2}$	-2.87* (1.68)	0.77* (0.43)

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Table 2.5 (continued)

TiVA Sector	Sanction Variable	M&A Value	M&A Count
Land transport and transport via pipelines	$Export_{jk,t-2}$	—	-0.14 (0.67)
	$Import_{jk,t-2}$	—	0.36 (0.36)
	$ImpExp_{jk,t-2}$	—	-1.29* (0.76)
	$Financial_{jk,t-2}$	—	-0.09 (0.59)
	$Travel_{jk,t-2}$	—	-0.15 (0.71)
	$Military_{jk,t-2}$	—	-0.66* (0.35)
	$Arms_{jk,t-2}$	—	0.32 (0.62)
	$Other_{jk,t-2}$	—	0.05 (1.26)
Water transport	$Export_{jk,t-2}$	0.81 (1.99)	—
	$Import_{jk,t-2}$	0.02 (0.77)	—
	$ImpExp_{jk,t-2}$	1.22 (1.96)	—
	$Financial_{jk,t-2}$	-0.70 (1.91)	—
	$Travel_{jk,t-2}$	-1.19 (1.76)	—
	$Military_{jk,t-2}$	-0.09 (0.72)	—
	$Arms_{jk,t-2}$	3.43** (1.52)	—
	$Other_{jk,t-2}$	-0.81 (1.53)	—
Air transport	$Export_{jk,t-2}$	—	-0.88 (2.06)
	$Import_{jk,t-2}$	-20.08** (8.45)	1.18 (1.31)
	$ImpExp_{jk,t-2}$	—	-1.95 (1.91)
	$Financial_{jk,t-2}$	—	1.75 (1.51)
	$Travel_{jk,t-2}$	—	-1.55 (1.74)
	$Military_{jk,t-2}$	—	0.30 (1.18)
	$Arms_{jk,t-2}$	—	3.17 (2.13)
	$Other_{jk,t-2}$	—	—
Warehousing and support activities for transportation	$Export_{jk,t-2}$	-4.99 (4.47)	-0.50 (0.70)
	$Import_{jk,t-2}$	-1.47 (1.14)	-0.01 (0.22)
	$ImpExp_{jk,t-2}$	-19.38*** (7.28)	-1.31* (0.67)
	$Financial_{jk,t-2}$	4.60 (4.42)	1.34** (0.67)
	$Travel_{jk,t-2}$	10.26 (9.21)	0.69 (0.67)
	$Military_{jk,t-2}$	0.83 (1.62)	-0.56 (0.45)
	$Arms_{jk,t-2}$	5.17 (4.39)	-1.29* (0.75)
	$Other_{jk,t-2}$	—	0.02 (1.24)
Postal and courier activities	$Export_{jk,t-2}$	—	—
	$Import_{jk,t-2}$	—	—
	$ImpExp_{jk,t-2}$	—	—
	$Financial_{jk,t-2}$	—	—
	$Travel_{jk,t-2}$	—	—
	$Military_{jk,t-2}$	—	—
	$Arms_{jk,t-2}$	—	—
	$Other_{jk,t-2}$	—	—
Accommodation and food service activities	$Export_{jk,t-2}$	2.50 (3.33)	-1.24* (0.63)

Continued on next page

Table 2.5 (continued)

TiVA Sector	Sanction Variable	M&A Value	M&A Count
	$Import_{jk,t-2}$	1.53** (0.66)	-0.35 (0.22)
	$ImpExp_{jk,t-2}$	1.88 (3.23)	0.03 (0.58)
	$Financial_{jk,t-2}$	-3.02 (2.98)	0.51 (0.52)
	$Travel_{jk,t-2}$	-4.64* (2.60)	-0.35 (0.54)
	$Military_{jk,t-2}$	2.02** (0.92)	-0.23 (0.26)
	$Arms_{jk,t-2}$	-4.87* (2.85)	0.02 (0.60)
	$Other_{jk,t-2}$	7.72*** (2.84)	0.24 (1.01)
Publishing, audiovisual and broadcasting activities	$Export_{jk,t-2}$	0.19 (0.91)	0.21 (0.32)
	$Import_{jk,t-2}$	0.24 (0.35)	0.11 (0.08)
	$ImpExp_{jk,t-2}$	-1.71** (0.77)	0.58* (0.31)
	$Financial_{jk,t-2}$	1.41* (0.76)	-0.37 (0.27)
	$Travel_{jk,t-2}$	2.15*** (0.55)	0.07 (0.27)
	$Military_{jk,t-2}$	0.21 (1.09)	-0.08 (0.16)
	$Arms_{jk,t-2}$	-0.71 (1.00)	0.16 (0.30)
	$Other_{jk,t-2}$	3.38** (1.33)	-0.21 (0.67)
Telecommunications	$Export_{jk,t-2}$	-2.19 (1.57)	-0.22 (0.27)
	$Import_{jk,t-2}$	1.17* (0.69)	0.42*** (0.14)
	$ImpExp_{jk,t-2}$	-0.74 (1.52)	0.49 (0.33)
	$Financial_{jk,t-2}$	-1.11 (1.61)	-0.30 (0.26)
	$Travel_{jk,t-2}$	1.04 (0.98)	-0.29 (0.35)
	$Military_{jk,t-2}$	1.57** (0.70)	-0.04 (0.14)
	$Arms_{jk,t-2}$	-2.67** (1.15)	-0.68** (0.27)
	$Other_{jk,t-2}$	3.16 (2.09)	0.66 (0.47)
IT and other information services	$Export_{jk,t-2}$	1.95 (1.56)	-0.10 (0.39)
	$Import_{jk,t-2}$	0.23 (0.50)	-0.01 (0.17)
	$ImpExp_{jk,t-2}$	1.27 (1.33)	0.35 (0.40)
	$Financial_{jk,t-2}$	-1.46 (1.18)	-0.30 (0.37)
	$Travel_{jk,t-2}$	-0.81 (0.90)	0.21 (0.38)
	$Military_{jk,t-2}$	0.27 (0.64)	0.22 (0.24)
	$Arms_{jk,t-2}$	-1.26 (1.22)	-0.07 (0.40)
	$Other_{jk,t-2}$	3.80** (1.85)	0.32 (1.75)
Financial and insurance activities	$Export_{jk,t-2}$	-0.15 (0.82)	-0.01 (0.19)
	$Import_{jk,t-2}$	0.27 (0.42)	-0.02 (0.11)
	$ImpExp_{jk,t-2}$	-1.48* (0.86)	-0.28 (0.27)
	$Financial_{jk,t-2}$	1.23* (0.72)	0.07 (0.18)
	$Travel_{jk,t-2}$	-0.18 (0.67)	-0.19 (0.26)
	$Military_{jk,t-2}$	-0.99** (0.40)	-0.44*** (0.14)
	$Arms_{jk,t-2}$	0.33 (0.73)	0.26 (0.22)
	$Other_{jk,t-2}$	0.16 (1.09)	0.31 (0.33)
Water supply; sewerage, waste management and remediation activities	$Export_{jk,t-2}$	—	—
	$Import_{jk,t-2}$	—	—
	$ImpExp_{jk,t-2}$	—	—

Continued on next page

Table 2.5 (continued)

TiVA Sector	Sanction Variable	M&A Value	M&A Count
	$Financial_{jk,t-2}$	—	—
	$Travel_{jk,t-2}$	—	—
	$Military_{jk,t-2}$	—	—
	$Arms_{jk,t-2}$	—	—
	$Other_{jk,t-2}$	—	—
Professional, scientific and technical activities	$Export_{jk,t-2}$	3.77*** (1.26)	0.05 (0.28)
	$Import_{jk,t-2}$	-1.41** (0.59)	0.09 (0.15)
	$ImpExp_{jk,t-2}$	1.62 (1.37)	0.04 (0.36)
	$Financial_{jk,t-2}$	-2.75** (1.32)	0.24 (0.29)
	$Travel_{jk,t-2}$	0.11 (0.78)	-0.52 (0.40)
	$Military_{jk,t-2}$	0.28 (0.56)	-0.16 (0.13)
	$Arms_{jk,t-2}$	-1.08 (0.97)	-0.28 (0.28)
	$Other_{jk,t-2}$	-2.87 (2.24)	-1.36* (0.73)
Administrative and support services	$Export_{jk,t-2}$	-0.21 (2.51)	0.32 (0.39)
	$Import_{jk,t-2}$	1.45*** (0.54)	0.18 (0.14)
	$ImpExp_{jk,t-2}$	-2.40 (3.55)	0.43 (0.49)
	$Financial_{jk,t-2}$	1.86 (2.44)	-0.15 (0.34)
	$Travel_{jk,t-2}$	0.13 (3.30)	0.08 (0.40)
	$Military_{jk,t-2}$	-1.09 (0.83)	-0.38* (0.20)
	$Arms_{jk,t-2}$	1.37 (3.19)	-0.26 (0.42)
	$Other_{jk,t-2}$	—	-1.10 (0.68)
Public administration and defence; compulsory social security	$Export_{jk,t-2}$	—	833.15 (762.00)
	$Import_{jk,t-2}$	—	-0.66 (1.88)
	$ImpExp_{jk,t-2}$	—	20.93*** (3.82)
	$Financial_{jk,t-2}$	—	—
	$Travel_{jk,t-2}$	—	—
	$Military_{jk,t-2}$	—	-27.18*** (2.60)
	$Arms_{jk,t-2}$	—	—
	$Other_{jk,t-2}$	—	—
Education	$Export_{jk,t-2}$	6.82 (5.49)	—
	$Import_{jk,t-2}$	-1.98* (1.15)	—
	$ImpExp_{jk,t-2}$	2.71 (5.39)	—
	$Financial_{jk,t-2}$	-4.62 (5.38)	—
	$Travel_{jk,t-2}$	-19.27* (10.80)	—
	$Military_{jk,t-2}$	-1.78** (0.75)	—
	$Arms_{jk,t-2}$	—	—
	$Other_{jk,t-2}$	—	—
Human health and social work activities	$Export_{jk,t-2}$	—	-0.21 (0.75)
	$Import_{jk,t-2}$	—	-0.36 (0.25)
	$ImpExp_{jk,t-2}$	—	0.54 (0.89)
	$Financial_{jk,t-2}$	—	-0.33 (0.66)
	$Travel_{jk,t-2}$	—	-0.56 (0.62)

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Table 2.5 (continued)

TiVA Sector	Sanction Variable	M&A Value	M&A Count
	$Military_{jk,t-2}$	—	-0.09 (0.39)
	$Arms_{jk,t-2}$	—	0.02 (0.77)
	$Other_{jk,t-2}$	—	-0.34 (0.99)
Arts, entertainment and recreation	$Export_{jk,t-2}$	—	-1.97*** (0.69)
	$Import_{jk,t-2}$	—	-0.19 (0.13)
	$ImpExp_{jk,t-2}$	—	-0.84 (0.65)
	$Financial_{jk,t-2}$	—	0.37 (0.59)
	$Travel_{jk,t-2}$	—	-0.26 (0.43)
	$Military_{jk,t-2}$	—	-0.11 (0.22)
	$Arms_{jk,t-2}$	—	0.37 (0.49)
	$Other_{jk,t-2}$	—	0.06 (1.29)
Other service activities	$Export_{jk,t-2}$	—	—
	$Import_{jk,t-2}$	—	—
	$ImpExp_{jk,t-2}$	—	—
	$Financial_{jk,t-2}$	—	—
	$Travel_{jk,t-2}$	—	—
	$Military_{jk,t-2}$	—	—
	$Arms_{jk,t-2}$	—	—
	$Other_{jk,t-2}$	—	—
N		775,083	788,040

Note: Models estimated via Poisson pseudo-maximum likelihood with origin-year, target-year, industry-year, and directed country-pair fixed effects. Standard errors clustered by directed dyad are in parentheses. Industry fixed effects are based on TiVA sector codes. Significance levels: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 2.6: Effects of Trade Sanctions and Industry Concentration on Bilateral Industry FDI

Independent Variables	**GF Value**$_{ijkt}$	**GF Count**$_{ijkt}$	**M&A Value**$_{ijkt}$	**M&A Count**$_{ijkt}$
Export$_{jk,t-2}$	0.48**	-0.07	0.36	-0.16
	(0.22)	(0.11)	(0.44)	(0.13)
$\times$ HHI$_i$	-0.01	-0.12***	-0.03	-0.13*
	(0.04)	(0.03)	(0.10)	(0.06)
Import$_{jk,t-2}$	-0.20	-0.14***	0.78***	-0.01
	(0.14)	(0.05)	(0.17)	(0.04)
$\times$ HHI$_i$	0.10	0.04	0.10	0.04*
	(0.08)	(0.04)	(0.08)	(0.02)
ImpExp$_{jk,t-2}$	0.00	-0.10	0.48	-0.07
	(0.22)	(0.10)	(0.40)	(0.14)
$\times$ HHI$_i$	-0.02	-0.05	0.18*	-0.02
	(0.05)	(0.04)	(0.08)	(0.02)
Financial$_{jk,t-2}$	-0.33**	0.09	-0.47	-0.13
	(0.17)	(0.08)	(0.32)	(0.09)
Travel$_{jk,t-2}$	0.08	-0.22***	-0.16	-0.03
	(0.23)	(0.08)	(0.33)	(0.11)
Military$_{jk,t-2}$	-0.24	-0.07	-0.60***	-0.21**
	(0.16)	(0.06)	(0.17)	(0.08)
Arms$_{jk,t-2}$	-0.19	0.01	-1.28*	0.00
	(0.20)	(0.08)	(0.51)	(0.12)
Other$_{jk,t-2}$	0.73**	0.23	-0.44	0.20
	(0.32)	(0.15)	(0.54)	(0.11)
Observations	14,736,347	14,736,347	33,756,331	33,806,916

Notes: Models estimated via Poisson pseudo-maximum likelihood with origin-year, target-year, industry-year, and directed country-pair fixed effects. Standard errors clustered by directed dyad are in parentheses. Industry fixed effects are based on ITPD-E sector codes. There are many more industries ITPD-E industries in the M&A data than in the greenfield data. HHI$_i$ denotes the mean-centered log of the average Herfindahl-Hirschman Index for each industry across all years of the sample. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.7: Effects of Trade Sanctions and Upstreamness on Bilateral Industry FDI

Independent Variables	**GF Value**$_{ijkt}$	**GF Count**$_{ijkt}$	**M&A Value**$_{ijkt}$	**M&A Count**$_{ijkt}$
Export$_{jk,t-2}$	0.37	-0.02	0.25	-0.03
	(0.40)	(0.10)	(0.38)	(0.11)
× Upstreamness$_i$	0.74	-1.08	0.53	0.11
	(2.27)	(0.82)	(1.90)	(0.46)
Import$_{jk,t-2}$	-0.19	-0.16***	0.66***	-0.06
	(0.13)	(0.05)	(0.18)	(0.05)
× Upstreamness$_i$	-1.61**	-0.95***	0.09	0.48
	(0.63)	(0.28)	(0.63)	(0.32)
ImpExp$_{jk,t-2}$	-0.21	-0.08	0.17	-0.07
	(0.23)	(0.10)	(0.46)	(0.14)
× Upstreamness$_i$	1.74***	0.71***	1.55	0.36*
	(0.64)	(0.27)	(1.86)	(0.15)
Financial$_{jk,t-2}$	-0.30*	0.09	-0.53	-0.14
	(0.16)	(0.08)	(0.34)	(0.09)
Travel$_{jk,t-2}$	0.08	-0.23***	-0.11	-0.02
	(0.22)	(0.08)	(0.35)	(0.11)
Military$_{jk,t-2}$	-0.28*	-0.08	-0.51**	-0.21**
	(0.14)	(0.06)	(0.17)	(0.08)
Arms$_{jk,t-2}$	-0.21	0.03	-1.12*	0.01
	(0.19)	(0.07)	(0.50)	(0.12)
Other$_{jk,t-2}$	0.58*	0.18	-0.43	0.13
	(0.32)	(0.16)	(0.51)	(0.11)
Observations	17,336,878	17,336,878	35,404,988	35,461,800

Notes: Models estimated via Poisson pseudo-maximum likelihood with origin-year, target-year, industry-year, and directed country-pair fixed effects. Standard errors clustered by directed dyad are in parentheses. Industry fixed effects are based on TiVA sector codes. There are many more TiVA sectors in the M&A data than in the greenfield data. Upstreamness$_i$ is the mean-centered log of each industry's average upstreamness in the sample. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.8: Effects of Trade Sanctions and Trade Dependence on Bilateral Industry FDI

Independent Variables	**GF Value**$_{ijkt}$	**GF Count**$_{ijkt}$	**M&A Value**$_{ijkt}$	**M&A Count**$_{ijkt}$
Export$_{jk,t-2}$	0.61***	0.09	-0.10	-0.09
	(0.21)	(0.11)	(0.39)	(0.10)
× Export Dependence$_{ijk,t-2}$	-3.49	-6.69**	-54.15	0.76
	(3.58)	(2.67)	(44.04)	(1.51)
× Import Dependence$_{ijk,t-2}$	8.61**	2.99	11.99	-6.63
	(3.57)	(3.19)	(10.07)	(6.35)
Import$_{jk,t-2}$	-0.17	-0.13**	0.69***	-0.01
	(0.16)	(0.06)	(0.18)	(0.04)
× Export Dependence$_{ijk,t-2}$	-1.59	2.08	2.33***	-0.12
	(2.67)	(2.23)	(0.87)	(0.25)
× Import Dependence$_{ijk,t-2}$	1.74	-3.35	-2.30**	0.07
	(2.69)	(2.37)	(0.93)	(0.22)
ImpExp$_{jk,t-2}$	0.18	-0.03	0.15	-0.12
	(0.22)	(0.11)	(0.42)	(0.14)
× Export Dependence$_{ijk,t-2}$	-3.48	1.73	21.00**	-0.47
	(4.29)	(2.04)	(10.58)	(1.60)
× Import Dependence$_{ijk,t-2}$	-3.29	0.15	-3.81	0.03
	(2.33)	(0.67)	(2.46)	(0.54)
Financial$_{jk,t-2}$	-0.43***	0.03	-0.15	-0.07
	(0.16)	(0.09)	(0.33)	(0.09)
Travel$_{jk,t-2}$	0.27	-0.16*	-0.62	-0.09
	(0.22)	(0.09)	(0.41)	(0.11)
Military$_{jk,t-2}$	-0.24	-0.06	-0.57***	-0.22***
	(0.16)	(0.06)	(0.17)	(0.07)
Arms$_{jk,t-2}$	-0.21	-0.01	-1.30***	0.04
	(0.20)	(0.08)	(0.48)	(0.12)
Other$_{jk,t-2}$	0.72**	0.24	-0.24	0.26**
	(0.33)	(0.15)	(0.46)	(0.11)
Log Export Dependence$_{ijk,t-2}$	1.55***	1.49***	-0.61	0.10
	(0.60)	(0.35)	(0.53)	(0.08)
Log Import Dependence$_{ijk,t-2}$	0.65	-0.34	-0.12	-0.01
	(0.59)	(0.38)	(0.42)	(0.06)
Observations	12,726,845	12,726,845	42,617,846	42,672,366

Notes: Models estimated via Poisson pseudo-maximum likelihood with origin-year, target-year, industry-year, and directed country-pair fixed effects. Standard errors clustered by directed dyad are in parentheses. Industry fixed effects are based on ITPD-E industries in greenfield and M&A data. Trade dependence measures (*Export Dependence* and *Import Dependence*) are mean-centered logs of the share of total sector-level sales or consumption attributed to the target country. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2.9: ISIC Division Mapping: TiVA and ITPD-E Concordance

ISIC Division, Rev. 3, Description	ISIC	Regroup	TiVA	ITPD-E
Crop and animal production, hunting and related service activities	1	1	1	1 – 26
Forestry and logging	2	2	1	27
Fishing and aquaculture	3	3	2	28
Mining of coal and lignite	5	5	3	29, 30
Extraction of crude petroleum and natural gas	6	6	3	31
Mining of metal ores	7	7	4	32
Other mining and quarrying	8	89	4	33
Mining support service activities	9	89	5	33
Manufacture of food products	10	10	6	36–48
Manufacture of beverages	11	11	6	49–52
Manufacture of tobacco products	12	12	6	53
Manufacture of textiles	13	1314	7	54–59
Manufacture of wearing apparel	14	1314	7	59–61
Manufacture of leather and related products	15	15	7	62–64
Manufacture of wood and of products of wood and cork, except furniture	16	16	8	65–69
Manufacture of paper and paper products	17	17	9	70–72
Printing and reproduction of recorded media	18	18	9	73–78
Manufacture of coke and refined petroleum products	19	19	10	79–80
Manufacture of chemicals and chemical products	20	20	11	82–86, 88–90

Continued on next page

Table 2.9 (continued)

ISIC Division, Rev. 3, Description	ISIC	Regroup	TiVA	ITPD-E
Manufacture of pharmaceuticals, medicinal chemical and botanical products	21	21	12	87
Manufacture of rubber and plastics products	22	22	13	91–93
Manufacture of other non-metallic mineral products	23	23	14	94–101
Manufacture of basic metals	24	24	15	102–103
Manufacture of fabricated metal products, except machinery and equipment	25	25	16	104–108, 121
Manufacture of computer, electronic and optical products	26	26	17	124, 131–137
Manufacture of electrical equipment	27	27	18	123, 125–130
Manufacture of machinery and equipment n.e.c.	28	28	19	109–120, 122
Manufacture of motor vehicles, trailers and semi-trailers	29	29	20	138–140
Manufacture of other transport equipment	30	30	21	141–147
Manufacture of furniture	31	31	22	148
Other manufacturing	32	32	22	149–153
Repair and installation of machinery and equipment	33	33	22	.
Electricity, gas, steam and air conditioning supply	35	35	23	34–35
Water collection, treatment and supply	36	36	24	.
Sewerage	37	37	24	.

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Table 2.9 (continued)

ISIC Division, Rev. 3, Description	ISIC	Regroup	TiVA	ITPD-E
Waste collection, treatment and disposal activities; materials recovery	38	38	24	.
Remediation activities and other waste management services	39	39	24	.
Construction of buildings	41	4143	25	158
Civil engineering	42	4143	25	158
Specialized construction activities	43	4143	25	158
Wholesale and retail trade and repair of motor vehicles and motorcycles	45	4547	26	155
Wholesale trade, except of motor vehicles and motorcycles	46	4547	26	155
Retail trade, except of motor vehicles and motorcycles	47	4547	26	155
Land transport and transport via pipelines	49	4953	27	156
Water transport	50	4953	28	156
Air transport	51	4953	29	156
Warehousing and support activities for transportation	52	4953	30	156
Postal and courier activities	53	4953	31	156
Accommodation	55	5556	32	.
Food and beverage service activities	56	5556	32	.
Publishing activities	58	5863	33	162
Motion picture, TV, sound recording	59	5863	33	162
Programming and broadcasting activities	60	5863	33	162
Telecommunications	61	5863	34	162
Computer programming, consultancy and related activities	62	5863	35	162

Continued on next page

Table 2.9 (continued)

ISIC Division, Rev. 3, Description	ISIC	Regroup	TiVA	ITPD-E
Information service activities	63	5863	35	162
Financial service activities (except insurance and pension)	64	6467	36	159–160
Insurance, reinsurance and pension funding	65	6467	36	159–160
Holding and other investment offices	67	6467	36	159–160
Activities of head offices; management consultancy activities	70	70	38	163
Architectural and engineering activities	71	71	38	163
Scientific research and development	72	72	38	163
Advertising and market research	73	73	38	163
Other professional, scientific and technical activities	74	74	38	163
Veterinary activities	75	75	38	163
Employment activities	78	7882	39	163
Travel agency and related activities	79	7882	39	163
Security and investigation activities	80	7882	39	163
Services to buildings and landscape activities	81	7882	39	163
Office administrative and other business support activities	82	7882	39	163
Public administration and defence	84	84	40	.
Education	85	8588	41	166
Human health activities	86	8588	42	165
Residential care activities	87	8588	42	165
Social work activities without accommodation	88	8588	42	165
Libraries, archives, museums	91	9196	43	164

Continued on next page

Table 2.9 (continued)

ISIC Division, Rev. 3, Description	ISIC	Regroup	TiVA	ITPD-E
Gambling and betting activities	92	9196	43	164
Sports, amusement and recreation activities	93	9196	43	164
Activities of membership organizations	94	9196	44	164
Repair of computers and household goods	95	9196	44	164
Other personal service activities	96	9196	44	164
Activities of households as employers of domestic personnel	97	97	45	.

Table 2.10: fDi Markets Sector Mapping to TiVA and ITPD-E Concordance

fDi Markets Sector	**Sector Code**	**Regrouped**	**TiVA**	**ITPD-E**
Aerospace	1	121	21	144
Automotive Components	2	23	20, 26	138, 139, 140
Automotive OEM	3	23	20, 26	138, 139, 140
Building Materials	4	4	8, 14	.
Business Machines and Equipment	5	5	19	124
Ceramics and Glass	6	6	14	94, 95, 96, 97
Chemicals	7	7	11	82, 83, 84, 85, 86, 88, 89
Coal, Oil and Gas	8	8	3, 5, 10	29, 30, 31, 35, 79, 80
Communications	9	9	34	162
Consumer Electronics	10	10	17	133
Electronic Components	11	11	17, 18	131, 132, 135, 136, 137
Engines and Turbines	12	12	19	109
Industrial Equipment	13	13	19	110–120, 122
Metals	14	1415	4, 5, 15, 16	32, 33, 102, 103, 104, 105, 108
Minerals	15	1415	4, 5, 14	33, 98, 99, 100, 101
Non-Automotive Transportation OEM	16	16	21	141–147
Pharmaceuticals	17	17	12	87
Plastics	18	18	13	93
Rubber	19	19	13	91, 92
Semiconductors	20	20	17	131
Space and Defense	21	121	21, 40	121, 144
Wood Products	22	22	8, 9	65–69

CHAPTER

3

BYPASSING TRADE SANCTIONS: HOW CHARACTERISTICS OF U.S. FIRMS SHAPE M&A IN TARGET COUNTRIES

The annexation of Crimea in 2014 and the full-scale invasion of Ukraine in 2022 by the Russian Federation were met with sweeping financial and trade restrictions aimed at deterring Western engagement with Russian markets. While many firms responded by cutting ties with Russia entirely, others perceived opportunity amid this retreat. For instance, despite U.S. trade sanctions targeting Russia's energy sector, the American oilfield services company SLB expanded its operations in Russia in 2022. This behavior is not isolated. Between 2014 and 2022, U.S. firms announced 46 mergers and acquisitions (M&A) in Russia[1]. This highlights a broader pattern: some American firms deepen their presence in sanctioned markets even after new restrictions are imposed.

The pattern of increased M&A in sanctioned markets raises a critical question about how

[1] Calculated by author from SDC M&A data

multinational firms manage their global capital flows during times of heightened trade restrictions. International trade sanctions are primarily designed to reduce bilateral trade between sender and target countries, and a large body of empirical evidence confirms that trade volumes fall accordingly (Kohl et al., 2024; Jäkel et al., 2024; Larch et al., 2022; Felbermayr, Syropoulos, Yalcin, and Yotov, 2020). Yet the effects of sanctions on foreign direct investment (FDI) – especially at the firm level – remain less clear. In some cases, trade sanctions inadvertently prompt multinational firms from the sanctioning country to increase their investments in the target market, either to circumvent higher trade costs, acquire distressed assets, or exploit reduced competition.

This study seeks to understand how firm heterogeneity explains foreign direct investment patterns after the imposition of trade sanctions. What is the size of multinational companies that increase their presence in sanctioned markets? Are they more flexible due to cash reserves? Are they politically connected? Do they have past experience in sanctioned markets? The answers to these questions will shed light on which firms are most capable of navigating restrictive policy environments.

Specifically, I evaluate the impact of international sanctions imposed by the United States on the mergers and acquisitions (M&A) by publicly listed American multinational companies in sanctioned countries from 2003 until 2022. I focus on trade sanctions because they directly create barriers to exporting and importing goods. In response, firms may turn to foreign direct investment as a way to preserve access to key markets, circumvent restrictions, or restructure supply chains. Studying trade sanctions provides a clear test of how firms adapt when traditional trade channels are restricted but investment channels remain open.

My focus on the United States is relevant for several reasons. First, the United States is one of the most important sanctioning countries, responsible for most unilateral sanctions and a participant in all UN-backed sanctions due to its role on the United Nations Security Council. American firms also dominate global M&A activity, accounting for a large share of cross-border deals. US companies are also more likely to increase their presence in target countries after sanctions. Chapter I of this dissertation showed that FDI flows from the US into target countries increased after unilateral sanctions imposed by the United States. A closer examination of U.S. firms is warranted because they may enjoy advantages such as access to lobbying channels, sanctions waivers, and regulatory flexibility that are less

available to non-U.S. firms.

This study is structured as follows. I begin with an overview of how firms of different sizes, liquidity, political connections, and experience with sanctions might respond to trade bans. Next, I present the empirical strategy used to estimate the impact of US sanctions on firm-level M&A in sanctioned countries. I then explain the data before moving on to the results. Finally, I conclude with a summary of findings and their implications for decision-makers.

3.1 Firm Heterogeneity and M&A Response to Sanctions

Firm characteristics shape many of the trade and investment patterns observed on global markets. In general, multinational companies tend to be larger and more productive than firms that only operate domestically, and foreign direct investors tend to be the most productive of those multinational firms (Helpman et al., 2004; Bernard et al., 2007). Under geopolitical risk and uncertainty, though, adjustment strategies may vary considerably across the set of multinational firms. Four firm characteristics that can explain the varying impact of international sanctions on M&A across companies are the investor's firm size, financial flexibility, past experience in sanctioned markets, and political ties with the sanctioning government.

3.1.1 Firm Size

Large multinational firms often have operations that span many countries and multiple industries. These firms may be better positioned to replace sanctioned activities with existing relationships due to their presence in many global markets. For instance, Apple announced in 2025 that it would adapt to U.S. tariffs against China by shifting production to existing production centers in India (Vengattil, 2025). These large firms might also be the most equipped to increase their market power by acquiring assets in sanctioned markets due to their large revenues. Size may also influence the reputation damage incurred by the firm when it operates in sanctioned markets though. Large companies have better brand recognition and may provoke the ire of consumers if their adaptations to sanctions are deemed unethical. On the other hand, large companies often have a complex network of subsidiaries that can be used to obscure their activities in sanctioned markets.

In short, the effect of firm size on M&A activity in sanctioned countries is ex ante am-

biguous. Large firms may reduce M&A due to their public visibility and ability to shift operations to other locations. Conversely, they may increase M&A because they have the resources to invest in sanctioned markets or the organizational complexity to conceal such activities.

3.1.2 Financial Flexibility

A firm's ability to complete a merger or acquisition depends on its financial flexibility. Lamont et al., 2001 defines financial constraints as frictions that prevent firms from undertaking desired investments, often due to illiquid assets or limited access to external credit. Almeida et al., 2004 shows that financially constrained firms tend to accumulate cash as a precaution. Similarly, Merkoulova and Zivanovic, 2022 finds that constrained firms are less likely to finance acquisitions with cash, suggesting that liquidity plays a key role in M&A decisions.

These constraints may be more binding in the context of acquisitions in sanctioned countries, where regulatory risks, limited financing options, and reputational concerns raise the effective cost of capital. Firms without enough internal liquidity may be unable or unwilling to pursue deals in these markets. As a result, the firms that increase M&A activity after sanctions could be those with the cash and flexibility needed to overcome these barriers.

3.1.3 Experience in Sanctioned Countries

An investor's past experience with M&A deals in sanctioned countries can impact how that firm adjusts its investments after new restrictions are imposed. An investor who has never completed an M&A deal under a sanctioned market might overestimate the risk and pull out of the market entirely. Meanwhile, investors with significant experience in sanctioned countries have a more realistic understanding of risk and respond with adjustment strategies that minimally comply with the sanctions rules. These adjustment strategies are discussed in greater detail in Weber and Stępień, 2020.

3.1.4 Political Connections

While international sanctions are designed to harm a target country, they practically restrict the behavior of people and companies within the sanctioning state. For example, trade and financial sanctions imposed by the United States against Russia penalize U.S. firms that engage with Russian markets. Politically connected firms can receive exemptions to sanctions,

however. These firms may lobby for carve-outs, delay enforcement, or shape the design of sanctions altogether. As a result, politically connected firms face fewer constraints and may expand their activity in sanctioned markets while less connected competitors pull back.

Secondary sanctions extend these restrictions to foreign firms that do business with the sanctioned country, creating additional pressure on global partners. Multilateral sanctions, sanctions imposed against a target by multiple countries, can similarly drive out multinational companies by legally requiring firms in cooperating countries to exit the market. However, foreign firms typically lack the political channels to negotiate exemptions or influence enforcement. This gives U.S. firms with strong political ties a relative advantage in navigating sanctions. Firms with strong political connections to the U.S. government may increase or hold steady their investments in sanctioned countries.

Prior research has demonstrated that political connections can shape how firms respond to regulatory constraints. Faccio, 2006 shows that in countries with high levels of corruption or significant regulatory barriers to foreign direct investment, firms often rely on politically connected shareholders or executives to gain preferential access or avoid unfavorable treatment. While Faccio's analysis emphasizes connections between firms and officials in host countries, my study shifts the focus to connections between firms and policymakers in their home country. In both cases, however, the central concern is the relationship between firms and the authorities responsible for enforcing or designing relevant regulations. There is also evidence that politically connected investors are more likely to successfully acquire targets and face less regulatory scrutiny (Ferris et al., 2016). Politically connected firms may find it easier to invest in sanctioned countries due to looser restrictions from sanctioning government.

3.2 Empirical Strategy

I estimate the impact of U.S. sanctions on both the value and count of M&A deals by publicly listed American multinational firms in target countries using a gravity-style Poisson model. Although the Poisson model is traditionally used for count data, it is well suited for non-negative continuous outcomes such as investment values when estimated via Poisson pseudo-maximum likelihood (PPML). PPML accommodates the frequent occurrence of zero flows and addresses heteroskedasticity, which is common in international transactions

transactions data (Silva and Tenreyro, 2006, Santos Silva and Tenreyro, 2011). While the Poisson distribution assumes equidispersion, or equal conditional mean and variance, PPML remains consistent under any variance structure, provided the conditional mean is correctly specified as $E(Y_{ijt} \mid X_{ijt}) = \exp(X_{ijt}\beta)$ (Gourieroux et al., 1984, Silva and Tenreyro, 2006). This specification is likely to hold in my setting, as the model is grounded in the multiplicative gravity framework for FDI. PPML is particularly appropriate for M&A data since they are non-negative, zero-inflated, and right-skewed due to a small number of exceptionally large transactions. I implement the estimator using the `ppmlhdfe` command in Stata, which handles common convergence issues and supports high-dimensional multi-way fixed effects Correia et al., 2020b. The baseline regression is below.

$$M\&A_{ijkt} = \exp\Big(\beta_1 \text{Sanction}_{jk,t-\ell} + \beta_2 \text{InterstateConflict}_{jk,t-\ell} + \beta_3 \text{IntrastateConflict}_{k,t-\ell} + \gamma_{it} + \mu_{st} + \delta_k + \epsilon_{ijkt}\Big) \tag{3.1}$$

The dependent variable is $M\&A_{ijkt}$ is the total value or count of mergers and acquisitions announced by multinational firm i from home country j into host country k during year t. Since this study focuses exclusively only the M&A decisions of American multinational companies, home country j is always the United States. The independent variable $Sanction_{jk,t-\ell}$ takes a value of 1 if the United States imposed sanctions against country k during year $t-\ell$. The lag reflects the reality that it takes investors some time to adjust to sanctions with foreign direct investments. As in previous chapters, I use a two-year lag ($\ell = 2$) for all independent variables in the main regression.

My fixed effects strategy is motivated by best practices in the gravity modeling literature since I am modeling international flows. Specifically, gravity models should be estimated using origin-year, destination-year, and directed dyad fixed effects when the independent variable of interest varies across time and country-pairs. However, some adjustments are necessary due to my emphasis on U.S. firms. The origin country is now always the United States, so the origin-year fixed effect is not necessary. The dyadic fixed effect collapses into the destination fixed effect δ_k for a similar reason. Note that I cannot include a destination-year fixed effect because it would absorb $Sanction_{jkt}$. The fixed effects in equation 1 include firm-year (γ_{it}), industry-year (μ_{st}), and destination country (δ_k). Firms are identified with the 6-digit CUSIP code of each acquiring company in the M&A data. Industries are

identified with 2-digit NAICS codes. γ_{it} captures the time-varying characteristics of firms like revenue, employees, and corporate policies. μ_{st} captures global conditions that affect all firms in the same industry s in a given year, such as sector-specific macroeconomic shocks. The error term is clustered by destination country to allow for correlations between M&A deals within the same country.

The fixed effects strategy does not control for time-varying characteristics of the host country, which is problematic in this setting. Humanitarian crises, civil wars, and other forms of intrastate conflict in the target country often precede or coincide with the imposition of sanctions. If such events also influence M&A activity by increasing political risk or disrupting local markets, the estimated effect of sanctions may conflate the impact of these underlying shocks. This presents a risk of omitted variable bias. To address this concern, I include $IntrastateConflict_{k,t-\ell}$, a dummy variable that captures the presence of intrastate conflict in the host country two years prior. I control for the presence of militarized conflict between the home and host country using $InterstateConflict_{jk,t-\ell}$ a separate interstate conflict indicator. These controls help isolate the effect of sanctions from other politically destabilizing events that could independently affect cross-border investments.

I also estimate a specification that isolates the effect of each type of sanction on firm-level mergers and acquisitions. Building on the framework introduced in previous chapters, I replace the composite sanction indicator, $Sanction_{jk,t-\ell}$, with a vector of sanction-type dummies. These include indicators for export restrictions, import restrictions, joint import–export restrictions, financial sanctions, travel bans, arms embargoes, and bans on military assistance. All other aspects of the model remain consistent with the baseline specification presented in Equation (1). The sanction-type model is below.

$$\begin{aligned} M\&A_{ijkt} = \exp\Big(&\beta_1 \,\text{Export}_{jk,t-\ell} + \beta_2 \,\text{Import}_{jk,t-\ell} + \beta_3 \,\text{ImpExp}_{jk,t-\ell} \\ &+ \beta_4 \,\text{Financial}_{jk,t-\ell} + \beta_5 \,\text{Travel}_{jk,t-\ell} + \beta_6 \,\text{Military}_{jk,t-\ell} + \beta_7 \,\text{Arms}_{jk,t-\ell} + \beta_8 \,\text{Other}_{jk,t-\ell} \\ &+ \beta_9 \,\text{InterstateConflict}_{jk,t-\ell} + \beta_{10} \,\text{IntrastateConflict}_{k,t-\ell} \\ &+ \gamma_{it} + \mu_{st} + \delta_k + \epsilon_{ijkt}\Big) \end{aligned} \tag{3.2}$$

The main coefficients of interest in equation (2) are β_1, β_2, and β_3. These coefficients identify the effect of trade sanctions on firm-level M&A deals in sanctioned countries. Since the

variables are dummies, their coefficients tell us that the imposition of the given restriction changes the value or count of firm-level M&A deals in the target by $(exp(\beta_i)-1)\times 100$.

Finally, I analyze the role of firm heterogeneity by interacting firm characteristics with the trade sanction variables.

3.3 Data

The sample consists of all cross-border mergers and acquisitions announced and completed by 4,016 U.S. publicly listed multinational firms in 146 destination countries from 2003 until 2022. This leads to a panel of 11,726,720 observations. M&A deals occurred in 122 of the destination countries in the sample were sanctioned by the United States government at some point during the sample period. 47 destination countries were targeted by the United States government with trade sanctions. M&A deals occurred in 36 of the countries facing trade sanctions.

Beyond cross-border M&A deals and international sanctions, I use data on international and intranational armed conflicts, the financial information of acquiring firms, firm-level lobbying expenditures, and the number of times firms have completed M&A deals in sanctioned countries.

3.3.1 Cross-Border Mergers and Acquisitions

Information on cross-border mergers and acquisitions come from SDC, a database published by Refinitive. SDC provides rich information on M&A deals announced by investors from nearly every country. Each observation includes a unique deal ID, the target company, the acquiring company, the origin country, the host (or target) country, the deal announcement date, a status code that indicates whether the deal is pending or was completed or withdrawn, a variable indicating whether the company is public, and the deal value (SDC, n.d.).

I trimmed the M&A data to completed cross-border deals by publicly listed companies based in the United States. These M&A deals were aggregated by value and count within each firm-destination-year using Stata's collapse command. I then made a list of distinct

origin countries (just the United States), destination countries[2], and US multinational firms. I used this information to create a panel of every firm-destination-year investment channel from 2003 until 2022. I merged the M&A data to the firm-destination-year panel. Any firm-destination-year observations that did not match to the M&A data are assumed to have zero M&A deals. This is a standard practice in the M&A literature due to the completeness of SDC data. However, I changed the M&A value variable to missing in any observation where the M&A count is positive and the M&A value is zero.

3.3.2 International Sanctions

The international sanctions come from the Global Sanctions Database (GSDB) – a record of all sanctions imposed by governments since 1950. The Global Sanctions Database was first introduced in Felbermayr, Kirilakha, et al., 2020 and underwent several updates that are explained in Kirilakha et al., 2021, Syropoulos et al., 2023, and Yalcin et al., 2025. At the time of writing, GSDB contains 1,547 sanctions cases through the end of 2023.

The Global Sanctions Database contains detailed information on each sanction episode, including the identity of the sanctioning states and sanctioned countries, the stated political objectives, whether those objectives were achieved, and the specific types of measures imposed. Sanctions are categorized based on the mechanism through which they aim to exert pressure. Trade sanctions include export bans, import bans, and joint restrictions on both imports and exports, all of which are designed to disrupt the target country's ability to engage in international commerce. Financial sanctions limit access to capital by restricting transactions, freezing assets, or cutting off banking ties. Arms embargoes prohibit the export of weapons and military equipment, while bans on military assistance block material support to targeted military and paramilitary groups. Travel bans target individuals by restricting entry into the sanctioning country, often applying to political elites. Other sanctions include a residual category of measures that do not fall neatly into the previous types, such as restrictions on diplomatic engagement or harbor access.

[2]The countries (in iso3c format) are ABW, AGO, ALB, ANT, ARG, ARM, ATG, AUS, AUT, AZE, BEL, BGD, BGR, BHS, BIH, BLR, BLZ, BMU, BOL, BRA, BRB, BWA, CAN, CHE, CHL, CHN, CMR, COD, COL, CRI, CSK, CYM, CYP, DEU, DMA, DNK, DOM, DZA, ECU, EGY, ESP, EST, ETH, FIN, FRA, GAB, GBR, GEO, GGY, GHA, GIB, GIN, GNQ, GRC, GRD, GTM, GUM, GUY, HKG, HND, HRV, HUN, IDN, IMN, IND, IRL, ISL, ISR, ITA, JAM, JEY, JOR, JPN, KAZ, KEN, KNA, KOR, KWT, LAO, LBN, LBR, LCA, LIE, LSO, LTU, LUX, LVA, MAC, MAR, MCO, MDG, MDV, MEX, MLI, MLT, MMR, MNE, MNG, MOZ, MUS, MYS, NGA, NIC, NLD, NOR, NZL, OMN, PAK, PAN, PER, PHL, PNG, POL, PRI, PRT, PRY, QAT, ROU, RUS, RWA, SAU, SGP, SLE, SLV, SRB, SUR, SVK, SVN, SWE, SYC, TCA, THA, TTO, TUN, TUR, TWN, TZA, UAE, UKR, URY, VEN, VGB, VIR, VNM, ZAF, and ZMB.

GSDB is also available in a dyadic format. Each observation in the dyadic dataset includes information on the sanctioning country, the sanctioned country, the year, and the types of sanctions in force. Since each observation is identified by origin country (sender), destination country (target), and year, the sanctions dataset is easily merged to the panel of cross-border M&A transactions.

3.3.3 Armed Conflicts

I obtain information on interstate and intrastate armed conflicts from the Uppsala Conflict Data Program (UCDP). Specifically, I use the dyad-year version of the UCDP/PRIO Armed Conflict Dataset (v24.1), which records armed conflicts between two opposing sides from 1946 through 2023. This dataset was introduced by Harbom et al., 2008 and expanded in S. Davies et al., 2024.[3]

UCDP defines a dyad as a pair of opposing actors in a conflict. These actors can be states or non-state groups such as rebel organizations. In contrast, this study defines dyads strictly as country pairs. To merge the conflict data with investment data, I restructure the dataset accordingly. Each conflict is first classified as either interstate or intrastate. Interstate conflicts are those in which both actors are recognized states. Cross-border conflicts involving non-state actors on one side, such as the United States and Al-Qaeda, are excluded.

I construct an interstate conflict dummy that equals one if two countries are in conflict with each other in a given year. I also create an intrastate conflict dummy that equals one if a country experiences conflict within its borders, regardless of the identity of the opposing actor. The interstate conflict variable is merged to the M&A data at the dyad-year level. The intrastate conflict variable is merged by country and year for both origin and target countries in the M&A dataset.

3.3.4 Firm Revenue and Cash

Recall from earlier that I am interested in how M&A in sanctioned markets depends on the size and financial flexibility of firms. I use revenue to measure firm size and cash holdings to

[3]All conflicts included in the UCDP/PRIO dataset meet a minimum threshold of 25 battle-related deaths per calendar year. See Gleditsch et al., 2002 for original coding rules.

measure financial flexibility. Cash holdings are a good proxy of the firm's financial flexibility because they represent immediately available internal funds that can be used to respond to shocks, finance investment without relying on external capital, and take advantage of time-sensitive opportunities. High levels of cash allow firms to operate with greater autonomy from credit markets, particularly during periods of high uncertainty. This flexibility is especially valuable when firms face frictions in accessing debt or equity, such as during international sanctions.

Revenue and cash holdings are available for many publicly listed U.S. firms through Compustat, a dataset containing the financial information of global companies managed by S&P Global Ratings, n.d. I derive firm-level characteristics from financial statements submitted with the issuance of securities. Since firms often issue multiple securities at different points within the same year, it is necessary to clean the data before merging it with the M&A transactions. Each security is identified by a 9-digit CUSIP code, with the first six digits corresponding to the issuing firm. For each firm-year (defined by the 6-digit CUSIP and year), I retain the maximum reported values of revenue and cash holdings and collapse the data to one observation per firm-year. The cleaned Compustat data is then merged to the M&A data using the 6-digit CUSIP and year. Because revenue and cash data are not available for all firms in every year, I create time-invariant variables based on the average revenue and average cash holdings across available years. This approach limits my ability to analyze firm-level changes over time, but it preserves information on cross-sectional differences in firm size and financial flexibility. Revenue data are available for 2,398 firms. Cash data are available for 2,404 firms.

3.3.5 Lobbying Expenditures

There are many ways to measure the political influence of U.S. firms, such as lobbying expenditures, contributions to political action committees, and the personal connections of board members. I use firm-level lobbying expenditures because companies can directly influence legislative actions by hiring lobbying firms. Lobbying expenditures are publicly available due to the reporting requirements of the Lobbying Disclosure Act of 1995. However, it is now known that these disclosures do not capture the full extent of a company's political influence. For example, firms trying to navigate sanctions may hire legal counsel to engage directly with the U.S. Treasury's Office of Foreign Assets Control to request licenses, exemptions, or interpretive guidance. These efforts are typically framed as legal services

and are not subject to lobbying disclosure requirements. Libgober and Carpenter, 2024 find that expenditures on this unofficial lawyer-lobbying are potentially much larger than expenditures on traditional lobbying.

Lobbying expenditures likely reflect only a portion of total political influence. Still, they may serve as a strong proxy if reported and unreported lobbying are positively correlated. In that case, firms that spend more on disclosed lobbying are also more likely to exert influence through undisclosed channels. While incomplete, lobbying expenditures offer a measure of political activity that can be used to study heterogeneity in how firms respond to sanctions.

I obtain lobbying expenditures data from LobbyView, a firm-level lobbying and congressional bills database introduced in Kim, 2018. Firms in LobbyView are uniquely identified by gvkey, a firm identifier used in Compustat and other S&P data products. I begin by linking each investing firm's 6-digit CUSIP code with its gvkey. I then use LobbyView's client database to identify which firms have hired registered lobbyists. If a firm has ever engaged in lobbying, it is assigned a unique identifier called lob_id in LobbyView. This lob_id is used to match firms to their lobbying expenditures for each filing period in the reports database. I construct the annual total of lobbying expenditures by summing all reported amounts by lob_id for each year. This annual measure of firm-level lobbying activity is then merged to the M&A data using gvkey and year. Since the LobbyView database is comprehensive, any unmatched firms in the M&A data are assumed to have zero lobbying expenditures for the given year.

The variable $Lobbying\ Expenditure_{it}$ is a year-varying firm-level variable. It is lagged by two years in the model based on the assumption that there is time lapse between the firm's investment decisions and the observed M&A deals, and that those decisions are based on political connections at the time of the initial decision.

3.3.6 Sanctions Experience

I measure each firm's sanctions experience by counting the number of M&A deals it has announced in sanctioned countries up to and including the current year. Using the international sanctions and cross-border M&A data described earlier, I identify whether the target country was under sanctions at the time of each deal. For each firm, I construct a cumulative count of all deals in sanctioned countries. $Sanction\ Experience_{it}$ captures how often

a firm i has invested in restricted environments and serves as a proxy for its experience navigating sanctions-related compliance and risk. $Sanction\ Experience_{it}$ is lagged by two years prior to estimation just like all other time-varying independent variables.

3.3.7 Further Data Processing

All continuous variables (i.e., firm characteristics) are log-transformed to improve the interpretation of the results. By taking the natural log of each firm characteristic, the coefficients can be interpreted as elasticities. Since firm heterogeneity is examined using an interaction term, the effects of sanctions on M&A will be presented within two groups. By default, the main effect represents the impact of U.S. sanctions on firm-level M&A deals when the interacted firm characteristic is equal to zero. However, this interpretation is inappropriate in the context of revenue and cash, since most firms with non-missing data report strictly positive values. In such cases, a zero value lies outside the support of the data, and the main effect would correspond to an out-of-sample scenario. To address this, I mean-center all log-transformed firm characteristics so that the main effect of sanctions corresponds to the average firm in the sample. In particular, each continuous firm characteristic is transformed as follows:

$$\widetilde{X}_{it} = \ln(X_{it}+1) - \frac{1}{N}\sum_{i=1}^{N}\ln(X_{it}+1)$$

where X_{it} is the original value of the firm characteristic for firm i in year t, and $\widetilde{X}_{it}$ is the resulting log-transformed and mean-centered variable. The term +1 ensures that the new variable is defined even when $X_{it} = 0$.

3.4 Descriptive Statistics

Table 3.1 describes the panel of firm-destination-year M&A observations. The full sample includes 11,720,772 firm-destination-year observations, covering 4,016 publicly listed U.S. multinational firms investing in 146 host countries between 2003 and 2022. As is typical with foreign direct investment data, most of these observations are zero. Investments occur in 10,974 observations. M&A deal values are available for 5,026 of observations. 4,016 U.S. multinational firms are responsible for all U.S. outbound M&A investments, but only 2,652 firms are present in the value data. The average value of firm-destination-year M&A flows is $395.45 million, the largest observation being $43,478.10 million. Meanwhile, the average number of firm-destination-year M&A deals is 1.1 deals, with the largest observation

being 9 deals. In short, the distribution is likely over-dispersed with the mean exceeding the variance. While the Poisson model typically requires equidispersion, the preferred Poisson pseudo-maximum likelihood estimator simply requires that the conditional mean is correctly specified. Overdispersion is not a problem for PPML.
Table 3.2 presents summary statistics for M&A activity in sanctioned countries by U.S. investors. Investments vary across sanction categories. The largest amount of M&A activity, both in value and count, occurs in host countries without sanctions. The average firm-level investment value in unsanctioned countries is $484.57 million, and the average number of deals is 1.1. In this sense, unsanctioned countries tend to host more M&A activity than the sample average.

In sanctioned countries, the average value of firm-level M&A is lower, at $266.38 million. The average number of deals per firm-year remains similar at 1.09. This suggests that deal frequency does not vary much by sanction status, but deal size does.

Average values differ across sanction types. Host countries facing import bans or combined export-import bans have mean M&A values of $390.90 million and $350.30 million, respectively. Host countries facing export bans alone receive much smaller average M&A flows, at $87.55 million. These differences may reflect variation in the kinds of firms that operate under each type of restriction or the opportunities available in those markets.

M&A activity under sanctions is also relatively rare. Of the 11.7 million firm-destination-year observations, only 5.2 million occur under any sanction, and just 2,053 of those involve non-zero investment. Export bans account for 28,055 observations, with only 45 non-zero firm-destination-year flows by 41 firms. Import bans appear in 132,144 observations and lead to 380 non-zero flows from 337 firms. Joint export-import bans cover over 1.1 million observations but only 95 non-zero flows involving 88 firms.

Most U.S. firms do not invest in sanctioned countries. Where investment does occur, it is limited to a small number of firms, especially under export restrictions. These descriptive patterns suggest substantial variation in exposure and investment activity across sanction types. The question remains whether these M&As by the investing firms are consistent with sanction-jumping or opportunism.

Table 3.1: M&A Activity Across the Full Sample of Firm-Destination-Year Observations

Panel A: M&A Value	
Statistic	**All Observations**
Total Observations	11,720,772
Non-zero Observations	5,026
Number of Investing Firms	2,652
Mean	395.45
Median	51.81
Min	0.01
Max	43,478.10
Standard Deviation	1,715.79
Panel B: M&A Count	
Statistic	**All Observations**
Total Observations	11,726,720
Non-zero Observations	10,974
Number of Investing Firms	4,016
Mean	1.10
Median	1
Min	1
Max	9
Standard Deviation	0.38

Note: Descriptive statistics are calculated using only non-zero M&A observations. M&A values are expressed in millions of U.S. dollars.

Table 3.2: Summary of Firm-Level M&A Investments by Sanction Exposure

Panel A: M&A Value (millions USD)					
Statistic	**No Sanctions**	**Any Sanction**	**Export Ban**	**Import Ban**	**Export-Import Ban**
Total Observations	6,502,121	5,218,651	28,055	132,144	1,168,527
Non-zero Observations	2,973	2,053	45	380	95
Number of Investing Firms	1,760	1,339	41	337	88
Mean	484.57	266.38	87.55	390.90	350.30
Median	74.20	34.89	21.30	36.82	109.00
Min	0.01	0.01	0.01	0.04	0.05
Max	43,478.10	42,729.87	723.20	42,729.87	3,400.00
Standard Deviation	1,939.88	1,315.56	161.39	2,395.99	594.38
Panel B: M&A Count					
Statistic	**No Sanctions**	**Any Sanction**	**Export Ban**	**Import Ban**	**Export-Import Ban**
Total Observations	6,505,920	5,220,800	28,112	132,528	1,168,656
Non-zero Observations	6,772	4,202	102	764	224
Number of Investing Firms	2,725	2,163	89	599	184
Mean	1.10	1.09	1.15	1.06	1.05
Median	1	1	1	1	1
Min	1	1	1	1	1
Max	9	5	4	4	3
Standard Deviation	0.40	0.35	0.45	0.28	0.24

Note: M&A values are expressed in millions of U.S. dollars. “Number of Investing Firms” refers to the count of unique U.S. firms that made at least one M&A investment in the specified category.

Table 3.3 summarizes the firms in the sample. A total of 4,016 publicly traded U.S. multinational firms announced at least one cross-border M&A deal between 2003 and 2022. On average, these firms spent $0.20 million per year on lobbying and had prior experience with 0.85 M&A deals in sanctioned countries. Revenue and cash data are available for more than half of all firms. Due to data constraints, revenue and cash holdings are averaged over time for each firm, and summary statistics are based on these firm-level averages.

Among the 2,398 firms with revenue data, the average firm earned $4,676.26 million in annual revenue. Revenue is highly dispersed, with a standard deviation of $18,081.07 million and a maximum of $435,669.70 million. Cash reserves are available for 2,404 firms. The mean value of average cash holdings is $636.35 million, with a standard deviation of $3,104.89 million and a maximum of $73,272.00 million. Lobbying expenditures vary widely, ranging from $0 to $995.00 million, while M&A experience in sanctioned countries ranges from 0 to 35 deals. Table 3.4 summarizes firm characteristics by sanction exposure. Firms that invest in sanctioned countries tend to be somewhat larger than those investing only in unsanctioned markets. Among firms with revenue data, the average revenue for those operating in sanctioned countries is $12,890.00 million, compared to $11,884.64 million for firms that operate only in countries without sanctions. Revenue averages are even higher among firms that invest in countries under export bans ($17,902.91 million) and joint export-import bans ($12,631.42 million). However, these means are skewed by a small number of very large firms. Across all groups, revenue is highly dispersed due to a wide variety of firm sizes.

Cash holdings follow a similar pattern. The average firm investing in sanctioned countries holds $2,564.94 million in cash reserves, slightly more than firms investing only in unsanctioned markets ($2,371.43 million). Firms active in countries under export bans report the highest average cash reserves, at $5,090.66 million. Firms operating under import bans report lower average cash holdings of $1,806.75 million, and the lowest median among all groups. This may reflect a different profile of firms engaging with import-restricted markets like smaller or more financially constrained firms.

Lobbying expenditures are broadly similar across groups. The average annual lobbying expenditure is $0.5753 million for firms investing only in unsanctioned countries and $0.4807 million for firms with activity in sanctioned markets. Median lobbying is zero in all groups, indicating that many firms report no lobbying activity. The means are influenced

by a relatively small number of politically active firms.

Firms investing in sanctioned countries tend to have more experience doing so. Among firms with sanctioned M&A exposure, the average firm completed 1.60 such deals, compared to 2.38 for firms without recent sanctioned activity. Experience is highest among firms investing in countries under joint export-import bans (2.51 deals) and export bans (2.07 deals). This suggests that repeat entry into sanctioned environments is concentrated among a small group of firms with prior exposure.

These patterns suggest that firms investing in sanctioned markets are, on average, larger, more experienced, and slightly more politically engaged. Firms under export-only sanctions tend to be larger and more liquid. Firms under import restrictions appear somewhat smaller, on average, but still represent a non-trivial share of overall sanctioned activity. These descriptive differences point to possible selection into sanctioned markets but do not indicate how sanctions shape investment behavior. An empirical strategy is needed to assess these effects.

3.5 Results

I now carry out the empirical analysis. I first estimate the impact of any type of U.S. sanction on the total value and count of firm-level M&A deals flowing from the United States to the sanctioned countries two years later. I then replace the sanction dummy with a vector of sanction-type indicators to estimate how effects vary across different restrictions. I then move on the heterogeneity analysis, where I interact the sanctions variables with average firm revenue, average cash holdings, lobbying expenditures, and cumulative sanctions experience. Recall from earlier that all models are estimated via Poisson pseudo-maximum likelihood with firm-year, industry-year, and destination (host) country fixed effects. Robust standard errors are clustered by destination country.

3.5.1 U.S. Sanctions vs. Firm-Level M&A in Sanctioned Countries

Table 3.5 and figure 3.1 present the effects of sanctions imposed by the United States on mergers and acquisitions by American companies in target countries. All results should be interpreted relative to the reference group of firm-destination-year observations that are not exposed to lagged sanctions or armed conflicts.

Firms significantly reduce the number of M&A deals in sanctioned countries. This decline appears to be driven by travel restrictions and bans on military assistance. Sanctions have no significant effect on the average value of investments by U.S. firms in target countries. One possible explanation is that firms adopt different adjustment strategies that can either raise or lower the value of M&A deals after sanctions are imposed. These adjustments may depend on both the type of sanction and the characteristics of the firm. While the average effect of any sanction ($Sanction_{jk,t-2}$) is statistically insignificant, import bans and arms embargoes show distinct patterns. Import sanctions increase the average value of firm-level investments, while arms sanctions reduce them. The number of M&A deals is not significantly affected by either import sanctions or arms sanctions.

The increase in M&A value after import bans aligns with several foreign direct investment strategies, including export platforming and firesale FDI. As discussed in Chapter 1, export platforming might occur when a U.S. firm can no longer import from the target country due to sanctions. Rather than abandon the supply chain, the firm can acquire the producer in the sanctioned market to control production and export decisions. Because the United States prohibits imports from the sanctioned country, the firm reroutes goods through neutral third countries. These intermediaries are not directly subject to the same restrictions and can export to the U.S. without violating the sanctions regime. This three-step strategy – production in the target country, transit through a neutral country, and re-export to the U.S. – allows the firm to maintain supply while complying with trade restrictions. The link between M&A deals and export platforming is well-documented in the context of tariffs. During the 2018 US-China trade war, Chinese firms acquired Vietnamese assets to establish an export platform to re-route trade from China to Vietnam to the United States to circumvent increased trade costs (Iyoha et al., 2025). While the Chinese firms were attempting to maintain the flow of exports and not imports, this example illustrates the importance of M&As in trade diversion strategies. It is plausible that U.S. firms would similarly acquire firms in the sanctioned country to maintain supply chains.

An alternative possibility is that U.S. import restrictions reduce the value of foreign firms in the sanctioned country by cutting them off from a major export destination. When U.S. firms are prohibited from importing goods from the target country, producers that once relied on American demand face sharp revenue losses. This is particularly damaging for firms in export-oriented sectors, whose business models depend on stable access to foreign

markets. As demand collapses, asset prices in the sanctioned country may fall, creating buying opportunities for U.S. investors. Firms with sufficient capital and risk tolerance may take advantage of these distressed valuations by acquiring local producers at a discount.

3.5.2 Firm Heterogeneity

Table 3.6 and figure 3.2 show how the effects of different types of sanctions on the value of M&A deals vary by the four firm characteristics discussed earlier in the study. Table 3.7 and figure 3.3 show how those interactions impact M&A counts. The sample-wide average effects concealed an interesting fact: some U.S. firms respond to export restrictions by acquiring assets in the target country.

Firm size, cash reserves, political connections, and past sanctions experience all appear to influence firm-level M&A decisions following export sanctions. At the average level of log-transformed revenue, export sanctions do not significantly affect the value of M&A deals. A similar pattern holds for firms with average levels of log-transformed cash reserves, lobbying expenditures, and sanctions experience. In contrast, firms with above-average levels of these characteristics increase their M&A expenditures after export sanctions. This suggests that the firms responding strategically to export sanctions are those that are large, financially liquid, and experienced in operating within sanctioned environments. Firms that allocate more than average to lobbying two years before the M&A announcement also increase their acquisitions in sanctioned countries, though the effect is modest in size. Similar patterns emerge when analyzing the count of M&A deals rather than their value.

Taken together, these results imply that adaptation to export sanctions through foreign investment is concentrated among firms with the resources and institutional knowledge to pursue risky cross-border deals. These firms may be engaging in export-sanction-jumping – a strategy of acquiring production assets in the target country to maintain market access when exporting from the United States is no longer feasible. They could also be exploiting reduced competition in sanctioned markets, where non-U.S. multinational firms exit the target country due to the risk of secondary sanctions imposed by the United States. In either case, M&A becomes a tool for repositioning in response to export bans, but only for U.S. firms with the capacity to act.

An entirely different pattern emerges when examining how firm characteristics shape

M&A decisions following import sanctions. Firms with average levels of revenue, cash reserves, lobbying expenditures, and sanctions experience significantly increase the value of their M&A deals in target countries after import bans. Interestingly, larger firms and those that spend more on lobbying do not exhibit statistically significant changes in their M&A activity in response to import restrictions. Firms with above-average sanctions experience increase the value of their M&A deals, but the fact that the average firm already shows a strong positive response suggests that prior experience is not the primary determinant of whether a firm pursues acquisitions after import bans. In contrast, firms with above-average cash reserves significantly reduce their M&A expenditures. One possible explanation is that firms with ample liquidity may already have the flexibility to adjust supply chains or stockpile inventories, making acquisitions unnecessary. Put differently, firms with large cash reserves may have a broader menu of adjustment strategies and can more easily locate alternative suppliers. Firms with more constrained cash positions may be more likely to engage in import-sanction-jumping, a strategy of acquiring production assets in the target country to retain access to critical goods or resources that are no longer legally importable from abroad. By purchasing suppliers in the target country, U.S. firms can continue using those inputs within their global operations, either by routing them through neutral third countries or by shifting downstream production closer to the source. Notably, the effect on the number of M&A deals does not vary significantly with any of the firm characteristics, suggesting that firm-level responses to import bans are driven by the scale of investment rather than the frequency of deals.

When import and export restrictions are imposed together, firms with above-average revenue and cash reserves significantly reduce the number of their M&A deals in sanctioned countries. No other significant effects are detected. One possibility is that joint import-export sanctions send a stronger signal of geopolitical and commercial risk, discouraging firms from pursuing acquisitions altogether. Another explanation is that the export-sanction-jumping strategy, observed when export restrictions are imposed in isolation, becomes unviable once U.S. firms are also barred from importing goods from the target country. In previous cases, U.S. firms may have acquired upstream production assets in the sanctioned country to ensure continuity of supply chains that depended on U.S. inputs and ultimately served the U.S. market. But when import bans are layered on top, the incentive to maintain upstream operations collapses since the final goods or components can no longer re-enter the United States.

3.6 Conclusion

This study examined how U.S. sanctions affect the M&A decisions of American multinational companies in sanctioned countries and how those decisions vary across firm characteristics. Rather than deterring all forms of engagement, trade sanctions can prompt U.S. firms to increase their M&A activity in sanctioned markets. In general, sanctions that restrict imports from the target country lead to larger acquisitions by average firms that are not especially large, liquid, or politically connected. These firms may be using M&A to secure local production and re-route goods back to the United States through neutral third countries. In contrast, export sanctions lead to increased M&A activity by large, liquid, politically connected, and experienced firms, likely as a way to preserve foreign market access or take advantage of reduced competition resulting from multilateral or secondary sanctions.

These findings contribute to the growing literature on the unintended consequences of economic sanctions. While sanctions are designed to restrict cross-border engagement with targeted economies, this study shows that U.S. multinational firms can adapt with capital investments. M&A may allow firms to maintain or reposition operations when direct trade becomes legally or logistically restricted. If sanctioning authorities aim to reduce economic ties, they may need to pair trade restrictions with investment controls that target capital flows as well.

Several questions remain for future research. Do firms that continue investing in sanctioned countries operate under formal waivers, or are they responding to gaps in sanctions enforcement? Are some firms openly defying sanctions? Understanding how M&A behavior varies across firms with and without licenses to operate in sanctioned markets would offer insight into the compliance environment. Future work could also examine how sanctions affect firm-level greenfield investment, which may involve longer-term commitments and greater regulatory risk than mergers and acquisitions. Studying this distinction can clarify which types of firms choose between building new capacity and acquiring existing assets when adapting to sanctions.

Table 3.3: Firm Characteristics in the Full Sample (2003–2022)

Panel A: Financial Characteristics		
	Avg. Revenue (millions USD)	**Avg. Cash (millions USD)**
Firms	2,398	2,404
Mean	4,676.26	636.35
Median	583.50	87.36
Min	0	0
Max	435,669.70	73,272.00
Standard Deviation	18,081.07	3,104.89
Panel B: Lobbying Expenditures and Sanctioned M&A Experience		
	Annual Lobbying (millions USD)	**Sanctioned M&A Experience**
Firms	4,016	4,016
Mean	0.2012	0.85
Median	0	0
Min	0	0
Max	995.00	35
Standard Deviation	3.77	1.80

Table 3.4: Characteristics of Investing Firms by Sanction

Variable	Statistic	No Sanctions	Any Sanction	Export Ban	Import Ban	Export-Import Ban
Avg. Revenue (millions USD)	Firms	1,795	1,297	59	417	122
	Mean	11,884.64	12,890.00	17,902.91	10,322.88	12,631.42
	Median	2,203.99	2,180.02	5,123.29	1,680.99	2,409.35
	Min	0	0	0	0	0
	Max	435,669.70	435,669.70	149,814.30	179,354.50	435,669.70
	Std. Dev.	30,603.35	33,423.74	30,157.12	23,500.53	44,387.61
Avg. Cash (millions USD)	Firms	1,802	1,295	59	417	120
	Mean	2,371.43	2,564.94	5,090.66	1,806.75	2,596.12
	Median	268.78	236.51	487.91	224.52	464.26
	Min	0	0	0.16	0	0.00
	Max	73,272.00	73,272.00	73,272.00	73,272.00	73,272.00
	Std. Dev.	8,608.55	9,004.97	14,095.05	6,646.27	9,266.61
Lobbying Expenditures (Annual, millions USD)	Firms	2,725	2,163	89	599	184
	Mean	0.5753	0.4807	0.5718	0.3713	0.5370
	Median	0	0	0	0	0
	Min	0	0	0	0	0
	Max	38.6	34.5	14.2	19.1	15.1
	Std. Dev.	2.3534	2.0219	2.1113	1.7224	1.7880
Sanctioned M&A Experience	Firms	2,725	2,163	89	599	184
	Mean	2.380443	1.600877	2.066667	1.510338	2.513393
	Median	0	0	1	0	0
	Min	0	0	0	0	0
	Max	35	23	18	33	33
	Std. Dev.	4.397533	3.013401	3.172211	3.052200	4.919058

Note: Avg. Revenue and Avg. Cash are expressed in millions of U.S. dollars and reflect each firm's average across all firm-year observations. *Sanctioned M&A Experience* measures the cumulative number of M&A deals a firm has completed in sanctioned markets up to a given year.

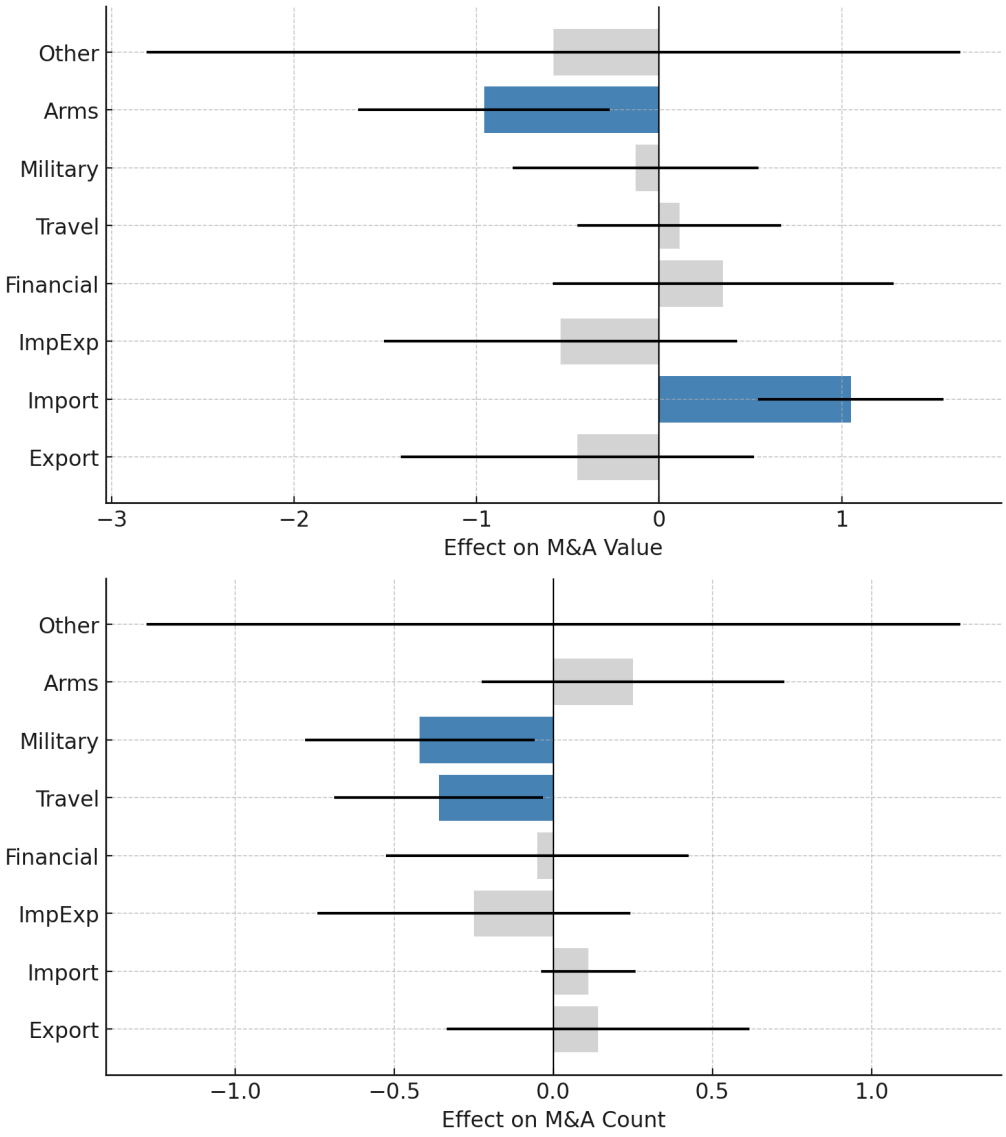

Figure 3.1: U.S. Sanctions vs. M&A by American Firms in Target Countries

Table 3.5: US Sanctions vs. M&A by American Firms in Target Countries

Independent Variables	**Value**$_{ijkt}$	**Value**$_{ijkt}$	**Count**$_{ijkt}$	**Count**$_{ijkt}$
Sanction$_{jk,t-2}$	0.62		-0.29*	
	(0.46)		(0.16)	
Crossborder Conflict$_{jk,t-2}$	0.02	0.30	0.12	0.13
	(0.56)	(0.56)	(0.12)	(0.13)
Internal Conflict$_{k,t-2}$	-0.08	-0.16	-0.20*	-0.18
	(0.43)	(0.44)	(0.11)	(0.12)
Export$_{jk,t-2}$		-0.45		0.14
		(0.59)		(0.29)
Import$_{jk,t-2}$		1.05***		0.11
		(0.31)		(0.09)
ImpExp$_{jk,t-2}$		-0.54		-0.25
		(0.59)		(0.30)
Financial$_{jk,t-2}$		0.35		-0.05
		(0.57)		(0.29)
Travel$_{jk,t-2}$		0.11		-0.36*
		(0.34)		(0.20)
Military$_{jk,t-2}$		-0.13		-0.42*
		(0.41)		(0.22)
Arms$_{jk,t-2}$		-0.96**		0.25
		(0.42)		(0.29)
Other$_{jk,t-2}$		-0.58		0.00
		(1.36)		(0.78)
N	11,720,772	11,720,772	11,726,720	11,726,720

Note: All models estimated via PPML with firm-year, industry-year, and destination fixed effects. Robust standard errors are clustered by destination country. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

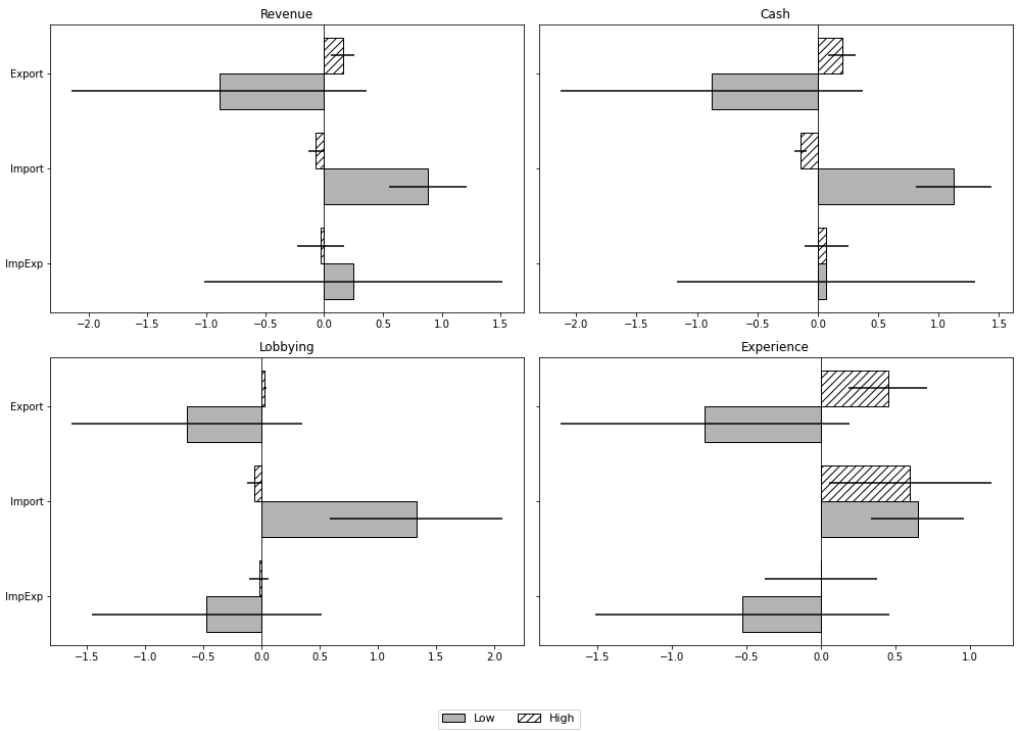

Figure 3.2: U.S. Trade Sanctions × Firm Characteristics vs. Value of M&A Deals by American Companies in Target Countries

Table 3.6: US Sanctions × Firm Characteristics vs. Value of M&A Deals by American Companies in Target Countries

Independent Variables	**Revenue**$_i$	**Cash**$_i$	**Lobbying Expenditure**$_{i,t-2}$	**Sanction Experience**$_{i,t-2}$
Export$_{jk,t-2}$	-0.89	-0.88	-0.64	-0.78
	(0.76)	(0.76)	(0.60)	(0.59)
Export$_{jk,t-2}$× Firm Characteristic	0.16***	0.20***	0.03**	0.45***
	(0.06)	(0.07)	(0.01)	(0.16)
Import$_{jk,t-2}$	0.88***	1.12***	1.33***	0.65***
	(0.20)	(0.19)	(0.45)	(0.19)
Import$_{jk,t-2}$× Firm Characteristic	-0.07	-0.14***	-0.06	0.60*
	(0.04)	(0.03)	(0.04)	(0.33)
ImpExp$_{jk,t-2}$	0.25	0.07	-0.47	-0.53
	(0.77)	(0.75)	(0.60)	(0.60)
ImpExp$_{jk,t-2}$× Firm Characteristic	-0.03	0.07	-0.02	0.00
	(0.12)	(0.11)	(0.05)	(0.23)
Financial$_{jk,t-2}$	0.14	0.01	0.35	0.34
	(0.71)	(0.69)	(0.57)	(0.57)
Travel$_{jk,t-2}$	-0.71	-0.77	0.09	0.11
	(0.66)	(0.68)	(0.33)	(0.33)
Military$_{jk,t-2}$	-0.48	-0.35	-0.13	-0.10
	(0.37)	(0.39)	(0.41)	(0.40)
Arms$_{jk,t-2}$	-0.40	-0.58	-0.97**	-0.91**
	(0.54)	(0.55)	(0.42)	(0.42)
Other$_{jk,t-2}$	-0.47	-0.56	-0.58	-0.66
	(1.65)	(1.66)	(1.36)	(1.37)
Crossborder Conflict$_{jk,t-2}$	0.77**	0.42	0.28	0.20
	(0.36)	(0.26)	(0.57)	(0.53)
Internal Conflict$_{jk,t-2}$	-0.93***	-0.58***	-0.15	-0.16
	(0.31)	(0.21)	(0.44)	(0.45)
N	6,997,749	7,015,275	11,720,772	11,720,772

Note: Each model is estimated via PPML with firm-year, industry-year, and destination fixed effects. The outcome variable is the total value of M&A deals by a publicly traded US company in a host country. Revenue and cash are firm averages that are then logged and mean-centered. The reference group for revenue and cash models is the set of observations at the mean values of logged average revenue and logged average cash, respectively. Lobbying expenditure and sanction experience are logged and lagged by two years. The reference group for the sanction experience and lobbying expenditures models is the set of observations for which the logged variables are equal to zero. See data section for more details. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

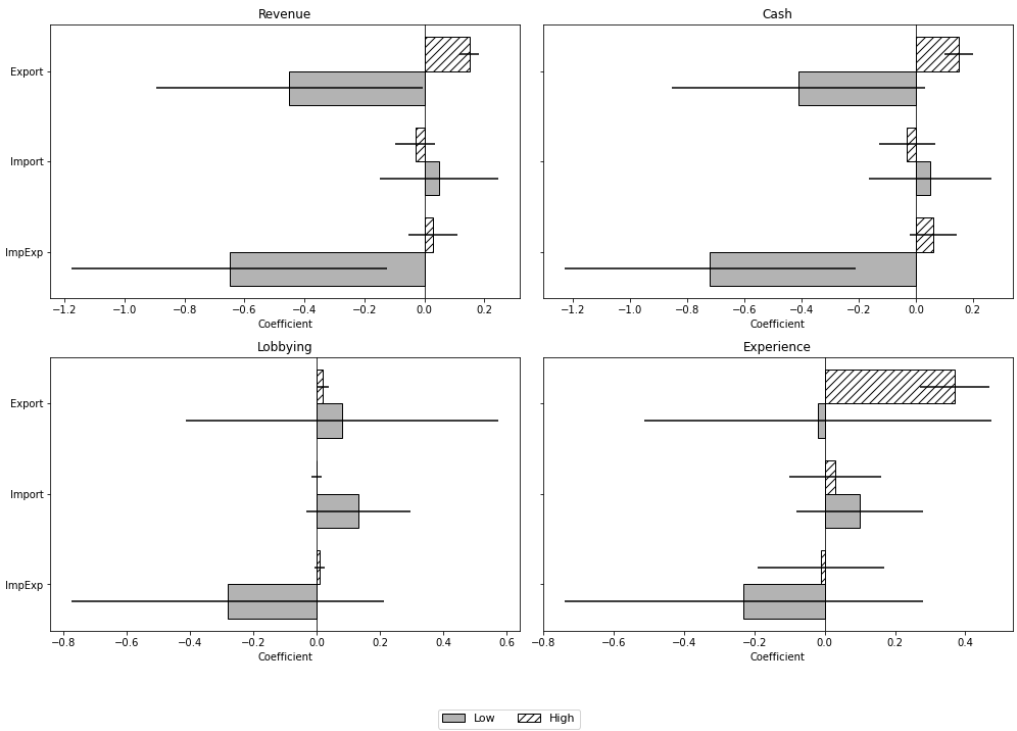

Figure 3.3: U.S. Trade Sanctions × Firm Characteristics vs. Number of M&A Deals by U.S. Companies in Target Countries

Table 3.7: U.S. Sanctions × Firm Characteristics vs. Number of M&A Deals by U.S. Companies in Target Countries

Independent Variables	**Revenue**$_i$	**Cash**$_i$	**Lobbying Expenditure**$_{i,t-2}$	**Sanction Experience**$_{i,t-2}$
Export$_{jk,t-2}$	-0.45*	-0.41	0.08	-0.02
	(0.27)	(0.27)	(0.30)	(0.30)
Export$_{jk,t-2}$× Firm Characteristic	0.15***	0.15***	0.02***	0.37***
	(0.02)	(0.03)	(0.01)	(0.06)
Import$_{jk,t-2}$	0.05	0.05	0.13	0.10
	(0.12)	(0.13)	(0.10)	(0.11)
Import$_{jk,t-2}$× Firm Characteristic	-0.03	-0.03	0.00	0.03
	(0.04)	(0.06)	(0.01)	(0.08)
ImpExp$_{jk,t-2}$	-0.65**	-0.72**	-0.28	-0.23
	(0.32)	(0.31)	(0.30)	(0.31)
ImpExp$_{jk,t-2}$× Firm Characteristic	0.03	0.06	0.01	-0.01
	(0.05)	(0.05)	(0.01)	(0.11)
Financial$_{jk,t-2}$	0.33	0.33	-0.05	-0.06
	(0.26)	(0.26)	(0.29)	(0.29)
Travel$_{jk,t-2}$	-0.39	-0.37	-0.36*	-0.37*
	(0.29)	(0.29)	(0.19)	(0.19)
Military$_{jk,t-2}$	-0.32*	-0.32*	-0.42*	-0.42*
	(0.19)	(0.19)	(0.22)	(0.22)
Arms$_{jk,t-2}$	0.41	0.41	0.25	0.32
	(0.28)	(0.28)	(0.29)	(0.31)
Other$_{jk,t-2}$	0.85	0.85	0.00	-0.01
	(0.77)	(0.77)	(0.78)	(0.78)
Crossborder Conflict$_{jk,t-2}$	0.04	0.03	0.13	0.12
	(0.13)	(0.13)	(0.13)	(0.14)
Internal Conflict$_{jk,t-2}$	-0.15	-0.14	-0.18	-0.18
	(0.10)	(0.10)	(0.12)	(0.12)
N	7,002,160	7,019,680	11,726,720	11,726,720

Note: Each model is estimated via PPML with firm-year, industry-year, and destination fixed effects. The outcome variable is the total count of M&A deals by a publicly traded US company in a host country. Revenue and cash are firm averages that are then logged and mean-centered. The reference group for revenue and cash models is the set of observations at the mean values of logged average revenue and logged average cash, respectively. Lobbying expenditure and sanction experience are logged and lagged by two years. The reference group for the sanction experience and lobbying expenditures models is the set of observations for which the logged variables are equal to zero. See data section for more details. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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