ADJUSTMENT COSTS AND SANCTIONS

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Chapter 1

Adjustment Costs and Sanctions Severity: A Quantitative Analysis

1.1 Introduction

The United States Creating Helpful Incentives to Produce Semiconductors (CHIPS) Act of 2022 is an example of how contemporary states integrate adjustment costs into economic decision-making. This research defines adjustment costs as the economic burdens a state incurs when adapting to trade disruptions. CHIPS provided federal investment and incentives to support U.S. domestic semiconductor manufacturing and research.

The act is a departure from the U.S.'s long-standing strategy of advocating for liberalized trade policy. This shift emphasized subsidy-focused policies and marks a movement towards techno-nationalism (Luo and Van Assche 2023). If CHIPS is an investment in the U.S.'s economic comparative advantage across critical sectors, it is also a strategic initiative to mitigate potential adjustment costs associated with trade disruptions. This approach aims to reduce critical dependency on China, and is driven by concerns over the economic costs of potential conflict-induced shocks—adjustment costs.

The CHIPS Act demonstrates the dual nature of adjustment costs—capturing both endogenous and exogenous elements. On one hand, the U.S. government's investments in domestic semiconductor manufacturing reflect deliberate consideration of endogenous adjustment costs. On the other hand, these policies mitigate potentially larger exogenous adjustment costs from geopolitical disruptions, particularly related to critical supply chains linked to China.

CHIPS exemplifies how states insure against the costs of adjusting trade flows across critical sectors—this demonstrates that adjustment costs are a central consideration in the strategic calculus of states. With the rise of industrial policy and weaponized interdependence, surely a state's calculus on whether and when it should sanction trade partners is also evolving. To analyze this shift, I develop a composite index of adjustment costs to

predict a state's response to an adversary.

The central research question guiding this study is: How do the anticipated economic costs of trade disruptions, as measured by adjustment costs, influence a state's decision to impose sanctions on a target state? I examine sanctions through the lens of adjustment costs. Specifically, states with high adjustment costs are less likely to impose severe sanctions on other states, *ceteris paribus*. This approach breaks from existing research in three key areas.

First, it challenges the assumption that powerful states can impose sanctions at will and highlights the economic constraints that all states face in the global economy. Second, it introduces a more nuanced measure of economic vulnerability than simple trade dependence. Third, it provides an explanation for understanding why states might refrain from imposing sanctions—even in situations where they have strong political motivations to do so.

States must balance the damage they can inflict against the costs they will bear. This approach builds on recent scholarship on weaponized interdependence (Farrell and Newman 2019) by providing a quantifiable measure of a state's susceptibility to economic disruption. Sanctions decisions hinge equally on what senders risk losing and what they can destroy.

In the context of economic sanctions, states weigh the anticipated economic costs of trade disruptions (adjustment costs) against the potential political gains resulting from sanctions. Existing research misses how adjustment costs shape state behavior in a globalized economy. To address this gap, I construct a composite measure of adjustment costs to explain when states impose sanctions.

This is the first of three chapters focusing on adjustment costs and aims to establish how varying levels of adjustment costs for sender and target states influence sanctioning outcomes on average. In this chapter, I construct a composite measure of adjustment costs and utilize ordered logistic regressions, linear probability models, and Bayesian latent variable models to offer suggestive evidence for the theory. Specifically, Chapter 1 quantitatively tests two hypotheses. First, higher aggregate adjustment costs in sender states decrease both the likelihood and severity of sanction imposition, as sender states seek to avoid significant domestic economic disruptions (H1). Second, higher aggregate adjustment costs in target states increase both the likelihood and severity of sanctions, as sender states

anticipate greater coercive effectiveness against economically vulnerable targets (H2).

Chapters 2 and 3 then explore two additional hypotheses. First, greater disparities in aggregate adjustment costs between sender and target states amplify sanction severity, as economically resilient senders strategically exploit vulnerable targets (H3). Second, sender states may impose sanctions despite short-term domestic disruptions if they anticipate imposing greater and enduring structural vulnerabilities on target states, reflecting a *comparative damage* logic (H4).

1.1.1 Preview of Findings

Results across multiple models support both hypotheses. First, states characterized by high target-side adjustment costs consistently experience more frequent and severe sanctions, which is consistent with the pattern that greater economic vulnerability enhances susceptibility to economic coercion. Second, sender states impose sanctions with lower frequency and severity when they face higher aggregate adjustment costs. This reflects policymakers' avoidance of domestic economic disruptions. These trends hold across numerous model types and specifications. The evidence supports both hypotheses: policymakers avoid sanctions when facing domestic economic costs and exploit target vulnerabilities when they can.

1.2 Literature Review

1.2.1 Economic Sanctions as Strategic Tools

States frequently use economic sanctions as coercive instruments, either as substitutes for military action or as supplementary measures (Drezner 2003, 2024; Drury 2000; Hufbauer et al. 2007; Pape 1997, 1998; Peterson and Drury 2011; Wood 2008). By imposing economic costs on target states, sanctions aim to coerce policy changes, deter undesirable actions, signal disapproval, or enforce international norms (Drezner 2015, 2024). Yet, the effectiveness of sanctions remains a subject of debate (De Jonge Oudraat 2000; Hufbauer et al. 2007; Pape 1997, 1998; Tsouloufas and Rochat 2023).

Sanctions serve multiple purposes. While this research operationalizes sanctions explicitly as instruments of economic coercion—the use or threat of economic disruption to induce compliance—scholars have identified and debated several additional motivations. These additional motivations include norm enforcement, international signaling, domestic audience cost management, or resource denial such as nuclear weapons development (Baldwin 1985; Erickson 2020; Giumelli 2016; Lindsay 1986; Mastanduno 1998; Whang 2011). Baldwin (1985) suggests that states rarely pursue a single goal at a time with respect to target states—multiple motivations often operate simultaneously. Sanctions can also be used punitively to punish past behaviors without expecting immediate policy concessions (Nossal 1989). While this analysis assumes economic coercion as the primary motivation for sanctions, other rationales are likely present, especially given the diverse range of dyadic relationships evaluated in this research.

Previous research has investigated the component parts of adjustment costs, such as economic size, trade dependencies, and political will (Bergeijk 1989; Caruso 2003; Clifton Morgan and Bapat 2003; Hufbauer et al. 2007; Lektzian and Souva 2007). Yet, there remains a gap in understanding how adjustment costs in their aggregate form influence a state's willingness to impose sanctions.

Sender-oriented analyses examine domestic political and economic factors influencing a state's willingness to impose sanctions, and highlight how domestic industries, interest groups, and anticipated economic self-harm significantly constrain policymakers' sanction decisions (Drezner 2003; Hufbauer et al. 2007; Kirshner 1997; Whang et al. 2013). Conversely, target-focused scholarship emphasizes vulnerabilities arising from economic dependencies, limited market alternatives, or structural weaknesses (Allen 2008; Dashti-Gibson et al. 1997; Drezner 2003; Kirshner 1997; Lektzian and Patterson 2015). Yet, these two analytical streams have largely developed in isolation.

This separation is problematic. Analyzing senders and targets separately misses the point—sanctioning decisions emerge from the interaction of mutual vulnerabilities, not isolated calculations. This gap is particularly pronounced in the context of globalization and complex interdependence. Global supply chains and networked economic relationships amplify the impact of adjustment costs (Farrell and Newman 2023; Keohane and Nye 2012).

The emergence of weaponized interdependence underscores how states occupying both central and hegemonic positions in global networks can leverage their economic forces to impose significant adjustment costs on others while minimizing their own (Cha 2023; Farrell and Newman 2019; Gjesvik 2023). Yet, traditional models often fail to account for these dynamics.

Moreover, measuring adjustment costs presents methodological challenges. Adjustment costs are inherently multifaceted and latent, thus making direct measurement difficult and entirely subjective. Existing proxies, such as trade dependency ratios, offer insights but also have limitations in capturing the full scope of adjustment costs (Johnson 2014).

This research addresses these limitations by integrating sender and target vulnerabilities through a unified lens—adjustment cost theory. This approach incorporates both sender and target economic vulnerabilities into a combined model. Further, it offers insight into how economic interdependencies simultaneously constrain sender states and amplify pressures on targets—thus shaping the calculus underlying sanction decisions.

1.2.2 Conceptualizing Adjustment Costs

Adjustment costs broadly refer to the economic burdens states experience when adapting to changes in trade conditions. These conditions may arise from policy shifts (Rodrik 1998), technological advancements (Autor et al. 2003), or the imposition of sanctions (Hufbauer et al. 2007). Adjustment costs manifest as immediate efficiency losses—unemployment and reduced output—alongside long-term adaptation challenges, including workforce retraining, capital reallocation, and delays in returning to market equilibrium due to forced economic reorientation. Although security agreements and domestic audience costs represent additional forms of adjustment costs that constrain sanction decisions, they are not the primary focus here. This chapter specifically examines economic adjustment costs due to their measurability, theoretical clarity, and direct relevance to policymakers' calculus.

Adjustment costs vary significantly across sectors. Energy and defense industries, for instance, face higher costs due to limited substitutes and strategic importance (Autor et al. 2020, 2016; Bernard et al. 2018). Strategic sectors, particularly energy and military tech-

nology, typically incur higher adjustment costs due to their critical national importance and the scarcity of perfect substitutes (Goldthau et al. 2018; Shih 2020). The semiconductor industry exemplifies this dynamic: it relies heavily on complex global supply chains and substantial research and development investments—making any disruption costly (Bown 2020).

Additionally, adjustment costs occur over distinct time horizons. Short-term costs involve immediate disruptions, including layoffs and decreased production. In contrast, long-term costs pertain to structural transformations such as shifts in comparative advantage and changes in domestic industry composition (Autor et al. 2016; Dix-Carneiro et al. 2023). The severity and duration of these costs largely depend on labor market flexibility, capital mobility, institutional adaptability, and the availability of governmental policy interventions (Autor et al. 2020; Blanchard et al. 1992). Economies characterized by flexible labor markets and highly mobile capital typically adjust more rapidly, thus mitigating the long-term impacts of trade shocks.

To further clarify the concept, it is helpful to distinguish between economic independence and interdependence. Economic independence describes a state's ability to maintain regulatory standards, production capacities, and policy autonomy without substantial harm from external economic pressures (Drezner 2015; Lashitew et al. 2021). Independence implies resilience—the capability to swiftly transition to domestic substitutes or alternative trading partners if existing relationships deteriorate, avoiding significant economic shocks. Yet, interdependence entails potentially severe economic consequences when established trade relationships are disrupted.

Gent and Crescenzi (2021) further delineate costs into two forms: *sensitivity* and *vulnerability*. Sensitivity costs are short-term economic disruptions that occur when states alter their trade relationships or suppliers in response to external shocks, such as sanctions or retaliatory trade measures. Although these costs are immediate and disruptive, they are generally manageable if alternative markets or suppliers are accessible (Gent and Crescenzi 2021). Vulnerability costs represent more severe, long-term economic disruptions faced by states lacking sector-level substitutes or encountering significant structural barriers to economic adaptation, such as natural gas infrastructure. These costs involve inefficiencies and

resource reallocation, which all impact a state's economic stability (Gent and Crescenzi 2021).

Consequently, when facing high adjustment costs, sender states hesitate to impose sanctions, as they anticipate substantial economic repercussions and political backlash. Conversely, sender states perceive sanctions as more strategically appealing and potentially effective when targeting states with significant vulnerability costs (Gent and Crescenzi 2021). Due to measurement limitations, this research primarily operationalizes adjustment costs as a state's vulnerabilities. The subsequent section explores sender-side adjustment costs.

1.2.3 Sender-Side Adjustment Costs

The sender-side perspective suggests that policymakers evaluate anticipated domestic economic disruptions before imposing sanctions. Senders weigh potential coercive gains against the substantial domestic costs that sanctions often entail, including loss of markets, unemployment, retraining, and capital reallocation (Drezner 2003; Hufbauer et al. 2007; Whang et al. 2013). Policymakers must thus balance strategic objectives against the domestic political backlash and economic disruptions that can weaken political support and reduce overall economic welfare.

Empirical evidence suggests that significant domestic adjustment costs markedly constrain states' willingness to impose sanctions and, when sanctions are employed, moderate their severity. Martin (1992) demonstrates that states facing high domestic economic disruptions are incentivized to pursue multilateral rather than unilateral sanctions to mitigate costs through burden-sharing. Similarly, McLean and Whang (2014) suggest that powerful economic actors negatively affected by sanctions actively lobby policymakers, and in turn, influence sanction decisions and severity. Thus, domestic political pressures arising from anticipated economic disruptions reduce policymakers' willingness to impose aggressive sanctions—even when strategic objectives or Western norms might otherwise encourage coercion.

The following hypothesis tests the sender-side implications of adjustment cost theory:

H1: Higher *aggregate* adjustment costs in sender states decrease the likelihood and severity

of sanction imposition, as states seek to avoid domestic economic harm.

To examine this hypothesis, I develop and employ a composite measure of sender adjustment costs that integrates multiple economic indicators, such as economic complexity, trade elasticity, trade dependency, and gravity measures, which capture the observable dimensions of domestic economic vulnerability. By linking these adjustment cost measures directly to sanctioning behavior, this research clarifies how adjustment costs embolden or restrain sender states. Now, consider the target's perspective.

1.2.4 Target-Side Adjustment Costs

The target-side perspective suggests that the economic vulnerabilities of sanctioned states shape the effectiveness and appeal of sanctions. Extant scholarship has outlined how states with pronounced economic vulnerabilities, such as substantial trade dependencies, limited market alternatives, and restricted economic diversification, are more susceptible to sanction pressure—thereby increasing the likelihood and potential severity of sanctions imposed against them (Dashti-Gibson et al. 1997; Drezner 1999; Morgan and Schwebach 1997). Similarly, Drezner (1999) and Morgan and Schwebach (1997) posit that policymakers likely exploit vulnerabilities in target states to amplify the coercive pressure and maximize their strategic advantage. In line with these arguments, the following hypothesis tests the target-side implications of adjustment cost theory:

H2: Higher *aggregate* adjustment costs in target states increase the likelihood and severity of sanctions due to enhanced economic vulnerability, as sender states anticipate greater coercive effectiveness.

To evaluate this hypothesis, I employ the same composite measure of adjustment costs used in the sender-side analysis to capture diverse dimensions of a state's economic vulnerability. This approach connects sender decisions to the economic vulnerabilities of target states and addresses previous limitations that isolated target vulnerabilities from sender calculations.

1.2.5 Toward a Composite Measure

Most sanctions research relies on single-factor measures, such as trade dependency ratios or economic size indicators, to assess economic vulnerability. However, these approaches do not fully capture structural factors such as market flexibility, product substitutability, and global supply chain dependencies (Caruso 2003; Hufbauer et al. 2007; Streeten 1993). To address these limitations, this research advances a composite measure which integrates Economic Complexity Index (ECI) (reflecting diversification and adaptive capacity), trade elasticity (indicating responsiveness to trade shocks), trade gravity (capturing the depth and substitutability of bilateral relationships), and trade dependency (measuring exposure to specific trade partners) (Anderson and van Wincoop 2003; Bergstrand 1985; Fontagné et al. 2022; Hausmann et al. 2014; Hidalgo and Hausmann 2009; Imbs and Mejean 2015). The construction and operationalization of the composite measure are outlined in the following section.

1.3 Theoretical Framework

Adjustment costs function differently for sender and target states. A central assumption is that policymakers evaluate their state's vulnerabilities prior to imposing costly sanctions. Sender states with diversified economies, stable domestic markets, and well-developed alternative supply chains experience low adjustment costs, and thus possess greater flexibility to impose severe sanctions without incurring substantial domestic repercussions (Baldwin 1985; Hufbauer et al. 2007; Kirshner 1997). Conversely, sender states that rely heavily on critical imports, exports, or financial relationships with the target state face high adjustment costs. Policymakers in these cases encounter strategic constraints and consequently adopt symbolic, incremental, or narrowly targeted sanctions to meet domestic political demands or signal international resolve without incurring significant economic damage (Kaempfer and Lowenberg 1992; Peksen 2019b).

On the target side, adjustment costs reflect the economic vulnerabilities of states subjected to sanctions. Target states with high adjustment costs typically have limited economic diversification, low economic complexity, rigid trade structures, and substantial de-

pendence on specific commodities or trade partners. These vulnerabilities amplify the economic damage from sanctions and increase their perceived coercive potential. Consequently, economically fragile targets are attractive candidates for coercive sanctions.

Sanctions achieve maximum coercive effectiveness when targets have high adjustment costs due to economic dependence, limited adaptability, or a lack of viable alternative markets and substitutes. High adjustment costs intensify economic pressures and internal political consequences for target states, and increase the probability of concessions (Allen 2008; Marinov 2005). Table 1.1 summarizes the interaction between sender and target adjustment costs. Hypotheses 3 and 4 are examined in Chapters 2 and 3.

Table 1.1. Hypotheses: Expected Outcomes, Rationale, and Chapter Coverage

Hypothesis	**Expected Outcome**	**Rationale**	**Chapter(s)**
Sender Adj Costs (H1)	Higher sender costs reduce sanction likelihood and severity	Sender states avoid substantial domestic economic disruptions	1, 2
Target Adj Costs (H2)	Higher target costs increase sanction likelihood and severity	Targets vulnerable to economic disruptions enhance coercive effectiveness	1, 2
Adj Cost Disparity (H3)	Greater disparity increases sanction severity	Economically resilient senders exploit vulnerabilities in economically weaker targets	2, 3
Comparative Damage (H4)	Senders sanction despite high short-term sectoral costs if long-term target vulnerabilities are higher	Senders accept manageable short-term disruptions to inflict sustained vulnerability on targets	2, 3

Understanding policymakers' actual decision-making requires examining the underlying assumptions that shape their behavior.

1.3.1 Actors and Bounded Rationality

Policymakers assess economic vulnerabilities when deciding on sanctions, but bounded rationality and cognitive biases can constrain their decision-making processes. Strategic action in this context does not always imply classical economic rationality; instead, poli-

cymakers operate within conditions shaped by cognitive limitations, time constraints, and incomplete information (Bendor 2010). Policymakers frequently impose sanctions primarily to satisfy domestic political demands or to signal international resolve, reflecting a symbolic *do something* logic even when economically irrational or strategically ineffective (Drezner 1999; Eland 1995). Although these motivations undoubtedly influence sanction decisions, empirically isolating symbolic actions or domestic political pressures from broader strategic considerations is challenging within bounded rational decision-making frameworks. For this research, I adopt a traditional rational actor assumption where a straightforward cost-benefit analysis drives the empirical insights.

1.3.2 Temporal Dimensions of Sanctioning Decisions

The trade-off between short-term disruptions and long-term objectives introduces a temporal dimension into sanctioning strategies. Sanctions typically lose their coercive effectiveness as target economies adjust and marginal impacts decline, which highlights the strategic importance of applying early-phase economic pressure (Dizaji and Van Bergeijk 2013). Policymakers, therefore, consider not only the magnitude of economic disruptions but also their timing and political visibility. Thus, sanction decisions depend crucially on policymakers' explicit assessment of the sequence and sustainability of anticipated benefits.

However, in cases of acute security crises, existential threats, or intense ideological conflicts, political imperatives often supersede economic considerations. States may willingly incur substantial economic harm in response to direct military aggression or severe ideological provocations, thus prioritizing deterrence or symbolic demonstrations of resolve over economic considerations (Drezner 1999; Klotz 1995). Conversely, in stable security environments or cases with limited ideological conflict, economic vulnerabilities play a more prominent role (Lektzian and Souva 2003).

1.3.3 Mechanisms

This section describes the mechanisms. Table 1.2 summarizes how adjustment costs shape states' responses and illustrates distinct courses of action based on sender and target

adjustment costs.

The mechanism linking adjustment costs to sanction decisions operates through a multi-level assessment. Policymakers evaluate economic vulnerabilities by examining economic complexity, trade dependence, and the availability of alternative markets or substitutes. Policymakers then incorporate this explicit economic assessment into a broader political cost-benefit analysis, where higher adjustment costs correspond to greater anticipated domestic economic disruption.

As adjustment costs increase, the threshold for imposing sanctions rises, and policymakers require greater anticipated strategic gains to justify the economic and political risks. This mechanism informs the central hypotheses: sender states with high adjustment costs are less likely to impose sanctions due to elevated domestic vulnerabilities. In contrast, targets with high adjustment costs become attractive sanctioning opportunities, as policymakers perceive them as more susceptible to coercion and therefore more likely to yield concessions.

Table 1.2. State Responses by Adjustment Cost Level

Adjustment Costs	Course of Action	Rationale
High (Target)	More Likely to Receive Severe Sanctions	Higher adjustment costs for the target lead to more severe sanctions, as the target is more vulnerable to economic pressure.
High (Sender)	Less Likely to Impose Severe Sanctions	Higher adjustment costs for the sender reduce the likelihood of imposing severe sanctions due to potential economic self-harm.
Low (Target)	Less Likely to Receive Severe Sanctions	Lower adjustment costs for the target lead to less severe sanctions, as the target is more resilient to economic pressure.
Low (Sender)	More Likely to Impose Severe Sanctions	Lower adjustment costs for the sender increase the likelihood of imposing severe sanctions, as the economic risk is manageable.

The subsequent chapters extend these foundations through sector-level case analyses.

1.4 Research Design

1.4.1 Data and Dyads

Utilizing a dyad-level dataset, I analyze how economic variables shape state sanctioning decisions. The primary independent variables include ECI, trade elasticity, bilateral trade flows, and trade gravity. Each dimension captures a distinct facet of economic vulnerability: complexity reflects structural adaptability, elasticity indicates market responsiveness, trade dependence quantifies immediate exposure, and gravity captures enduring economic interconnections. The composite explicitly prioritizes structural vulnerabilities. The dependent variable, sanctions, is categorized into three levels: no sanctions, limited sanctions, and comprehensive sanctions.

The dataset spans the years 1980 through 2024 and includes 185 states. For consistency, territories without independent military capabilities are excluded. Dyads are constructed annually, pairing each state with every other state using standardized ISO3 country codes—resulting in 1,531,800 total observations over 45 years. The dataset uses a balanced panel design with complete observations for all country pairs throughout the study period. The study period was selected based on the availability and reliability of adjustment cost proxies.

1.4.2 Empirical Models

To assess how adjustment costs influence sanction severity, I use ordered logistic regression models to analyze how economic vulnerabilities in both sender and target states influence sanction decisions. Year-fixed effects are included to control for systematic, time-specific factors.

I supplement the ordered logistic approach with linear probability models (LPMs). To ensure robust inference, I employ dyad-clustered and dyad-robust standard errors to address correlation and heteroskedasticity within dyads over time (Aronow et al. 2017). The LPM serves as a robustness check against the ordered logistic models.

Recognizing the latent and multidimensional nature of adjustment costs, I also use Bayesian structural equation modeling (SEM) and ordinal Bayesian logistic regression.

These Bayesian methods model the unobserved economic vulnerabilities underlying adjustment costs.

Control variables included across all models consist of nuclear capability (capturing strategic deterrence) and preferential trade agreements (PTAs, indicating formal economic ties). As an additional robustness check, I incorporate Level of Democracy controls derived from Polity V scores.

This chapter assumes that comparative advantage, and more broadly, economic factors, drive trade. Alliances are not included as controls, as early analyses indicated these variables likely influence either sanctions or adjustment costs—but not both. Initial versions also explored controls for regime types and central bank effectiveness, but omitted them for the same reason. Standard errors are clustered at the dyad level to address potential correlations within dyads over time.

1.4.3 Assumptions

Despite the controls used in this chapter, the potential for unobserved confounders remains a critical consideration. Factors such as formal and informal political agreements likely play a significant role and highlight the complexities inherent in analyzing trade and statecraft. To manage reader expectations, I clarify a key assumption: the treatment (adjustment costs) of one state does not influence the potential outcomes (sanction decisions or severity) for another state. Given the interconnected nature of international relations, this assumption likely does not hold—representing a primary limitation of this analysis.

1.4.4 Variables

1.4.4.1 Dependent Variable: Sanction Severity

The outcome variable in this chapter is sanction severity, categorized into three levels: 0 (no sanctions), 1 (limited sanctions), and 2 (comprehensive sanctions). Data for this variable are sourced from the Global Sanctions Database (GSDB), which documents sanction events, including their initiation, duration, and types (Kirikakha et al. 2021). The GSDB is selected over the TIES dataset due to its comprehensive and current collection of economic sanctions

data. I differentiate between the three sanction levels based on the scope and severity of the measures imposed, and utilize the GSDB classification system, which sorts sanctions into five categories: arms, military, financial, travel, and other. Cases involving two or fewer sanction types are coded as limited sanctions, while those with three or more types are classified as comprehensive sanctions.

1.4.4.2 Independent Variables: Adjustment Cost Proxies

1.4.4.3 Economic Complexity Index

The first proxy measure used in the composite adjustment cost index is the Economic Complexity Index (ECI). ECI measures the diversity and sophistication of a country's export profile and reflects underlying productive capabilities and knowledge base (Hidalgo and Hausmann 2009). Higher ECI scores indicate greater economic adaptability.

Empirical studies consistently link higher ECI values with greater economic resilience. Hausmann et al. (2014) suggest that states with higher ECI possess a more diverse and adaptable productive structure. This potentially enhances their capacity for sustained long-term growth and adaptability to economic changes. Similarly, Gao and Zhou (2018) show that Chinese regions with higher complexity scores experience stronger economic performance and improved resilience to economic shocks, particularly in regions with initially lower GDP per capita.

Specifically, a target state with lower ECI faces greater adjustment costs when sanctioned, as its economy is less diversified, less sophisticated, and thus more vulnerable to economic disruption. Conversely, sender states with higher ECI possess lower domestic adjustment costs, as their economies are more resilient and adaptable.

1.4.4.4 Bilateral Trade Flows

The second proxy measure included in the composite adjustment cost index is bilateral trade flows. Specifically, I measure trade flows using total bilateral trade (imports plus exports) relative to a country's gross domestic product (GDP). This approach captures a country's economic openness and provides insight into potential vulnerability and adjust-

ment costs that states face when sanctions disrupt trade. I tested an alternative measure, bilateral trade as a share of total trade, which yielded broadly similar empirical results. However, the GDP-based measure is preferred because it directly assesses bilateral trade relative to a state's overall productive capacity.

Trade flow measures are commonly used proxies for assessing economic vulnerability to trade disruptions. Caruso (2003) highlights that extensive sanctions typically result in significant declines in bilateral trade. Similarly, Early (2015) suggests that major trading partners can partially mitigate the adverse effects of sanctions through adjustments in trade patterns. Empirical research consistently shows that states with extensive bilateral trade ties tend to experience higher adjustment costs when these relationships are disrupted, as alternative markets or suppliers may not be immediately accessible or viable (Bapat and Kwon 2015; Dizaji and Van Bergeijk 2013).

Despite their broad use, trade dependency ratios have limitations. They often oversimplify complex trade relationships and inadequately account for the substitutability of goods, trade complementarities, or intermediate goods in global supply chains (Johnson 2014; Koopman et al. 2014). Additionally, aggregate measures can exaggerate vulnerabilities if alternative suppliers exist or obscure critical dependencies, such as reliance on military or defense technologies (Hufbauer et al. 2007).

In my analysis, trade flows serve as indicators of potential adjustment costs, particularly for targeted states. States with higher bilateral trade-to-GDP ratios incur substantial adjustment costs from sanctions due to their relative economic openness and limited immediate options to substitute trade partners. Conversely, states with high bilateral trade exposure, such as those with high sender states, similarly face elevated domestic adjustment costs, which likely constrains their willingness or ability to impose severe sanctions.

1.4.4.5 Trade Elasticity

The third component in the composite adjustment cost measure is trade elasticity—defined as the responsiveness of import volumes to changes in trade costs or prices. This research utilizes country-specific import demand elasticity estimates provided by Fontagné et al. (2018). Fontagné, Martin, and Orefice construct trade elasticity by measuring how

export volumes respond to changes in prices, tariffs, and exchange rates, using firm-level data to capture states' underlying adaptability to trade shocks. Lower elasticity values imply higher adjustment costs, as states with less responsive import demand face greater challenges in substituting sanctioned goods or reconfiguring disrupted trade relationships. Therefore, the elasticity values are standardized and inverted in the composite index.

Macroeconomic models suggest that the evolving nature of elasticity and argue that long-run elasticity values better represent a country's true adaptive capacity and resilience following trade disruptions (Alessandria et al. 2021; Boehm et al. 2020). Despite their utility, elasticity measures have limitations: they vary widely by product, country, and time period—complicating generalization (Kee et al. 2008). Additionally, elasticity measures typically do not fully account for adjustment costs related to fixed capital investments, labor market rigidity, or institutional constraints (Chor 2009).

In my analysis, trade elasticity serves as a macro-level indicator of how readily states can adapt to economic disruptions caused by sanctions. Target states with lower trade elasticities face higher adjustment costs due to rigid import patterns and limited ability to substitute sanctioned goods. Conversely, sender states with higher trade elasticity can impose sanctions with relatively lower domestic economic repercussions.

1.4.4.6 Trade Gravity

The fourth and final proxy measure included in the composite adjustment cost index is trade gravity. This measure is derived from the gravity model of trade, formulated by Tinbergen (1963) and subsequently developed by Anderson (1979) and Anderson and van Wincoop (2003). The gravity model posits that bilateral trade flows between states are positively related to their economic sizes (GDP) and negatively related to the geographic distance between them.

The gravity model has been extensively used in international trade research to understand and predict bilateral trade flows (Bergstrand 1985; Chaney 2018; Deardorff 1998; Porto 2020). Despite its utility, the gravity model has limitations. For example, it does not account for trade complementarities or the specific composition of trade, such as differences between consumer-driven and labor-intensive economies, which may influence actual

economic disruptions and adjustment costs during trade shocks.

In this chapter, trade gravity is calculated using the following formulation:

$$\text{Gravity Score}_{ijt} = \frac{\text{GDP}_{it} \times \text{GDP}_{jt}}{\text{Distance}_{ij}} \tag{1.1}$$

where GDP_{it} and GDP_{jt} represent the gross domestic products of sender (i) and target (j) states at time t, and Distance_{ij} is the geographic distance between these states. GDP data are sourced from the World Bank's World Development Indicators (World Bank 2024), and geographic distance measures come from the CEPII GeoDist database (Mayer and Zignago 2011).

Including trade gravity in the composite measure provides a structural indicator of potential economic vulnerability to sanctions by capturing two fundamental components of bilateral economic relationships: economic scale and geographic proximity. Dyads characterized by large economies and close geographic proximity typically exhibit greater trade interdependence. Such economic ties are inherently *sticky*, making disruptions particularly costly and difficult to replace, and elevating associated adjustment costs (Hinz 2019).

While trade dependency captures specific bilateral economic reliance, trade gravity assesses general capacity for substantial trade interactions based on economic scale and geography. Incorporating both measures ensures the analysis accurately reflects both the depth of specific bilateral dependencies and broader structural economic characteristics that are likely driving adjustment costs.

1.4.4.7 Constructing the Composite Index

Measuring adjustment costs associated with sanctions poses methodological challenges due to the latent nature of adjustment costs. Researchers typically rely on single proxies, such as trade dependency or elasticity, to estimate adjustment costs. While useful, these individual proxies fall short of capturing the full complexity of economic vulnerability. To address this limitation, I utilize a composite measure. Combining these proxies into a single composite provides a comprehensive assessment of states' economic vulnerabilities to sanctions. This approach acknowledges that adjustment costs reflect multiple structural and

economic factors, rather than relying on any single indicator alone. Figure 1.1 illustrates how these individual proxies combine conceptually into the unified composite measure.

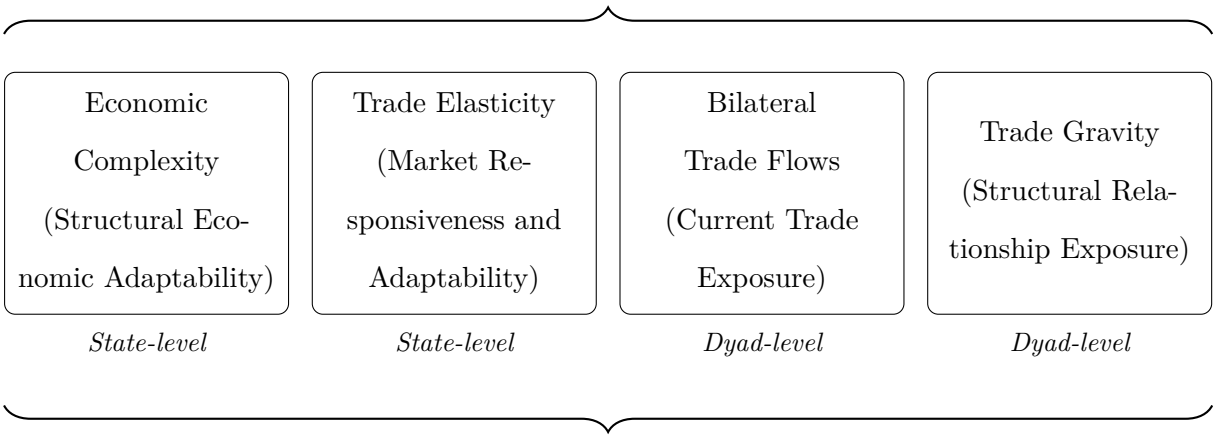

Figure 1.1. Composite Adjustment Cost Measure

Building a composite adjustment cost measure raises several methodological issues. First, a potential critique of the composite measure is its integration of indicators measured at different analytical levels—specifically, the combination of state-level (Economic Complexity and Trade Elasticity) and dyad-level indicators (Bilateral Trade Flows and Trade Gravity). However, this integration represents a deliberate theoretical choice. Policymakers assessing adjustment costs must simultaneously consider their intrinsic economic adaptability and resilience (state-level characteristics) alongside specific vulnerabilities emerging from particular trade relationships (dyad-level characteristics). Importantly, these indicators are not independent; rather, they inform and contextualize each other dynamically. A state's structural adaptability influences how it perceives and manages vulnerabilities. Yet the dyadic-level exposure shapes policymakers' broader assessments of their overall resilience. The composite measure is designed to capture the relationship between these assessments.

Second, selecting appropriate weights for each component requires both theoretical and empirical justification, as alternative weighting schemes could substantially alter the composite index's interpretation and predictive validity (Benson and Clinton 2016; OECD and European Union 2008). Third, aggregating trade data can obscure sector-level variations, potentially overlooking critical vulnerabilities within strategically significant industries such as advanced semiconductors. Finally, composite indices may not fully capture political

elements, such as credible threats, signaling, or the target state's willingness to endure sanctions (Drezner 2024).

To construct the composite adjustment cost index, I standardize each of the four proxies—ECI, trade elasticity, bilateral trade flows, and trade gravity—to a mean of zero and a standard deviation of one. Given that lower ECI and trade elasticity values indicate higher adjustment costs, I invert the signs for these two variables to ensure consistent directionality within the composite measure.

1.4.4.8 Control Variables

Nuclear capability is a binary variable indicating whether the sender or target state possesses nuclear weapons, based on data from the Federation of American Scientists (Kristensen 2024). This control serves as a proxy for states' broader geopolitical status and hard power capabilities. Nuclear weapons likely alter strategic calculations and significantly raise potential costs of escalation, affecting both the likelihood and severity of sanctions imposed. Including nuclear status accounts for the possibility that nuclear-armed states possess increased diplomatic leverage and influence targets' perceptions of conflict costs, especially in dyads where nuclear powers confront non-nuclear states (Beardsley and Asal 2009). However, nuclear capabilities could also introduce endogeneity concerns, given their correlation with broader strategic attributes. To address this, I estimate additional baseline models without the nuclear control. This is unlikely to bias the core argument, as it primarily rests on the evaluation and measurement of economic factors.

Preferential Trade Agreements (PTAs) are included as a binary control variable to capture formal economic ties between sender and target states, based on data from the World Bank database (Hofmann et al. 2017). PTAs typically reduce transaction costs among member states, potentially influencing states' calculus regarding sanction decisions. Including PTAs elevates the risk of introducing post-treatment bias; however, I justify their inclusion by emphasizing that PTAs primarily reflect preexisting efforts to reduce transaction costs rather than being driven directly by adjustment cost considerations. For example, a state may establish a PTA to benefit from reduced trade barriers or lower transaction costs, even if alternative trade partners exist (Gent and Crescenzi 2021). Thus, accounting for PTAs

clarifies whether existing formal trade agreements independently influence sanctioning behaviors apart from broader economic vulnerabilities.

The Level of Democracy is included as a control variable using Polity V scores for both sender and target states. These scores, derived from the Polity V dataset (Marshall et al. 2018), quantify political institutions on a scale from -10 (full autocracy) to +10 (full democracy). The scale is based on factors such as executive constraints, political participation, and leadership selection processes. Given that this research treats states as rational actors primarily responding to economic incentives, Level of Democracy is included as a robustness check rather than a central control in all models.

1.4.5 Model Specifications

Given the nature of the sanction severity, I estimate ordered logistic regression models to analyze how sender and target economic vulnerabilities, operationalized via standardized proxies (ECI, trade dependency, trade elasticity, trade gravity, and a composite latent measure), influence sanctions. These models control for nuclear capability and PTAs, incorporate year-fixed effects to manage systematic temporal variation, and employ dyad-level bootstrapped standard errors to address serial correlation and within-dyad clustering. To ensure robustness and account for dyadic heterogeneity, I also implement an ordinal Bayesian logistic regression with dyad-specific random intercepts. Finally, as an additional robustness check to enhance interpretability, linear probability models (LPMs) examine the *binary* decision to impose sanctions, using standard errors clustered at the dyad level alongside year-fixed effects. While these LPMs do not directly capture sanction severity, they offer complementary insights into the likelihood of sanction initiation.

1.4.5.1 Bayesian Latent Variable Model

To estimate latent adjustment costs and assess their influence on sanction outcomes, I utilize a Bayesian Structural Equation Model (SEM). The Bayesian SEM is particularly suitable given that adjustment costs are inherently latent—they cannot be directly observed but can be inferred from related indicators.

1.4.5.1.1 Methodological Justification A Bayesian latent variable framework captures this unobserved complexity. Similar latent variable approaches have been successfully applied to estimate constructs such as democratic governance (Pemstein et al. 2010) and alliance strength (Benson and Clinton 2016).

One methodological concern with the Bayesian SEM used in this chapter is potential circularity. Factor loadings for observed economic indicators (ECI, trade elasticity, trade dependence, and trade gravity) are simultaneously estimated within a structural model that predicts sanction severity. This simultaneity raises the risk that latent adjustment costs partially reflect the outcomes they aim to explain. To mitigate this issue, I estimate several alternative models, including ordered logistic regressions and linear probability models, where observed indicators are directly included without latent variable weighting derived from sanction outcomes. These analyses provide critical robustness checks and confirm the consistency of relationships between economic vulnerabilities and sanction severity—independent of the Bayesian structural estimates.

1.4.5.1.2 Model Formulation The Bayesian SEM integrates two interconnected components: a measurement model and a structural model. Each component differentiates between sender and target adjustment costs using distinct latent variables that capture the unobserved economic vulnerabilities of each state.

1.4.5.1.3 Measurement Model The measurement model relates observed economic indicators to latent sender ($AdjCost_S$) and target ($AdjCost_T$) adjustment costs. Specifically, latent adjustment costs for both sender and target states are derived from standardized indicators including ECI, trade dependency, trade elasticity, and trade gravity. Factor loadings represent how strongly each observed indicator contributes to the latent constructs, which enables an interpretation of states' underlying economic vulnerabilities. Additionally, the measurement model allows factor loadings for all indicators to be freely estimated.

1.4.5.1.4 Structural Model The structural component links latent sender and target adjustment costs to observed ordinal sanction outcomes. The latent adjustment costs, along

with controls such as preferential trade agreements (PTAs) and nuclear capabilities, predict the likelihood of increasingly severe sanctions (no sanctions, limited sanctions, comprehensive sanctions).

1.4.6 Estimation Strategy

The Bayesian SEM is estimated using Markov Chain Monte Carlo (MCMC) methods. I employ weakly informative, broad priors to ensure that the observed data predominantly shape the posterior distributions. Three parallel MCMC chains are run to ensure reliable inference. After discarding initial burn-in iterations (500) to mitigate potential dependence on starting values, posterior samples are retained to produce parameter estimates of latent adjustment costs and their influence on sanction severity.

1.4.6.1 Posterior Predictive Checks

Model adequacy is assessed through posterior predictive checks, which compare simulated distributions of sanction severity with the observed data. This diagnostic verifies whether the estimated Bayesian SEM effectively captures empirical patterns, thus confirming that the latent structure and relationships suggested by the theoretical model accurately reflect observed sanctioning behaviors in the data.

1.4.7 Methodological Limitations

1.4.7.1 Omitted Variable Bias and Reverse Causality

Several challenges complicate the interpretation of this paper's findings as causal relationships between adjustment costs and sanctions. First, states may avoid imposing sanctions if major allies have already done so, or conversely, they may feel compelled to impose sanctions due to alliance obligations, despite incurring high economic adjustment costs. Additionally, membership in major alliances may correlate with lower adjustment costs—further complicating causal inference. The influence of multilateral sanctions, leveraged by major powers or international organizations, may not be captured by a dyadic analysis. Moreover, multilateral sanctions may not accurately reflect the true adjustment costs faced

by individual states within bilateral relationships. Another key threat is reverse causality, particularly regarding bilateral trade flows. Sanctions inherently reduce trade between the sender and the target, which then generates negative correlations between sanction outcomes and observed trade-share variables. To mitigate this concern, I incorporate multiple proxies for adjustment costs.

The relationship between adjustment costs and sanctioning behavior is fundamentally bidirectional—this raises endogeneity concerns. States actively shape their economic structures in anticipation of geopolitical risks. For example, the CHIPS Act demonstrates how the U.S. has invested in semiconductor capacity to mitigate future vulnerability to Chinese trade disruptions. Moreover, states anticipating sanctions may preemptively diversify their economies, develop additional domestic industrial capacity, or alter trade relationships—making measured adjustment costs partially endogenous to sanctions expectations. While adjustment costs also contain exogenous components like geographic distance and natural resource endowments, disentangling economic positioning from structural characteristics is empirically challenging, and the causal relationship runs in both directions.

Given these endogeneity concerns, this dissertation does not claim to identify causal effects of adjustment costs on sanctioning behavior. The hypotheses and empirical tests throughout all three chapters should be interpreted as examining correlations rather than causal relationships. When this research states that higher adjustment costs *decrease* or *increase* sanction likelihood, these statements describe correlations. This analysis provides suggestive evidence of the material impacts of sanctions, rather than strict causal identification. The aim of this research is to document the correlation between adjustment costs and sanction decisions, highlighting the constraints associated with sanctioning behavior, even if causation cannot be established.

1.4.7.2 Sample Selection

The dataset does not capture instances of back-channel diplomacy where sanctions were threatened but ultimately not imposed, thus potentially omitting critical elements of the sanctions spectrum (Drezner 2003). Additionally, states with advanced economies and significant global influence are more frequently and publicly engaged in sanctioning activities.

This visibility likely leads to an overrepresentation of sanctions involving these states, which then skews analysis and potentially causes over- or underestimation of sanction frequency.

1.5 Results

Hypothesis 1 (H1) predicts that higher sender adjustment costs reduce the likelihood and severity of sanction imposition, while Hypothesis 2 (H2) anticipates that higher target adjustment costs increase sanction likelihood and severity. Table 1.3 summarizes these initial findings and demonstrates support for both hypotheses.

Table 1.3. Summary of Results

Model	Sender Adj. Costs	SE	Target Adj. Costs	SE	Observations
Ordered Logit	-3.554	(0.022)	1.191	(0.013)	300,474
Ordered Logit w/ Year FE	-3.193	(0.017)	1.274	(0.009)	300,474
Bayesian SEM	-0.010	(0.001)	0.035	(0.002)	300,474
Ordinal Bayesian Logit	-1.010	(0.160)	0.490	(0.080)	300,474
Linear Probability Model	-0.149	(0.008)	0.238	(0.011)	300,474
LPM w/ Dyad-Robust SE	-0.149	(0.035)	0.238	(0.039)	300,474
LPM w/ Polity V	-0.036	(0.014)	0.071	(0.017)	50,576
Ordered Logit w/ Polity V	-1.868	(0.056)	0.249	(0.044)	50,576

1.5.1 Ordered Logistic Regression Results

The ordered logistic regression models are presented in sequential steps to evaluate the robustness and consistency of the hypotheses across multiple specifications.

First, the baseline ordered logistic model without additional controls offers strong support for both hypotheses. Sender adjustment costs exhibit a robust negative relationship with sanction severity (coefficient = -2.53, SE = 0.017, $p < 0.01$), demonstrating that sender states with higher domestic adjustment costs are associated with less severe sanctions. Conversely, target adjustment costs show a significant positive relationship (coefficient = 2.06, SE = 0.011, $p < 0.01$), confirming that economically vulnerable targets are more frequently and severely sanctioned.

Subsequent analyses introduce controls such as trade gravity, PTAs, and nuclear status.

Including controls strengthens the core findings. Sender adjustment costs remain negative (coefficient = -3.554, SE = 0.022, $p < 0.01$), while target adjustment costs maintain their positive effect (coefficient = 1.191, SE = 0.013, $p < 0.01$).

The preferred specification incorporates year-fixed effects and bootstrap dyad-clustered standard errors (Table 1.4). This specification continues to offer support for both hypotheses. In models (1) through (6), each adjustment cost proxy is tested separately, both individually and subsequently with additional controls; in every specification, all proxies display the theoretically expected signs. Sender adjustment costs show a highly significant negative coefficient (coefficient = -3.193, SE = 0.017, $p < 0.01$), and target adjustment costs again present a positive effect (coefficient = 1.274, SE = 0.009, $p < 0.01$). These results confirm the robustness of both hypotheses to temporal and dyadic clustering.

Table 1.4. Ordered Logistic Regression Results

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Target ECI	-0.693***			-0.847***					
	(0.005)			(0.005)					
Sender ECI	1.038***			0.775***					
	(0.005)			(0.005)					
Target Trade % GDP		0.424***			0.348***				
		(0.004)			(0.004)				
Sender Trade % GDP		-2.160***			-4.608***				
		(0.061)			(0.138)				
Target Elasticity			-0.285***			-0.161***			
			(0.002)			(0.003)			
Sender Elasticity			0.462***			0.722***			
			(0.004)			(0.004)			
Target Nuclear				-0.134***	-0.203***	-1.213***	-0.826***		-0.642***
				(0.016)	(0.018)	(0.014)	(0.013)		(0.016)
Sender Nuclear				-1.151***	-1.748***	0.307***	-1.090***		0.090***
				(0.026)	(0.027)	(0.022)	(0.021)		(0.029)
Trade Gravity				0.738***	1.018***	0.757***	0.694***		1.047***
				(0.005)	(0.007)	(0.004)	(0.003)		(0.007)
PTA				-1.293***	-1.822***	-1.860***	-1.830***		-1.591***
				(0.025)	(0.024)	(0.023)	(0.022)		(0.028)
Target adj Costs								1.952***	1.274***
								(0.008)	(0.009)
Sender adj Costs								-2.134***	-3.193***
								(0.012)	(0.017)
Year Fixed Effects				Included (not displayed)					
Observations				300,474					

Note: Bootstrap Dyad-Clustered SE *p<0.1; **p<0.05; ***p<0.01

Including Polity V controls yields similar results, indicating that regime type does not drive the findings. In this specification, sender adjustment costs remain significantly negative (coefficient = -1.868, SE = 0.056, $p < 0.01$), and target adjustment costs maintain their expected positive sign and significance (coefficient = 0.249, SE = 0.044, $p < 0.01$). This illustrates that the central hypotheses hold even after controlling for level of democracy. This is not the preferred specification as including polity reduces the sample size (reduced to 50,576).

1.5.2 Linear Probability Model Results

In these specifications, the outcome is a binary variable indicating whether sanctions are imposed.

Initially, the baseline LPM without controls supports both hypotheses. Sender adjustment costs significantly decrease the likelihood of sanctions (coefficient = -0.161, SE = 0.009, $p < 0.01$), confirming sender states' aversion to sanctions when facing higher domestic economic disruptions. Conversely, Target adjustment costs increase sanction likelihood (coefficient = 0.229, SE = 0.011, $p < 0.01$), indicating greater sanction severity against vulnerable targets.

Introducing controls, trade gravity, preferential trade agreements, and nuclear status maintains these findings. Sender adjustment costs retain a significant negative effect (coefficient = -0.149, SE = 0.008, $p < 0.01$), while target adjustment costs continue showing a strong positive relationship (coefficient = 0.238, SE = 0.011, $p < 0.01$).

To provide context for the results, a one-unit change in the independent variable represents a one standard deviation shift in the composite sender adjustment cost index. Using the United States as an example, the U.S.-Djibouti dyad entries register near zero on the adjustment cost scale. Conversely, the U.S.-Canada dyad entries measure 3.06—a 3.06-standard-deviation increase in adjustment costs relative to U.S.-Djibouti. In Model 9, the coefficient on sender adjustment costs is -0.149, which suggests that a one-standard-deviation increase in sender costs decreases sanction probability by 14.9 percentage points. This 3.06-unit difference translates to a 45.6 percentage-point decline in sanction likelihood against Canada compared to Djibouti.

Further robustness is tested by including year-fixed effects and employing dyad-robust standard errors (Table 1.5). These additional specifications substantiate both hypotheses. Sender adjustment costs with controls remain negative and significant (coefficient = -0.149, SE = 0.035, $p < 0.01$). In contrast, target adjustment costs with controls remain positively significant (coefficient = 0.238, SE = 0.039, $p < 0.01$), and offer further support for the hypotheses.

Table 1.5. Linear Probability Model Results

	Dependent variable: Imposition of Sanctions								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Target's ECI	-0.069***			-0.085***					
	(0.022)			(0.022)					
Sender's ECI	0.107***			0.086***					
	(0.018)			(0.016)					
Target's Trade % GDP		0.054***			0.046***				
		(0.015)			(0.014)				
Sender's Trade % GDP		-0.021***			-0.033***				
		(0.007)			(0.009)				
Target's Elasticity			-0.029***			-0.021***			
			(0.024)			(0.027)			
Sender's Elasticity			0.031***			0.047***			
			(0.015)			(0.014)			
Target's Nuclear				-0.009	-0.028**	-0.105***	-0.061***		-0.080***
				(0.047)	(0.050)	(0.082)	(0.057)		(0.061)
Sender's Nuclear				-0.094***	-0.116***	0.013	-0.084***		-0.024
				(0.044)	(0.041)	(0.051)	(0.052)		(0.033)
Trade Agreement				-0.091***	-0.131***	-0.118***	-0.124***		-0.111***
				(0.028)	(0.039)	(0.038)	(0.039)		(0.029)
Target's Adjustment Costs								0.229***	0.238***
								(0.039)	(0.039)
Sender's Adjustment Costs								-0.161***	-0.149***
								(0.037)	(0.035)
Year Fixed Effects	Included (not displayed)								
Observations	300,474								
Note: Clustered SE by Dyad									*p<0.1; **p<0.05; ***p<0.01

Finally, incorporating Polity V controls into the linear probability models demonstrates consistent results even within this more restrictive sample. Sender adjustment costs continue to significantly reduce sanction likelihood (coefficient = -0.036, SE = 0.014, $p < 0.01$), and target adjustment costs retain a robust positive effect (coefficient = 0.071, SE = 0.017, $p < 0.01$). The following section extends this analysis further by incorporating an Ordinal Bayesian Logistic Regression.

1.5.3 Ordinal Bayesian Logistic Regression Results

The ordinal Bayesian logistic regression with dyad-level random intercepts and year-fixed effects assesses the robustness of findings from previous models—but also incorporates an additional approach to control for dyadic heterogeneity and temporal dynamics (Table 1.6). Sender adjustment costs continue to predict lower sanction severity, with a negative estimate (coefficient = -1.01, SE = 0.16, 95% CI [-1.34, -0.70]), offering strong support for H1. The significance of this effect suggests that higher domestic economic vulnerabilities constrain sender states from initiating sanctions.

Target adjustment costs, consistent with H2, elevate sanction severity (coefficient = 0.49, SE = 0.08, 95% CI [0.33, 0.65]). This positive relationship suggests that states leverage sanctions more aggressively against economically vulnerable targets.

Table 1.6. Ordinal Bayesian Logistic Regression Results

	Estimate	Est. Error	95% CI Lower	95% CI Upper	Rhat	Bulk ESS	Tail ESS
Independent Variables							
Target adj Costs	0.49	0.08	0.33	0.65	1.01	427	511
Sender adj Costs	-1.01	0.16	-1.34	-0.70	1.03	249	421
Target Nuclear	1.72	0.87	0.08	3.36	1.06	57	217
Sender Nuclear	6.04	0.79	4.36	7.48	1.10	42	42
PTA	-3.36	0.24	-3.82	-2.90	1.00	340	394
Random Effects (Dyad-Level)							
sd(Intercept)	11.96	0.43	11.20	12.82	1.06	91	242
Year Fixed Effects			Included (not displayed)				
Observations			300,474				
Dyad-Level Random Intercepts			Yes (24,470 dyads)				

Note: 3 chains, 1000 iterations (500 warm-up)

1.5.4 Bayesian Structural Equation Model Results

The Bayesian SEM represents the central empirical test of the theory. Unlike the ordered logistic or linear probability models, which treat these proxies independently and equally, the Bayesian latent variable framework accounts for measurement error and interdependencies among the indicators. The composite measure of adjustment costs intentionally integrates

multiple correlated indicators—including ECI, trade elasticity, trade dependence, and trade gravity—that jointly reflect distinct yet interrelated dimensions of economic vulnerability.

The results in Table 1.7 offer support for the theory. The latent sender adjustment cost construct demonstrates a statistically significant negative effect on sanction severity (posterior mean = -0.010, 95% CI [-0.010, -0.009]). This result suggests that sender states tend to avoid sanction imposition when facing higher anticipated domestic adjustment costs.

Conversely, latent target adjustment costs elevate the severity of sanctions imposed by sender states (posterior mean = 0.035, 95% CI [0.033, 0.038]). This result aligns with theoretical expectations that sender states exploit economic vulnerabilities of target states to maximize the coercive effectiveness of sanctions. Economically vulnerable targets, characterized by limited ECI, high trade dependency, and rigid trade elasticity, face heightened sanction severity due to their reduced capacity to absorb or offset economic disruptions.

Factor loadings reflect the components theorized to make up adjustment costs. For target adjustment costs, indicators such as Trade % GDP (loading = 0.257), Trade Elasticity (loading = 0.302), and ECI (loading = -0.237) align with the theory's predictions. Notably, trade gravity negatively loads onto target adjustment costs (-0.861), indicating that geographically distant or economically disconnected targets inherently face lower adjustment costs, consistent with the expectations of reduced economic exposure (Figure 1.2).

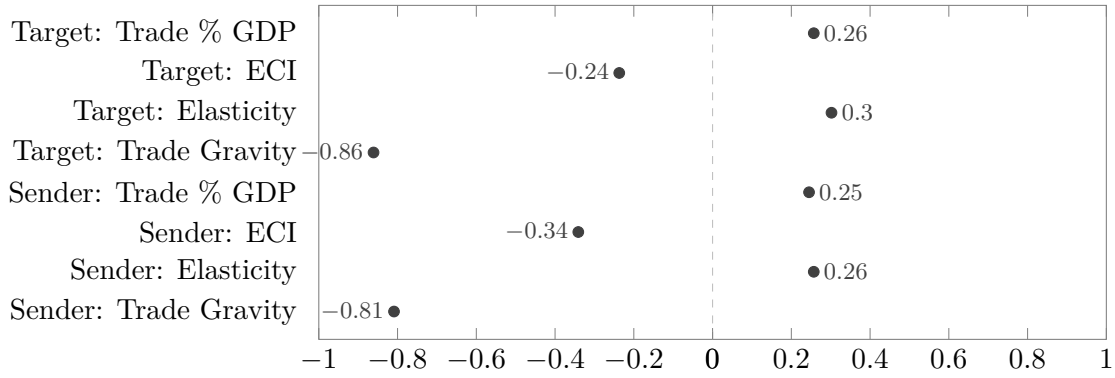

Figure 1.2. Bayesian Factor Loadings

Similarly, sender adjustment costs reflect: Sender Trade % GDP (loading = 0.245), Sender Trade Elasticity (loading = 0.257), and Sender ECI (loading = -0.341). These factor loadings are consistent with the theory of domestic economic exposure and struc-

tural vulnerabilities. The negative loading of trade gravity (-0.809) suggests that greater economic interconnectedness and proximity heighten sender economic vulnerability, and thereby constrain sanction deployment.

Table 1.7. Bayesian SEM Results

	Estimate	Std. Error
Measurement Model		
Target Adjustment Costs		
Target Trade % GDP	0.257	0.001
Target ECI	-0.237	0.001
Target Elasticity	0.302	0.001
Trade Gravity	-0.861	0.001
Sender Adjustment Costs		
Sender Trade % GDP	0.245	0.001
Sender ECI	-0.341	0.001
Sender Elasticity	0.257	0.001
Trade Gravity	-0.809	0.001
Structural Model		
Target Adjustment Costs	0.035	0.002
Sender Adjustment Costs	-0.010	0.001
PTA	-0.043	0.002
Target Nuclear Status	-0.025	0.001
Sender Nuclear Status	-0.025	0.001
Observations	300,474	
Chains	3	

The analyses consistently support the hypotheses across multiple approaches, including ordered logistic regressions, linear probability models, ordinal Bayesian logistic regressions, and Bayesian modeling. These results provide suggestive evidence that sender states tend to avoid imposing sanctions when facing high domestic economic vulnerabilities, whereas

economically vulnerable targets tend to face increased sanction severity.

1.6 Discussion and Conclusion

This research advances sanctions scholarship in three ways. First, the results directly challenge conventional assumptions within realist frameworks that suggest powerful sender states can employ economic sanctions unilaterally and without meaningful domestic constraints. Instead, the empirical evidence highlights significant strategic limitations even for economically diversified sender states.

Second, the composite measure's construction offers notable improvements over simpler, single-proxy approaches. For example, the robust negative relationship between ECI and sanction vulnerability demonstrates that states possessing diversified and sophisticated economic structures experience reduced sanction severity—precisely because their adaptive capacities allow them to mitigate disruptions through rapid substitution and diversification.

Third, sender states avoid imposing severe economic measures precisely because they anticipate significant domestic economic and political costs. Chapter 2 further supports these findings through qualitative case analyses. Chapter 3 then empirically validates these mechanisms through a comparative damage framework.

Chapter 2

Adjustment Costs and Sanctions Severity: A Qualitative Analysis

2.1 Introduction

In 2021, the United States imposed comprehensive sanctions against Myanmar following its military coup. These sanctions signaled international condemnation of a violation of democratic norms. Yet just three years earlier, when Saudi Arabia faced intense global criticism for the murder of journalist Jamal Khashoggi—an equally egregious normative breach—the U.S. limited its response to symbolic sanctions on mid-level officials and deliberately avoided measures directly targeting Crown Prince Mohammed bin Salman (MBS). Why do states respond to similar violations with dramatically different sanctions?

In this chapter, I argue that the variation in sanction responses reflects the influence of economic *adjustment costs*—the domestic economic disruptions that occur when existing trade and financial relationships are restricted or terminated. Specifically, because the U.S. and Saudi Arabia are closely tied by oil and security interests, U.S. officials anticipated high domestic costs and therefore ruled out harsher sanctions. In contrast, limited economic interdependence with Myanmar reduced these costs and facilitated the imposition of more comprehensive sanctions.

Sanctions seldom affect the entire economy; rather, their impact tends to be concentrated in strategic sectors. At first glance, targeting economically significant sectors might imply high aggregate adjustment costs for sender states. Evidence presented later in this chapter, such as the EU's experience of sharply rising gas prices following sanctions on Russian natural gas, shows that some policymakers and media outlets perceived sector-specific adjustment costs to be substantial. Yet, as Chapter 1 suggests, these aggregate costs remained manageable despite notable sector-specific burdens—a tension explicitly addressed in Chapter 3, which employs a DiD-style analysis to demonstrate the logic of comparative damage empirically.

While other factors, such as security agreements or domestic audience costs, influence sanction decisions—as highlighted by the U.S.–Saudi Arabia case, where strategic partnerships elevated perceived adjustment costs despite congressional pressures—they are not central to this analysis. Instead, this chapter explicitly emphasizes sector-level adjustment costs due to their measurability and theoretical clarity.

To examine how sector-specific economic adjustment costs shape both the decision to impose sanctions and their severity, I adopt a qualitative comparative approach that analyzes four historical and four contemporary sanctions cases. Thus, this chapter's case studies serve both to validate the aggregate-level suggestive evidence from Chapter 1 and to clarify the mechanisms driving policymakers' strategic decisions—mechanisms that quantitative models cannot fully specify. This chapter sets aside the question of sanction effectiveness and focuses only on how adjustment costs shape severity. Instead, it exclusively investigates how varying sector-specific adjustment costs influence policymakers' decisions regarding both the initiation and severity of sanctions, which range from symbolic measures to comprehensive embargoes.

The case studies are organized into four groups and explore how policymakers perceive, evaluate, and respond to economic adjustment costs. First, in cases where neither the sender nor the target faces significant economic adjustment costs, sanctions are likely to be symbolic rather than economically coercive, since neither party would suffer meaningful disruptions. Second, policymakers confronting high domestic economic costs but targeting economically resilient states may impose mild or symbolic sanctions, despite considerable normative pressures, to avoid domestic economic blowback. Third, in scenarios of mutual economic vulnerability, policymakers will opt for incremental sanctions, counterintuitively avoiding maximalist coercive measures precisely because both the sender and the target face high economic risks. Finally, low sender costs coupled with a vulnerable target encourage policymakers to impose comprehensive sanctions because domestic blowback is negligible.

In this analysis, adjustment costs are sometimes exogenous, reflecting pre-existing economic dependencies, and at other times endogenous, emerging when policymakers strategically alter economic structures in anticipation of potential sanctions. In practice, however, disentangling these two dimensions is empirically challenging, as the causal relationship

frequently runs in both directions—complicating straightforward identification of the mechanisms in play.

2.2 Literature Review

Prior research has overlooked a critical dimension of sanctions. Most scholarship treats sender and target vulnerabilities in isolation. Adjustment cost theory addresses this gap by integrating both sender and target sensitivities into a unified framework. Sanctioning decisions emerge from the intersection of mutual vulnerabilities.

2.2.1 The Missing Dimension

Previous scholarship has analyzed various dimensions of adjustment costs separately, such as economic size, trade dependence, and political resilience (Bergeijk 1989; Caruso 2003; Clifton Morgan and Bapat 2003; Hufbauer et al. 2007; Lektzian and Souva 2007), but has not synthesized these into a comprehensive measure that influences sanction decisions. Moreover, sanction outcomes are influenced by numerous factors, including sanction type (targeted versus comprehensive), strategic intent (coercion, signaling, or containment), regime characteristics (democratic versus authoritarian), and broader economic and geostrategic conditions (Dashti-Gibson et al. 1997; Drezner 1999, 2024; Kirshner 1997; Peksen 2019a; Zarpli 2023).

2.2.2 Integrating Sender and Target Vulnerabilities

Gent and Crescenzi (2021) distinguish between two types of adjustment costs relevant to these calculations: *sensitivity costs*, which reflect temporary inefficiencies states and firms incur when shifting economic partners, and *vulnerability costs*, representing more severe long-term disruptions when alternatives or perfect substitutes are limited or nonexistent. Adjustment cost theory moves beyond frameworks focused solely on economic damage by examining how policymakers assess economic and political risks (Allen 2008; Marinov 2005).

2.2.3 Rational Restraint

Leaders grasp the complex and conditional nature of sanctions and balance potential domestic economic disruptions against the projected coercive benefits. Empirical evidence from EU member states shows that significant domestic adjustment costs—such as those borne by key exporting industries, elites, or influential firms—markedly reduce both the likelihood and severity of sanction implementation (McLean and Whang 2014; Preble 2020). This strategic restraint highlights policymakers' focus on mitigating anticipated domestic economic backlash. Moreover, Drezner (1999) suggests that anticipated domestic economic harm undermines sanction credibility and effectiveness, which likely constrains sanction severity. Similarly, Martin (1992) suggests that policymakers prefer multilateral sanctions to distribute costs and minimize domestic disruptions. This reflects their sensitivity to sender-side vulnerabilities. Specifically, adjustment cost theory predicts that higher aggregate sender adjustment costs reduce both the likelihood and severity of sanctions (Hypothesis 1).

Additionally, existing research suggests that higher aggregate target adjustment costs increase both the likelihood and severity of sanctions. Drezner (1999) suggests that senders impose more frequent and severe sanctions when targets exhibit significant economic vulnerabilities. Here, the strategic aim is to maximize coercive leverage. Empirical analyses confirm that sanctions targeting economically vulnerable states tend to be more effective, encouraging policymakers to exploit these vulnerabilities (Dashti-Gibson et al. 1997; Morgan and Schwebach 1997). Thus, policymakers impose more frequent and severe sanctions when aggregate target adjustment costs are high, leveraging these vulnerabilities to enhance coercive effectiveness (Hypothesis 2). Moreover, a greater disparity in adjustment costs between sender and target states incentivizes economically resilient sender states to impose more aggressive sanctions to leverage their relative economic advantage (Hypothesis 3).

2.2.4 Symbolic and Political Motivations

Yet a critical empirical puzzle remains: Given that adjustment cost theory predicts states will exercise restraint in sanction design to avoid substantial domestic economic harm

(Hypothesis 1) and actively exploit targets' vulnerabilities to enhance coercive effectiveness (Hypothesis 2), why do states frequently impose sanctions even when expected effectiveness is uncertain, domestic economic repercussions appear severe, or substantial political backlash is anticipated? Eland (1995) provides one influential explanation—policymakers often impose sanctions primarily to satisfy domestic political demands or to signal international resolve, even when such actions appear economically irrational or strategically ineffective, characterized as a *do something* logic (Drezner 1999).

Policymakers may thus use sanctions symbolically and prioritize domestic political imperatives or international normative commitments over straightforward economic rationality. While these explanations likely reflect partial aspects of the policymakers' calculus, their underlying motivations—such as symbolic action or domestic political pressures—are inherently challenging to isolate and empirically examine.

2.2.5 The Logic of Comparative Damage

The concept of comparative damage provides a clear rationale for why states impose sanctions when they will incur significant costs. This section offers only a brief review of the relevant comparative damage literature. Chapter 3 provides a comprehensive examination of these foundations, including the absolute-relative gains debate central to comparative damage calculations. At its core, this logic reflects a straightforward calculation of the projected utilities.

Specifically, policymakers accept short-term domestic pain when it inflicts greater, longer-lasting damage on the target. Rationalist models clearly articulate this logic. Sender states deliberately select sectors and sanction designs that leverage comparative advantages to impose persistent vulnerabilities on targets, even if this entails accepting initial domestic adjustment costs (Becko 2024; Eaton and Engers 1992). Moreover, states rationally accept temporary economic disruptions when these sacrifices are justified by significant longer-term strategic leverage or enduring economic pressure on adversaries (Chowdhry et al. 2024; Drezner 1999).

Notably, the EU's sanctions against Russia illustrate policymakers' willingness to accept

substantial short-term economic disruptions, especially in energy markets. Policymakers adopted this strategy after identifying viable domestic adjustment pathways (price caps and supplier diversification), ensuring immediate costs remained manageable relative to the enduring economic vulnerabilities imposed on Russia (Pertiwi 2024; Stoop 2016). States accept substantial short-term adjustment costs in economically critical sectors, provided these disruptions remain manageable relative to the sustained economic vulnerabilities imposed on the target state (Hypothesis 4). Chapter 3 provides direct support for this hypothesis.

The next section lays out the theoretical framework.

2.3 Theoretical Framework

Adjustment cost theory explains how states formulate the severity of sanctions. Central to this approach is the argument that policymakers explicitly account for anticipated adjustment costs when deciding whether and how severely to impose sanctions. Policymakers first assess their states' economic vulnerabilities—considering domestic industry reliance on imports from or exports to the target, the availability of alternative markets, and the expected domestic political repercussions of economic disruption. They then evaluate the target state's vulnerabilities, specifically its reliance on bilateral trade flows, access to alternative suppliers, and overall economic resilience. This two-stage calculation shapes policymakers' strategic decisions by clearly delineating feasible sanction severity based on projected domestic and economic repercussions.

A key assumption is that policymakers evaluate their own state's economic vulnerabilities prior to imposing sanctions. For example, sender states characterized by diversified economies, robust domestic markets, and access to alternative supply chains experience low adjustment costs; thus granting them greater strategic flexibility to pursue aggressive sanctions without significant domestic repercussions (Baldwin 1985; Hufbauer et al. 2007; Kirshner 1997). Conversely, sender states dependent on critical imports, exports, or financial ties with the target face high adjustment costs. Policymakers in these scenarios face strategic constraints, prompting them to adopt symbolic, incremental, or narrowly targeted sanctions aimed at satisfying domestic political demands or signaling international resolve

without incurring severe economic harm (Kaempfer and Lowenberg 1992).

Moreover, policymakers consider the economic vulnerabilities of target states. Sanctions achieve maximal coercive potential when targets face high adjustment costs due to economic dependence, limited domestic adaptability, or a lack of alternative markets and perfect substitutes. High adjustment costs amplify economic pressures and internal political consequences within target states, thereby increasing the likelihood of concessions (Allen 2008; Marinov 2005).

Crossing sender and target costs yields four scenarios, each with a clear prediction about sanction severity:

First, when adjustment costs are low for both the sender and target, sanctions typically serve symbolic or diplomatic purposes rather than substantive economic coercion. Policymakers implement sanctions primarily for diplomatic signaling or normative purposes, as neither anticipates meaningful economic disruption. Historical examples include U.S. sanctions on Spain during World War II and recent U.S. sanctions against Myanmar following its 2021 military coup.

Second, scenarios featuring high sender adjustment costs but low target vulnerabilities typically lead policymakers toward cautious, symbolic, or incremental sanctions rather than robust economic coercion. Although adjustment cost theory initially predicts policymakers would prefer to avoid sanctions entirely under these conditions, deviations in empirical cases reflect differences between perceived sector-specific costs and actual aggregate vulnerabilities. In other words, while policymakers publicly emphasize severe sector-specific disruptions, the analysis in Chapter 3 confirms aggregate adjustment costs remain manageable and comparatively low—aligning with the suggestive evidence in Chapter 1. Thus, what might initially appear inconsistent with the theoretical expectation is reconciled by distinguishing between heightened sectoral perceptions and genuinely modest risks. Illustrative examples include the League of Nations' incremental sanctions on Italy in 1935–1936 and the EU's incremental approach to sanctioning Russian natural gas following the 2022 invasion of Ukraine.

Third, scenarios characterized by mutual high adjustment costs, where both sender and target states face substantial economic vulnerabilities, lead policymakers toward incremen-

tal or narrowly targeted sanctions. Policymakers weigh coercive intent against the need to minimize reciprocal disruptions at home. Counterintuitively, mutual vulnerability restrains rather than encourages aggressive economic coercion. Examples include U.S.–Japan sanctions preceding World War II and contemporary U.S. sanctions against Saudi Arabia following the Khashoggi murder. Both cases demonstrate a cautious policy response shaped by mutual dependence. When both sender and target states face significant adjustment costs, policymakers anticipate substantial reciprocal economic harm, so caution is incentivized.

Finally, the most favorable scenario occurs when sender states face minimal adjustment costs and target states exhibit significant economic vulnerabilities. Policymakers leverage these asymmetries by imposing comprehensive and aggressive sanctions without fear of economic repercussions. Empirical examples feature targets with substantial economic dependence, limited market alternatives, or low economic resilience, maximizing coercive potential. Historical cases such as the Allied blockade of Germany during World War I and recent U.S. sanctions against Venezuela exemplify this scenario. I now outline the hypotheses.

2.3.1 Sanction Typology

This section offers a brief definition of the sanction types referenced in this research. These categories are not mutually exclusive, and sanctions often combine elements from multiple types.

Symbolic sanctions primarily signal political disapproval and are often motivated by domestic political interests rather than an aim to induce meaningful policy change. These sanctions typically involve low-cost measures—such as travel bans or asset freezes on mid-level officials—that minimize economic disruption for both sender and target (Nossal 1991; Whang 2011). Symbolic sanctions satisfy domestic audiences, uphold international norms, and allow policymakers to demonstrate resolve without incurring significant adjustment costs. This allows states to reinforce political legitimacy at home while signaling adherence to international norms abroad (Whang 2011).

I refer to incremental sanctions as representing a more flexible form of economic coercion that escalates in response to evolving target behavior. This categorization builds on formal models where both sender and target update their calculations in response to new information about resolve and costs (Drezner 2003). In my conceptualization, incremental sanctions allow states to buy time, manage domestic adjustment costs, and maintain diplomatic flexibility.

2.3.2 Hypotheses

This section outlines four central hypotheses connecting sender and target adjustment costs to sanctioning decisions.

Specifically:

H1: Higher *aggregate* adjustment costs in sender states decrease the likelihood and severity of sanction imposition, as states seek to avoid domestic economic harm.

H2: Higher *aggregate* adjustment costs in target states increase the likelihood and severity of sanctions due to enhanced economic vulnerability, as sender states anticipate greater coercive effectiveness.

H3: Greater disparities in *aggregate* adjustment costs between sender and target states amplify sanction severity. Economically resilient sender states impose more aggressive sanctions on economically vulnerable targets.

H4: Sender states may impose sanctions in sectors where their immediate economic adjustment costs are substantial, provided these costs remain temporary and manageable relative to the enduring vulnerabilities imposed on target states.

The next section details the methodology used to evaluate these hypotheses.

2.4 Research Design

Two critical assumptions guide this approach. First, sanction decisions evolve through sequential, interconnected stages, from policymakers' initial recognition of economic vulnerabilities—through internal deliberations and preliminary sanction design—to final policy outcomes.

Second, policymakers' perceptions of adjustment costs do not operate in isolation but are influenced by a broader constellation of political, strategic, and normative conditions that either amplify or constrain their strategies. Table 2.1 provides an overview of the cases, organized according to the four adjustment-cost scenarios.

Table 2.1. Case Study Selection

Target	**Adjustment Costs (Sender/Target)**
Spain (WWII)	Low/Low
Myanmar (2021)	Low/Low
Italy (1935–36)	High/Low
Russia (2022)	High/Low
Japan (1941)	High/High
Saudi Arabia (2018)	High/High
Germany (WWI)	Low/High
Venezuela (2019)	Low/High

2.4.1 Data Sources and Case Selection

This analysis uses academic scholarship and primary-source archival documents to reconstruct policymakers' perceptions and decision-making processes. The analysis covers cases from early 20th-century sanctions, such as the League of Nations against Italy (1935–1936), to contemporary cases, including EU sanctions on Russian natural gas (2022), U.S. petroleum sanctions targeting Venezuela (2019), and recent U.S. sanctions against Myanmar (2021).

I use two qualitative tools—pattern matching and narrative tracing—to test the argument. Pattern matching identifies consistencies between policymakers' perceived adjustment costs (independent variable) and decisions regarding sanction imposition and severity (dependent variable) and compares theoretical expectations against empirical observa-

tions across cases. Narrative explanation-building traces causal mechanisms within each case—preconditions, decision, sanction action, and outcomes—by analyzing policymakers' internal deliberations and evolving perceptions of economic and strategic vulnerabilities.

To account for alternative explanations, such as security alliances or domestic audience costs, I explicitly incorporate these factors into the qualitative case studies using process tracing. By examining policymakers' internal deliberations documented in diplomatic communications, legislative debates, and executive memoranda, I evaluate whether adjustment costs primarily drove sanction decisions or if competing strategic and domestic pressures shaped outcomes. Although these alternative factors are acknowledged contextually, attention to policymakers' stated rationales helps isolate the influence of economic adjustment costs.

2.4.2 Sequential Stages of Sanction Decisions

Within each case study, I explain how the sanction decision-making process unfolds across four interconnected stages. Each stage provides empirical support for tracing how policymakers' perceptions of economic adjustment costs—both preexisting and sanctions-induced—influenced state behavior.

2.4.2.0.1 Preconditions The initial stage involves assessing states' baseline economic sensitivities and vulnerabilities prior to sanction considerations. This stage examines states' underlying economic exposures, including critical import-export dependencies, trade diversification, and structural rigidities, such as pipeline access, that limit adaptability. Empirical evidence for this stage includes economic profiles, institutional analyses, government economic assessments, and internal policy documents acknowledging states' structural economic vulnerabilities.

2.4.2.0.2 Decision The second stage identifies the triggering event or policy infraction prompting policymakers to actively deliberate the imposition of sanctions. This stage captures policymakers' internal deliberations and emphasizes how they weigh the strategic imperative for sanctions against anticipated domestic economic and political repercussions.

I draw on archival records, policy memoranda, public statements, and other primary governmental sources to trace how policymakers weighed adjustment cost risks.

2.4.2.0.3 Implementation The third stage examines the design, timing, and comprehensiveness of sanctions enacted by policymakers. Here, I analyze how policymakers calibrate sanctions, including severity, targeting specificity, and timing, to manage anticipated disruptions. I use policy directives, legislative records, executive orders, diplomatic cables, and sanction decrees to reconstruct decisions.

2.4.2.0.4 Outcome The final stage evaluates the outcomes of sanction decisions and assesses how policymakers' perceptions of adjustment costs translated into realized economic impacts for sender states and coercive pressures on target states. Although this analysis does not focus on sanction effectiveness, policymakers' anticipatory perceptions of effectiveness matter as these shape their ex-ante adjustment cost calculations and expectations for future engagements. For this stage, I rely on economic impact studies, official policy evaluations, fiscal reports, and secondary analyses that track how each side adjusted.

2.4.3 Scope Conditions and Limitations

This section defines the scope conditions and acknowledges methodological limitations.

First, while the analyses in Chapter 1 suggest that adjustment costs influence states' sanctioning behavior at the aggregate level, the available data used in these models do not provide sufficient granularity for analyzing the precise causal mechanisms in the individual cases. Therefore, this chapter employs a sector-level disaggregation to identify and unpack the specific economic constraints and vulnerabilities policymakers confront when deciding whether and how severely to sanction.

Second, this dissertation focuses on economic adjustment costs measured through observable and quantifiable indicators. Although other critical yet less quantifiable adjustment costs, such as audience costs, reputational concerns, domestic political pressures, and alliance commitments, undoubtedly influence sanction decisions, their inherent complexity and context-specific nature preclude comparative analysis. For instance, audience costs,

such as domestic political demands following the Khashoggi murder, are acknowledged contextually but not rigorously evaluated across cases due to their limited measurability.

Third, this study does not examine the dynamics of repeated interaction scenarios nor incorporate policymakers' anticipations of future bargaining contexts or long-term strategic considerations. Each case is analyzed independently, with the analysis limited to immediate perceptions of economic vulnerabilities at discrete decision points. Consequently, potential influences such as reputation-building, deterrence strategies, or long-term strategic bargaining are excluded from the comparative framework.

Finally, while the comparative qualitative approach offers detailed insights, the limited number of selected cases prioritizes theoretical leverage over comprehensiveness. Additionally, the reliance on peer-reviewed academic scholarship ensures consistency but inherently introduces selection bias based on the availability of the documentation that describes sanctions deliberations—superpower states are overrepresented in the case study analysis.

The following section examines the scenarios in which target states face minimal adjustment costs, offering the strongest tests of adjustment cost theory.

2.5 Case Analysis

2.5.1 Low Target Adjustment Costs

I begin with cases where targets face low adjustment costs—the hardest cases for existing sanction theory to explain. Drezner (1999) argues that sender states typically pursue economic coercion when the anticipated payoff from sanctions is at least neutral or positive. While acknowledging the existence of outlier cases or instances of miscalculation, previous research does not thoroughly engage with instances in which sender states impose sanctions despite recognizing the target state's minimal economic vulnerability. In contrast, this section addresses these cases by drawing on case evidence to demonstrate that policymakers sometimes impose sanctions even when targets possess sufficient domestic resilience or access to perfect substitutes, significantly limiting their susceptibility to economic coercion.

Sender states face a particularly complex calculus in the Low-Sender Low-Target and High-Sender Low-Target scenarios. In the Low-Sender Low-Target pairing, minimal eco-

nomic interdependencies between sender and target states imply that sanctions primarily function as diplomatic signals rather than genuine economic coercion. Due to the target state's low adjustment costs stemming from domestic economic capacity and alternative trade partners, the coercive potential of sanctions is inherently limited. Policymakers in these contexts impose economic measures primarily to signal diplomatic displeasure, reinforce international normative standards, or respond symbolically to violations of international law or human rights.

Conversely, in High-Sender Low-Target cases, a sender may sanction even while forecasting domestic costs. At first glance, this appears to challenge the rational-choice assumptions central to Drezner's model, where sanctions are primarily justified by favorable strategic cost-benefit outcomes (Drezner 1999). Internal policy communications suggest that these sanction decisions sometimes originate from domestic political pressures to visibly respond to international crises or normative breaches. Policy narratives and contemporary media accounts often depict sector-specific adjustment costs as severe; however, when examined at the aggregate state-economy level, these costs are substantially lower, supporting the empirical findings from Chapter 1.

Moreover, integrating the comparative damage logic clarifies this apparent paradox: policymakers may strategically incur short-term, substantial domestic adjustment costs if they anticipate imposing enduring vulnerabilities on the target state. Thus, rather than purely symbolic or politically driven actions, High-Sender Low-Target scenarios can reflect calculated decisions where policymakers consciously accept immediate economic burdens to secure long-term leverage.

2.5.2 Cases of Low Sender and Low Target Adjustment Costs

When both sides lack significant economic vulnerability, sanctions are usually symbolic. We see this in two cases: U.S. sanctions on wartime Spain during World War II and Myanmar. Under these circumstances, sanctions function predominantly as signaling tools. These tools enable policymakers to demonstrate political resolve, uphold international norms, or respond to domestic pressures with minimal economic fallout. Although the theory broadly

applies across various political contexts, the explicit focus on U.S. cases in this section is justified by the United States' prominence as the most frequent sender of economic sanctions, resulting in its significant overrepresentation in sanctions literature (Drezner 1999).

2.5.3 U.S. Oil Sanctions on Spain (1940-1944)

The Allied response to Spain during World War II reveals how minimal economic interdependence shapes sanctioning strategies.

2.5.3.1 Preconditions

Before sanctions were enacted, both the Allies and Spain had minimal mutual economic reliance, which enabled the Allies to threaten sanctions without significant economic risk. For the United States and Britain, Spain was not a critical supplier to their wartime economies. In 1944, U.S. oil exports to Spain accounted for only 0.3 percent of total U.S. oil production. Moreover, the Allies had also gained substantial control over strategic commodities flowing to Spain. Beginning in 1940, they regulated or suspended oil shipments at will and demonstrated that their wartime plans could proceed without reliance on Spain. By mid-1940, Britain had implemented a comprehensive global shipping oversight system aimed at blocking essential goods from reaching Spain, while the U.S. had also agreed to halt its oil exports (Caruana and Rockoff 2006).

Spain, similarly, exhibited low adjustment costs. Spain was economically isolated due to its Axis sympathies. It had increasingly pursued autarky as a survival strategy during World War II—driven largely by economic devastation from the preceding Spanish Civil War (López 2015). These conditions compelled Spain to reduce its reliance on Allied imports. Instead, it emphasized domestic production and increased trade ties with Axis and neutral countries. Although critical resources such as oil remained a notable vulnerability, Spain believed it could mitigate shortages through rationing measures and Axis support if necessary. Spain developed a critical wartime economic lifeline by exporting wolfram (tungsten) to Nazi Germany, which significantly bolstered its economic position. By 1943, tungsten exports had risen from 0.4 percent to nearly 20 percent of Spain's total exports

(Calvo et al. 2019). Tungsten was crucial for German wartime armaments production, particularly in the manufacture of armor-piercing shells, which significantly impacted military effectiveness and lethality. This also made tungsten a significant target in Allied strategic calculations (Caruana and Rockoff 2006).

2.5.3.2 Decision

Allied policymakers imposed sanctions chiefly to signal opposition to Spain's support for Germany. By this point in the war, Spain, officially neutral but ideologically sympathetic to the Axis powers, continued to facilitate the German war effort through tungsten exports critical to Germany's armaments production (Caruana and Rockoff 2006). Earlier diplomatic pressure had yielded only limited concessions. With the war at a decisive juncture, the Allies determined that a firmer stance was necessary. Thus, in November 1943, the United States delivered a clear ultimatum demanding that Spain halt all tungsten shipments to Germany, which was a credible signal that the U.S. would escalate economic pressure (Cortada 1970).

Primarily, Allied policymakers sought to ensure Spain's sustained neutrality and to curtail its indirect support for Axis military efforts as the Allies prepared for major offensives. Sanctions thus served as a credible signal, demonstrating to neutral states that covert assistance to Nazi Germany would no longer be tolerated.

This decision formed part of a broader Allied diplomatic strategy combining military and economic measures to influence the strategies of neutral nations. Although Spain's ideological sympathies with the Axis were well-known, the Allies' principal concern was the tangible material support Spain provided to the German war effort. Consequently, the primary objective of Allied sanctions was to disrupt this economic assistance (Caruana and Rockoff 2006).

2.5.3.3 Implementation

Policymakers imposed a targeted oil embargo to signal diplomatic resolve rather than cripple Spain's economy. After Spain disregarded the U.S. ultimatum regarding tungsten exports, formal sanctions were enacted in January 1944, which halted oil shipments to Spain

(Caruana and Rockoff 2006). Enforcement relied heavily on meticulous monitoring. U.S. naval oversight enabled tight control over oil flows, slowed authorization, and gradually restricted Spain's oil supply (Thomàs 2011). By May 1944, these pressures compelled Spain to concede. Spain agreed to significantly reduce tungsten exports to Germany and expel German military and espionage personnel in exchange for restoring oil shipments and relaxing trade restrictions (Caruana and Rockoff 2006; Cortada 1970).

In practice, however, the enforcement of sanctions remained inconsistent, aligning closely with the expectation that they were primarily symbolic. Despite formal compliance with Allied demands, Spanish authorities largely tolerated clandestine tungsten exports to Germany during the embargo, substantially undermining economic effectiveness. On the sender side, internal disagreements diluted the sanctions' potency. While the U.S. advocated for a firm stance, Britain grew increasingly uneasy due to its substantial investments and significant postwar trade interests in Spain (Caruana and Rockoff 2006).

This divergence became explicit in Churchill's warning to Roosevelt that the United States was acting like "an elephant in the garden," highlighting the distinct and conflicting British and U.S. economic interests in the Spanish economy. This divergence supports the theory by illustrating differences in sender-state vulnerabilities: Britain faced higher adjustment costs due to extensive economic ties, including substantial investments and reliance on iron ore imports from Spain. These higher adjustment costs led Britain to advocate a more cautious sanctions strategy. By contrast, facing minimal economic exposure to Spain, the United States enjoyed significantly lower adjustment costs, which enabled a more aggressive sanctions approach without the threat of domestic economic repercussions (Caruana and Rockoff 2006).

2.5.3.4 Outcome

The modest economic disruption and partial diplomatic success of the sanctions demonstrate their primary role as symbolic tools rather than decisive economic instruments under conditions of minimal economic interdependence. Spain experienced only moderate economic impact as it lost some wartime export revenue and endured short-term fuel shortages. However, Spain successfully avoided any lasting economic harm. On the Allied side, sanc-

tions partially achieved their strategic objectives. As historical assessments suggest, Spain's cessation of critical assistance to Germany was less a result of direct economic pressure than of Spain's internal strategic calculation that the Axis powers were inevitably headed toward defeat (Caruana and Rockoff 2006).

Additionally, Spain's response options were also constrained by limited avenues for retaliation. Although Spain theoretically could have sought alternative oil supplies from Germany or Romania, neither option was realistically available as Germany required all accessible supplies for its own war effort, and Romanian oil was prohibitively costly and logistically unattainable (Caruana and Rockoff 2006; Preda 2013). Spain was thus limited to diplomatic protest and eventual compliance. In the broader context, this case illustrates that sanctions were frequently employed to *nudge* neutral states toward alignment rather than to inflict punitive economic damage.

2.5.4 U.S. Sanctions on Myanmar (2021)

The same symbolic dynamics are at play in contemporary sanctions episodes. Why did the U.S. sanction Myanmar's junta in 2021 when it lacked economic leverage? This section shows how normative commitments and domestic political pressures drove symbolic rather than economically coercive sanctioning strategies.

2.5.4.1 Preconditions

Prior to the coup, Myanmar's minimal economic integration with Western markets ensured that potential U.S. sanctions would pose limited economic risks for both states. Before the coup, Myanmar was one of the largest recipients of U.S. aid in Southeast Asia (International Crisis Group 2021). Yet, Myanmar's economy remained minimally integrated with Western markets, relying predominantly on regional trading partners. China alone accounted for over 26 percent of Myanmar's total trade, with Thailand representing approximately another 17 percent (Institute for Strategy and Policy 2022). Western investment remained modest. As of 2016, U.S. companies had invested only $248 million in Myanmar, less than 1 percent of total foreign investment, compared to China's $18

billion (Overby 2016). By 2020, Myanmar ranked as only the 84th-largest goods trading partner of the United States, with two-way trade totaling a scant $1.4 billion (Strangio 2021). Consequently, Myanmar's junta had readily available alternatives for trade and financing—indicating that exclusion from U.S. markets would result in limited economic harm. Previous attempts at isolating Myanmar through U.S. sanctions had similarly failed, as Myanmar's primary economic partners did not adopt parallel trade restrictions (Hadar 1998). Despite the vast asymmetry between the U.S. and Myanmar economies, with the U.S. economy over one hundred times larger, sanctions effectiveness was inherently undermined by minimal bilateral trade (Hufbauer et al. 2007).

2.5.4.2 Decision

Given the minimal bilateral economic interdependence, U.S. policymakers imposed sanctions primarily as symbolic measures reflecting normative commitments rather than as effective economic coercion. In February 2021, Myanmar's military seized power through a coup, deposing the elected civilian government. This direct assault on Myanmar's democratic transition triggered immediate international condemnation. U.S. President Joe Biden quickly denounced the coup, calling it "a direct assault on the country's transition to democracy and the rule of law," and declared that the United States would "stand up for democracy wherever it is under attack" (Brunnstrom et al. 2021; Lee 2021). Bipartisan congressional pressure further compelled the administration to respond.

Despite these pressures, U.S. officials and analysts openly acknowledged from the outset that their leverage over Myanmar's military leaders was minimal. Myanmar's generals maintained few direct ties to the United States—with limited personal or financial interests vulnerable to sanctions (Brunnstrom et al. 2021). Consequently, sanctions were anticipated to function primarily as a political signal of disapproval rather than a meaningful tool of economic coercion. Therefore, the decision to impose sanctions was grounded less in expectations of compelling the junta to reverse its actions and more in the symbolic and normative imperative to publicly condemn violations of democracy and human rights. Given the minimal bilateral economic interdependence, sanctions provided a cost-effective and politically attractive option. Moreover, policymakers publicly emphasized normative commitments

to democracy and human rights rather than expectations of economic coercion—sanctions were predominantly a symbolic policy tool.

2.5.4.3 Implementation

The sanctions targeted Myanmar's military leadership and were designed for maximum symbolic impact while minimizing economic costs. In February 2021, President Biden issued Executive Order 14014, establishing a legal framework for renewed sanctions against Myanmar (Executive Office of the President 2021). The U.S. Treasury's Office of Foreign Assets Control (OFAC) froze assets and blocked transactions involving key coup leaders. Moreover, the U.S. Treasury also simultaneously blacklisted three military-affiliated enterprises. This effectively prevented any U.S. entities from conducting business with the associated individuals or companies (U.S. Department of the Treasury 2021b). Concurrently, the U.S. Commerce Department implemented export controls designed to deny Myanmar's military access to sensitive U.S. goods and technology. Additionally, any bilateral economic engagements that might confer legitimacy upon the military regime were suspended. Notably, by late March 2021, the U.S. Trade Representative halted all ongoing trade and investment discussions under the 2013 Trade and Investment Framework Agreement with Myanmar (Office of the United States Trade Representative 2021).

These sanctions were aimed at reversing the economic openings Myanmar had achieved over the previous decade. Throughout this process, sender-side adjustment costs remained negligible. Given Myanmar's minimal economic integration with the United States, ranking as only its 84th-largest trading partner, the blocking of Myanmar-linked assets and trade posed no discernible impact on the U.S. domestic economy (Strangio 2021). This low level of interdependence rendered the sanctions politically straightforward and economically costless for the U.S., serving primarily as a symbolic demonstration of disapproval. In sum, the U.S. wielded these sanctions principally as statements of normative principle—incurring virtually no economic repercussions domestically.

2.5.4.4 Outcome

Despite some economic disruption, sanctions ultimately failed to alter Myanmar's policy behavior due to the junta's effective use of alternative economic partnerships. In the immediate aftermath of the coup and subsequent sanctions, Myanmar experienced a marked economic downturn. The World Bank projected an 18 percent contraction in GDP for the fiscal year 2021 (October 2020–September 2021) (World Bank Group 2021). Additionally, Myanmar's international trade declined by approximately 19 percent ($7 billion) in 2021, partially driven by the withdrawal of Western investors and economic partners (Institute for Strategy and Policy 2022). However, it is difficult to disentangle the extent to which the economic decline stems from sanctions versus the effects of COVID-19.

However, despite these impacts, Myanmar's junta effectively leveraged alternative economic partnerships and internal control mechanisms to maintain political and economic stability. Regional neighbors such as China, Thailand, and Russia quickly filled the economic vacuum through increased trade, direct investment, and military aid, effectively enabling strategic sanction evasion and significantly undermining U.S. coercive efforts. Moreover, natural gas exports, a key sector in Myanmar's economy, continued largely uninterrupted as Thailand maintained gas purchases via pipeline, generating approximately $660 million annually in revenue (Human Rights Watch 2024). China and Thailand remained Myanmar's dominant trading partners, jointly accounting for over 40 percent of its trade, thus significantly cushioning the junta from Western sanctions (Institute for Strategy and Policy 2022).

Myanmar's military government also deepened relationships with key regional powers, particularly Russia and China, which provided crucial political support, economic assistance, and military supplies. A UN report found that, following the coup, Russia and China supplied the junta with over $400 million and $260 million in military equipment, respectively (UN OHCHR 2023). Internally, the junta enacted new financial regulations to redirect foreign currency reserves directly into government coffers. For instance, exporters were required to convert portions of earnings at official exchange rates, and taxes were imposed on overseas worker remittances to bolster hard currency reserves (Bissinger 2024).

By 2022, the regime had redirected much of its foreign currency income from the sanctioned Myanmar Foreign Trade Bank to unsanctioned institutions (Human Rights Watch 2024).

2.5.4.5 Discussion

Sender states often impose sanctions even when targets' adjustment costs are low, because their underlying strategic objectives extend beyond pure economic rationality. The theory suggests that sanctions under these conditions primarily fulfill diplomatic and symbolic purposes. This enables sender states to signal political resolve, uphold international norms, or respond to domestic political pressures without incurring significant economic damage.

Counterfactual analyses further illustrate this dynamic. If the economic interdependence between the U.S. and Spain had been substantially higher, U.S. policymakers would have faced a substantial increase in their domestic political and economic costs. Consequently, the theory predicts that the United States would have opted for a more cautious and incremental approach, selecting targeted economic measures rather than a comprehensive embargo to protect critical domestic industries. Likewise, Spain's heightened vulnerability from greater economic reliance on U.S. markets would have intensified domestic pressures. This pressure might have driven early concessions and significantly reshaped resistance strategies to avoid economic disruption (Silva and Selden 2020).

Similarly, had Myanmar possessed strategically critical sectors integral to U.S. supply chains, such as advanced semiconductors, policymakers would have confronted significantly increased domestic adjustment costs. Under these circumstances, the U.S. would likely have implemented calibrated, incremental sanctions, reflecting heightened caution due to greater bilateral economic interdependence. For Myanmar, significant economic interdependence in strategically valuable sectors, such as semiconductors or rare earth minerals, would have markedly increased vulnerability to economic coercion. Anticipating severe domestic economic harm, Myanmar's regime would likely have adopted a proactive policy to preserve trade in its critical sectors. The next section extends this analysis by addressing cases where the sender's adjustment costs at the sector level are *perceived* to be high.

2.5.5 Cases of High Sender and Low Target Adjustment Costs

Adjustment cost theory predicts that sender states facing high aggregate adjustment costs typically avoid severe sanctions to mitigate significant domestic economic disruptions. However, the cases presented in this section differ slightly from this theoretical configuration. They are included not because sender states experience high aggregate adjustment costs, but because dominant media narratives portray sender states as highly vulnerable—the perception of adjustment costs was high. Imposing severe sanctions under genuinely high sender-side adjustment costs would constitute an off-equilibrium strategy.

I provide two explanations to clarify this scenario. First, in the League of Nations' sanctions against Italy, British and French policymakers possessed accurate assessments of both aggregate and sector-specific adjustment costs. Recognizing genuine vulnerabilities, policymakers imposed minimal sanctions, rendering sanctions ineffective. Conversely, when the EU sanctioned Russian natural gas following the 2022 Ukraine invasion, they pursued sanctions despite widely reported sector-specific vulnerabilities. This apparent paradox raises a crucial theoretical question: Why would policymakers rationally implement sanctions in contexts where dominant narratives suggest high domestic adjustment costs, particularly against economically resilient targets?

Policymakers sometimes absorb short-term costs if doing so imposes enduring vulnerabilities on the target, and the domestic pain remains manageable. Although policymakers and media narratives commonly emphasize substantial sector-specific costs, analyses from Chapter 1 demonstrate that disruptions are typically modest at the aggregate level. Policymakers are fully aware of this distinction and strategically accept these costs to impose long-term pain on an adversary.

The EU's sanctions following Russia's 2022 invasion of Ukraine clearly illustrate several interrelated mechanisms. Media narratives emphasized severe sector-specific impacts from sanctions due to Europe's heavy dependence on Russian natural gas, and predicted devastating economic disruptions (British Broadcasting Corporation 2022a; Inman 2022; Oltermann 2022; Twidale 2022). Yet, in aggregate terms—as the analyses presented in Chapter 1 suggest——the actual overall economic impact on European economies was con-

siderably more modest. Several distinct rationales informed the EU's willingness to impose sanctions despite anticipated short-term economic burdens. First, leaders calculated that accepting adjustment costs upfront to diversify energy supplies would significantly reduce long-term strategic vulnerabilities and end reliance on a state willing to weaponize natural gas exports. Second, collective action among EU member states substantially improved Europe's ability to secure reliable, *friendly* alternative suppliers and increased the availability of perfect or near-perfect substitutes, further mitigating domestic disruptions in future periods. Third, policymakers adopted a comparative damage logic and accepted immediate, manageable economic costs to exploit and intensify Russia's enduring structural economic vulnerabilities. This analysis clarifies that seemingly counterintuitive sanctioning behaviors reflect a rational calculus.

2.5.6 League of Nations Sanctions on Italy (1935-1936)

This section examines how economic and strategic vulnerabilities limited British and French sanctions during Italy's invasion of Ethiopia. It highlights why Britain and France deliberately avoided comprehensive sanctions, such as a total oil embargo, despite international pressure and normative imperatives.

2.5.6.1 Preconditions

Britain and France faced significant economic vulnerabilities. Their reliance on imported oil constrained their strategic options when responding to Italy's aggression. Britain's dependence on external oil supplies, predominantly sourced from the Middle East and the United States, made it especially vulnerable to any disruption in Mediterranean maritime routes. France similarly relied extensively on oil imports from Romania and the Americas, which exacerbated concerns about regional stability and economic security (Duckenfield 2022; Hoare 1935). Consequently, policymakers in both nations feared that heavy sanctions might provoke Mussolini into broader hostilities—jeopardizing their economic recovery. Prime Minister Stanley Baldwin remarked on the effectiveness of sanctions against aggressor states, stating: "There is no such thing as a sanction that will work that does not

mean war" (Wambaugh 1934).

Diplomatic archives from the period highlight fears that a comprehensive oil embargo would inadvertently push Italy into closer alignment with Nazi Germany (Hoare 1935; Straus 1936). On the eve of invading Ethiopia, Mussolini clearly outlined the limits of his tolerance, declaring in a radio speech that "To sanctions of an economic character we will reply with our discipline, with our sobriety, and with our spirit of sacrifice" (Hufbauer et al. 2007). British policymakers also expressed economic anxieties, particularly about safeguarding coal exports vital to their ongoing recovery from the Great Depression, which reinforced their reluctance to adopt aggressive sanctions (Strang 2008).

In contrast, Italy entered the sanctions period with notably low adjustment costs. Mussolini's regime undertook preparations by proactively stockpiling critical materials such as oil and coal, thus ensuring sufficient resources for at least six months of sustained warfare. These proactive measures significantly lowered Italy's adjustment costs—effectively shielding it from the immediate impacts of external sanctions. Moreover, Italy's pursuit of economic autarky and limited integration into global oil markets provided additional protection against external economic pressures. Importantly, neutral and quasi-neutral neighboring states, particularly Switzerland, Austria, and Hungary, facilitated trade evasion attempts and enabled Italy to sustain essential resource inflows during sanctions (Ristuccia 2000).

Some historical assessments suggest that Britain and France faced high economic adjustment costs during sanctions on Italy. However, archival evidence and economic analyses suggest these costs were largely sector-specific rather than broadly aggregated. For instance, British policymakers were particularly concerned about disruptions in the coal industry due to lost Italian markets; yet, British trade swiftly adjusted by redirecting exports to friendly states (Bonn 1937). Similarly, despite substantial reductions in French exports to Italy, France's overall export levels remained stable. Here, the aggregate impact was far less severe than initially anticipated (Bonn 1937).

2.5.6.2 Decision

Adjustment costs decisively shaped British and French policymakers' cautious decision to impose limited sanctions rather than a comprehensive oil embargo against Italy. When Mussolini invaded Ethiopia, British and French policymakers faced significant international pressure to impose sanctions. However, internal deliberations from this period reveal that perceptions of adjustment costs significantly influenced their responses. British Cabinet records from December 1935 reveal this tension. Foreign Secretary Samuel Hoare acknowledged to Parliament that a full oil embargo could potentially compel Italy's withdrawal, but simultaneously warned it could greatly escalate military risks and destabilize Europe (Hoare 1935). French policymakers, particularly Prime Minister Laval, shared these apprehensions. Diplomatic correspondence outlines Italy's explicit threats that any oil embargo would be interpreted as an act of war, which exacerbated French concerns around regional stability (Straus 1936). Although Laval publicly expressed solidarity with Britain, privately, he favored diplomatic alternatives, notably the controversial Hoare–Laval Plan—designed to avert the need for harsher sanctions and prevent further escalation (Robertson 1975). This strategic maneuvering highlights how Britain and France consciously sought alternatives to aggressive sanctions to avoid economic harm.

2.5.6.3 Implementation

Sanctions imposed by the League deliberately excluded oil. This choice reflected Britain's and France's attempt to minimize their economic vulnerabilities. Policymakers combined an arms embargo, financial freezes, and narrow trade bans to pressure Mussolini while avoiding military escalation (Duckenfield 2022). The deliberate omission of oil sanctions was calibrated to minimize Britain's and France's own adjustment costs. British policymakers, in particular, considered but rejected an oil embargo due to serious concerns. Diplomatic records suggest that the prevailing view was that Mussolini might retaliate by disrupting vital colonial supply routes if pressured by heavy sanctions (Hoare 1935). This risk was considered unacceptable without strong international backing.

French resistance similarly reinforced caution. Laval's government consistently opposed

aggressive sanctions that might sever diplomatic relations with Italy—prioritizing regional stability and containing the German threat (Straus 1936). Without full French cooperation, Britain was unwilling to proceed unilaterally. Furthermore, feasibility analyses conducted by the League indicated that an oil embargo required U.S. participation to be effective—a scenario deemed politically and practically unattainable at the time (Strang 2013). Additional domestic economic considerations, particularly the risk to British coal exports, further supported policymakers' cautious approach to sanctions. Cabinet deliberation documents reflect attention to potential domestic economic fallout, which reinforced the decision to exclude oil from sanctions to avoid domestic adjustment costs (Ristuccia 2000).

2.5.6.4 Outcome

The limited sanctions imposed weakened Italy economically but failed strategically. Sender-state economic vulnerabilities severely constrained effective collective action. In his address to the League on 30 June 1936, Emperor Haile Selassie of Ethiopia emphasized that the failure to halt aggression was deliberate rather than accidental, declaring, "At no time, and under no circumstances could sanctions that were intentionally inadequate, intentionally badly applied, stop an aggressor," further arguing that "this is not a case of the impossibility of stopping an aggressor but of the refusal to stop an aggressor" (Luti 2022). The partial nature of the sanctions, particularly the exclusion of oil, allowed Mussolini to sustain military operations.

Yet, trade records and contemporary economic analyses confirm that sanctions weakened Italy's economy: industrial production contracted, and foreign currency reserves became severely strained (Duckenfield 2022). However, these partial measures failed to achieve their primary strategic objective of halting or substantially disrupting Italy's military campaign in Ethiopia. Excluding oil from the sanctions package allowed Mussolini's forces to continue their offensive without significant logistical disruptions. By May 1936, Italy had captured Addis Ababa—securing a decisive victory before sanctions could erode its strategic capabilities. Mussolini later acknowledged that a comprehensive oil embargo would have compelled a near-immediate withdrawal. Here, the League's cautious sanctions strategy inadvertently guaranteed Italy's military success (Goralski and Freeburg 1987).

Strategically, the outcome proved disastrous for the League of Nations. Its inability to enforce effective sanctions severely undermined its credibility and significantly weakened the collective security framework it sought to uphold. Historians widely interpret the Abyssinian crisis as a critical turning point—further illustrating how sender adjustment costs severely constrain sanction effectiveness. By prioritizing short-term risk aversion over collective action, Britain and France's limited sanctions weakened international security norms and inadvertently emboldened revisionist powers.

2.5.7 EU Natural Gas Sanctions on Russia (2022)

The EU's response to Russia's 2022 invasion of Ukraine echoes this sanctions pattern. This section examines how the EU's high economic dependence on Russian natural gas significantly constrained its sanctioning decisions following Russia's invasion of Ukraine.

2.5.7.1 Preconditions

Prior to Russia's 2022 invasion of Ukraine, Europe's pronounced reliance on Russian natural gas significantly constrained the EU's initial sanctions package. Russia provided over 40 percent of Europe's imported gas, with countries such as Austria and Latvia relying on Russian pipeline gas for more than 80 percent of their domestic consumption (Gross and Stelzenmüller 2024; Lan et al. 2022). German Chancellor Olaf Scholz articulated these constraints on 7 March 2022, acknowledging that energy imports from Russia were exempted from initial sanctions because immediate alternatives were unavailable without substantial disruption (Wearden 2022).

Europe's vulnerability was intensified by limited short-term options for diversifying gas supplies. Unlike coal or oil, natural gas requires specialized infrastructure such as pipelines or liquefied natural gas (LNG) terminals. At the crisis's onset, the EU—particularly Germany, Europe's largest economy—lacked sufficient LNG import capabilities, operating no LNG terminals prior to the invasion (Lan et al. 2022). Consequently, European policymakers viewed abrupt reductions in Russian gas as prohibitively costly, as they would likely trigger sharp increases in energy prices (Soldatkin and Peleschuk 2025).

Russia likewise faced immediate sector-specific adjustment costs, yet initial analyses exaggerated its economic resilience. Chapter 3's empirical analysis, employing a DiD-style approach, shows that Europe's aggregate disruptions were short-term, sector-specific, and manageable. In contrast, Russia incurred substantial and enduring economic damage due to severely limited market alternatives and infrastructural constraints.

Initially, media narratives and policy analyses emphasized the EU's high perceived economic adjustment costs at the sectoral level. However, detailed analyses indicate Europe's aggregate-level vulnerabilities were significantly overstated, with disruptions predominantly short-term and manageable. Aggressive diversification efforts—including increased LNG imports from the United States and Qatar, rapid construction of LNG terminals, and expanded storage capacities—quickly alleviated Europe's perceived vulnerabilities (European Commission 2022a,b). In contrast, Russia experienced lasting economic damage, exemplified by Gazprom's persistent revenue losses, market share erosion, and infrastructure-related barriers to diversification toward alternative markets (Makogon 2025; Reuters 2024).

This suggests that the EU's incremental sanctioning strategy, initially characterized by sector-specific exemptions like natural gas, was not merely driven by domestic political pressures or economic apprehension. Rather, policymakers' calculus reflected a comparative damage logic.

2.5.7.2 Decision

Faced with substantial economic risk, EU policymakers opted for a incremental sanctions approach that prioritized domestic economic stability over immediate coercive pressure. The invasion triggered immediate EU discussions on sanctioning Russian energy. Ukrainian President Zelensky's directed appeals for a comprehensive embargo, which intensified political pressure within the bloc (Rosenberg 2022). Despite intense external pressure, internal EU negotiations exposed clear divisions driven by varying degrees of economic exposure. States with lower dependency on Russian energy imports, including Poland and the Baltic countries, supported immediate sanctions and advocated for measures aimed at curtailing Russian revenues (Gross and Stelzenmüller 2024). Conversely, heavily dependent member states such as Germany, Italy, and Austria raised concerns regarding the potential

for severe economic consequences. German Chancellor Scholz specifically cautioned that an immediate halt to Russian gas could trigger recessionary conditions, negatively impacting employment, industrial productivity, and economic stability throughout Europe (Gehrke and von der Burchard 2022).

2.5.7.3 Implementation

EU sanctions deliberately excluded immediate natural gas embargoes. This strategy aimed to distribute economic disruption over time and reduce immediate costs. Recognizing structural constraints to rapid diversification, the EU announced plans in March 2022 to reduce Russian gas imports by two-thirds by year-end and achieve complete independence from Russian gas imports "well before 2030" (Abnett 2022). This strategy aimed to gradually diminish Russia's energy revenues while distributing the cost over time.

Initial sanctions targeted coal in April 2022 and oil in May 2022, commodities with comparatively lower substitution costs, enabling the EU initially to avoid formal embargoes on natural gas. The sixth sanctions package implemented a incremental oil embargo that included substantial exemptions designed to protect economically vulnerable member states and to provide sufficient transition periods to minimize disruptions. Moreover, the EU also implemented indirect measures, including a voluntary 15 percent reduction in gas consumption during winter 2022–2023, active procurement of alternative LNG sources from the U.S. and Qatar, and the accelerated installation of floating LNG terminals in northern Europe (Gross and Stelzenmüller 2024).

2.5.7.4 Outcome

The EU's incremental sanctions yielded mixed outcomes. In the short term, the absence of an immediate and complete gas embargo allowed Russia to temporarily capitalize on sharply rising gas prices, briefly stabilizing its fiscal position despite decreased export volumes (Gross and Stelzenmüller 2024). By mid-2023, however, the long-term impacts of sanctions and European diversification efforts became clear. Russian gas exports to Europe sharply declined from approximately 45 percent of Europe's total supply in 2021 to roughly 15 percent by early 2023 (Borrell 2024). Over time, infrastructure limitations pre-

vented Russia from efficiently redirecting pipeline gas exports, gradually eroding its strategic economic leverage and illustrating the effectiveness of incremental sanctions. Gazprom reported a 40 percent reduction in profits and its first net financial loss in decades (Gross and Stelzenmüller 2024).

For Europe, short-term economic consequences were costly yet ultimately manageable. Gas prices surged during 2022, exacerbating inflation and forcing temporary shutdowns across energy-intensive industries. Coordinated measures, including mandated gas storage, infrastructure upgrades, aggressive diversification strategies, and targeted financial aid, successfully mitigated severe disruptions. The incremental approach thus supported long-term sanction effectiveness by gradually weakening Russia's strategic leverage in European energy markets. Overall, the EU's sanctioning strategy exemplifies the key trade-offs predicted by the adjustment cost framework.

2.5.7.5 Discussion

Following the comparative damage logic outlined earlier, these cases illustrate how policymakers rationally opt for cautious, incremental sanctions when sector-specific vulnerabilities initially appear substantial, yet aggregate-level analyses reveal manageable overall economic risks. The next section explores scenarios involving high mutual adjustment costs. Here, shared economic vulnerabilities between the sender and target constrain sanctions.

2.5.8 High Target Adjustment Costs

When target states face high adjustment costs, economic sanctions hold significant coercive potential. The theory suggests sanctions derive their leverage by exploiting critical economic vulnerabilities of targeted states, particularly dependencies on external markets, essential imports, or financial networks. Policymakers deploy sanctions to pressure these vulnerabilities and compel targeted states either to concede to sender demands or to incur economic and political damage. This section examines how target vulnerabilities impact the application of sanctions. It analyzes why states sometimes cautiously calibrate economic pressure despite clear target vulnerabilities, and why, in other instances, they adopt

aggressive measures that risk unintended escalation.

Two scenarios emerge when target adjustment costs are high: high mutual adjustment costs (High-Sender High-Target), and scenarios characterized by low sender costs with severe target vulnerabilities (Low-Sender High-Target). In scenarios of mutual vulnerability, sender states face constraints due to their own economic interdependencies. The theory predicts that sanctions under these conditions will be cautiously calibrated and balance coercive pressure against risks of domestic economic disruption or geopolitical escalation. Conversely, in scenarios with low sender costs and high target vulnerability, sender states possess the advantages and adopt aggressive measures.

2.5.9 Cases of High Sender and High Target Adjustment Costs

2.5.10 U.S. Oil Embargo on Japan (1940-1941)

This section examines why U.S. officials initially hesitated to impose comprehensive sanctions despite Japan's apparent economic weaknesses. It emphasizes that U.S. policymakers faced notable domestic economic costs, particularly potential losses in petroleum export revenues. Moreover, this analysis also demonstrates a critical threshold effect in adjustment costs: when sanctions are sufficiently severe to prevent a target state from sourcing critical substitutes in the global market, yet that state maintains significant military capabilities, sender-state strategies may inadvertently provoke military escalation rather than concessions.

2.5.10.1 Preconditions

Prior to 1941, Japan's heavy dependence on U.S. petroleum created significant vulnerabilities; however, U.S. policymakers initially hesitated to exploit these vulnerabilities due to substantial economic and strategic constraints. By the late 1930s, the U.S. provided approximately 80 percent of Japan's petroleum imports—essential to sustaining Japan's military operations in China and industrial production (Record 2009; U.S. Office of the Historian 2024). At this point, Japan lacked the domestic resources required to fulfill its demands for vital commodities such as oil and iron. Consequently, any significant disruption

of trade with the U.S. risked severe consequences. This confronted Japan with limited options: either accept U.S. demands or use force to obtain alternative sources of supply. These resource vulnerabilities directly informed Japan's aggressive pursuit of economic autonomy to reduce dependence on Western imports (U.S. Office of the Historian 2024).

While Japan faced high adjustment costs under sanctions, the United States itself encountered significant economic and strategic constraints, which initially limited its willingness to implement aggressive measures. Economically, U.S. industries profited considerably from trade with Japan. A memorandum by the Adviser on Political Relations, Hornbeck, argued that any action restricting commodity exports negatively impacts both parties involved. Specifically, he noted, "Any procedure which involves a cutting down of exports, as regards any commodity, is a procedure which has adverse effects in both directions: it makes difficulties for the country which is deprived of the commodity and it disturbs the economy of the country which applies the embargo" (Hornbeck 1941, p. 777). Moreover, the United States faced notable economic adjustment costs due to potential losses of petroleum export revenue to Japan. Although not catastrophic, these losses were significant enough that policymakers initially favored maintaining trade.

Strategically, U.S. policymakers feared provoking Japan into military retaliation at a time when U.S. military preparedness in the Pacific was inadequate. Officials within the State and War Departments consistently cautioned against comprehensive economic pressure. Moreover, the Ambassador Joseph Grew also cautioned that "... if we cut off Japanese supplies of oil... and she cannot obtain sufficient oil from other commercial sources to ensure her national security, she will probably send her fleet down to take the Dutch East Indies." Similarly, Secretary of State Cordell Hull expressed concerns that forcing Japan into a position of critical vulnerability could ignite broader conflict in the Pacific and divert resources from addressing the escalating Nazi threat in Europe (Maechling 1979).

Additionally, domestic U.S. isolationism and widespread public reluctance to enter another war reinforced President Roosevelt's preference for incremental sanctions (Utley 1976). Consequently, in 1940, Roosevelt adopted measured sanctions targeting secondary materials, such as scrap iron and aviation fuel, while continuing to export petroleum to Japan (Maechling 1979). This approach reflected deliberate U.S. attempts to balance coercive

strategic pressure with manageable cost. The intention was to gain time for U.S. rearmament and diplomatic negotiations. However, by mid-1941, Japan's expansion into southern Indochina signaled the failure of partial sanctions. This prompted the Roosevelt administration to impose a comprehensive asset freeze and complete oil embargo. U.S. officials knew these sanctions would effectively terminate bilateral economic relations and likely provoke broader conflict in the Pacific (Utley 1976).

2.5.10.2 Decision

Japan's occupation of southern Indochina in 1941 shifted U.S. policymakers' calculations. This occupation prompted a decisive escalation in sanctions despite the recognition that this increased the likelihood of military confrontation. Viewing Japan's actions as violating prior agreements and a strategic threat to U.S. interests in Southeast Asia and the Pacific, Roosevelt authorized the freezing of Japanese assets and halted petroleum exports (Nishiyama 2008).

Secretary of War Stimson, Treasury Secretary Morgenthau, and Ickes supported stronger sanctions to impede Japanese military expansion. In contrast, Secretary of State Cordell Hull and senior naval officials advocated caution. Hull specifically warned that severe economic measures could provoke Japan into military retaliation (Maechling 1979). Roosevelt also recognized the risks, privately acknowledging that a comprehensive embargo might inadvertently accelerate conflict rather than prevent it (Goralski and Freeburg 1987).

From Japan's perspective, U.S. sanctions were anticipated and directly informed strategic planning. Prior to occupying Indochina, Japanese leaders concluded at a July 1941 Imperial Conference that securing Southeast Asian resources was critical for national survival, even at the risk of war with Western powers (Record 2009). Japanese military planners prepared contingency operations to seize alternative petroleum supplies from the Dutch East Indies and neutralize potential U.S. opposition. By late 1941, rapidly diminishing petroleum reserves heightened urgency, reinforcing the Japanese assessment that delaying military action would worsen their strategic position (Goralski and Freeburg 1987).

High-level Japanese officials evaluated Japan's vulnerability, with Teiichi Suzuki, head of the Planning Board, reporting to the government that due to Allied embargoes, "Japan

will find herself totally exhausted and unable to rise in the future" if the status quo continued, warning specifically that the "blockade...would bring about Japan's collapse within two years," thus urging that a decisive choice between war and peace be made "without hesitation." Admiral Osamu Nagano, the Naval Chief of Staff, was even more direct, informing Emperor Hirohito that Japan had "only enough oil...to maintain the fleet under war conditions for one and a half years" and doubting Japan could secure "a sweeping victory in that time" (Morton 1954).

2.5.10.3 Implementation

In late July 1941, President Roosevelt implemented sanctions against Japan following its occupation of southern French Indochina. On July 26, Roosevelt issued Executive Order 8832, freezing Japanese assets in the United States. These measures were coordinated bilaterally and supported by Britain. Moreover, the U.S. effectively blocked Japan's access to essential oil supplies from British Malaya and the Dutch East Indies (Roosevelt 1941; Van Wijk 2019). Sanctions disrupted nearly 80 percent of its petroleum imports (Anderson 1975). Japanese petroleum reserves were estimated to last approximately three years under peacetime conditions but significantly less in wartime scenarios (Herzog 1966; Maechling 1979).

Facing significant adjustment costs, Japanese policymakers pursued parallel strategies of military preparation and diplomatic negotiation. Militarily, Japan consolidated its positions in Indochina, notably at strategic locations such as Saigon, and finalized contingency plans to seize resource-rich areas in the Dutch East Indies. Concurrently, Japanese diplomats in Washington, including Ambassador Nomura and Special Envoy Kurusu, pursued diplomatic negotiations to reverse sanctions. However, these diplomatic efforts failed due to irreconcilable demands—Japan refused to withdraw from occupied territories, while the U.S. conditioned lifting sanctions on full Japanese withdrawal (Clifford and Okura 2013; Prange 1991). Chihiro Hosoya, a professor of Diplomatic History, argued that the U.S. sanctions had critical repercussions for Japan. He stated specifically that "since the imposition of an oil embargo by the U.S. government at the end of July 1941 had struck a mortal blow at the vital points of the Japanese economic structure, Japanese leaders felt forced to

make their stand toward America more definite" (Hosoya 1966, p. 12).

U.S. policymakers recognized the risk that sanctions could lead directly to conflict. Internal deliberations acknowledged that a comprehensive oil embargo might provoke Japanese aggression against Allied territories in Southeast Asia and increase the likelihood of war (Bacon 1941). The Roosevelt administration gradually intensified sanctions as diplomatic consensus among Allied nations strengthened. Privately, senior U.S. officials and military planners began preparing for potential conflict—a scenario realized within five months when Japan attacked Pearl Harbor in December 1941 (Cross 2020; Morgenstern 2018).

2.5.10.4 Outcome

By tightening Japan's resource pinch, the U.S. inadvertently accelerated Japan's decision for military escalation—sanctions can trigger unintended strategic outcomes. The sanctions imposed significant adjustment costs on Japan and eliminated approximately 80 percent of its petroleum imports (Anderson 1975). Japanese officials calculated that fuel reserves would support military operations for a limited duration, creating a resource crisis (Maechling 1979). As the theory predicts, these adjustment costs compelled Japanese leaders toward a stark strategic choice—capitulate to U.S. demands, thereby abandoning imperial objectives—or secure alternative resources through military action. The embargo pushed Japanese policymakers toward conflict as critical resource adjustment costs reached a critical threshold. Prime Minister Hideki Tojo emphasized that accepting sanctions passively would reduce Japan to a "third-class nation," highlighting the existential threat posed by resource dependence (Record 2009). This case highlights a critical theoretical threshold: when sanctions impose extreme adjustment costs on a target state—particularly when it cannot readily source substitutes in global markets—the target may opt for military escalation rather than capitulation.

Ultimately, the sanctions produced an outcome counterproductive to their intended coercive effect. Japan's surprise attack on Pearl Harbor on December 7, 1941, rapidly escalated economic coercion into kinetic warfare. Specifically, this illustrates the paradox that sanctions severe enough to threaten a target's strategic position decisively may narrow policy options and incentivize military escalation rather than compliance (Duckenfield 2022).

2.5.11 U.S. Sanctions on Saudi Arabia (2018)

This section examines a contemporary case where high mutual economic and strategic vulnerabilities shaped policymakers' cautious sanctioning approaches.

2.5.11.1 Preconditions

On October 2, 2018, Jamal Khashoggi, a Saudi journalist, was assassinated by Saudi government agents at the Saudi consulate in Istanbul, Turkey. The U.S.–Saudi relationship is characterized by deep strategic, military, and economic interdependencies—this relationship severely constrained the range of potential sanctioning actions following Khashoggi's murder. Central to this bilateral partnership was the longstanding *oil-for-security* arrangement, whereby Saudi Arabia stabilized global petroleum markets, and in return, the U.S. guaranteed territorial security through arms transfers (Council on Foreign Relations 2018). Despite importing only approximately 7 percent of its petroleum from Saudi Arabia, the U.S. economy remained vulnerable to Saudi-influenced OPEC+ decisions affecting global oil prices (U.S. Energy Information Administration 2024). This reliance constrained U.S. policy choices—as severe sanctions risked retaliation from the Saudi government. This retaliation would likely disrupt global oil markets, lead to higher prices, and harm the U.S. economy.

In November 2018, U.S. President Trump emphasized the economic and strategic importance of U.S.-Saudi relations. He remarked: "Of the $450 billion, $110 billion will be spent on the purchase of military equipment from Boeing, Lockheed Martin, Raytheon and many other great U.S. defense contractors. If we foolishly cancel these contracts, Russia and China would be the enormous beneficiaries—and very happy to acquire all of this newfound business. It would be a wonderful gift to them directly from the United States!" Additionally, he highlighted Saudi Arabia's role in global oil markets, stating, "After the United States, Saudi Arabia is the largest oil-producing nation in the world. They have worked closely with us and have been very responsive to my requests to keeping oil prices at reasonable levels—so important for the world" (Trump 2018).

The security dimension further amplified mutual adjustment costs. Saudi Arabia con-

stituted a key pillar of the U.S. regional security framework, critical for countering Iranian influence, combating terrorism, and maintaining Gulf stability (Singh 2018). This strategic necessity directly translated into military interdependence. Between 2018 and 2022, Saudi Arabia ranked as the world's second-largest arms importer, sourcing roughly 78 percent of its military equipment from the United States, representing billions of dollars annually (Wezeman et al. 2023). Saudi military capabilities, particularly those of the Royal Saudi Air Force, depended heavily on U.S. equipment, logistical assistance, and maintenance, thus making it very difficult for Saudi Arabia to transition suppliers or terminate cooperation. Conversely, lucrative Saudi arms contracts supported U.S. defense industries and generated significant domestic economic incentives to avoid sanctions.

These dependencies produced significant reputational and strategic constraints. Although the Khashoggi murder generated U.S. bipartisan condemnation and demands for punitive action, U.S. policymakers recognized that sanctions could irreversibly damage a strategically valuable relationship. Severing ties risked pushing Saudi Arabia toward geopolitical rivals such as China or Russia (El Yaakoubi and Baptista 2022). In July 2022, President Joe Biden stated: "To do these things, we have to engage directly with countries that can impact those outcomes. Saudi Arabia is one of them, and when I meet with Saudi leaders...my aim will be to strengthen a strategic partnership going forward that's based on mutual interests and responsibilities, while also holding true to fundamental American values" (Renshaw 2022). Thus, high adjustment costs on both sides significantly constrained the scope and intensity of sanctions.

2.5.11.2 Decision

Despite bipartisan domestic pressures demanding accountability for Khashoggi's murder, the Biden administration deliberately limited sanctions due to substantial risks to strategic and economic interests. Bipartisan condemnation intensified following the February 2021 release of a U.S. intelligence report implicating MBS in approving the operation (Blanchard 2023). However, policymakers quickly faced a fundamental dilemma: severe sanctions directly targeting MBS risked undermining a longstanding security partnership critical to regional stability, counterterrorism, and broader U.S. strategic objectives (Blanchard 2023;

Singh 2018).

Congressional pressure, driven by human rights concerns and demands to halt arms transfers fueling Saudi-led operations in Yemen, exacerbated this tension. Legislators increasingly sought tangible actions signaling accountability. Only after Khashoggi's murder did majorities in Congress become willing to invoke the War Powers Act (WPA) to challenge the administration's ongoing support for Saudi policies directly (McHugh 2022). Yet, administration officials recognized that sanctions could destabilize critical defense cooperation necessary to counter Iranian influence (Gould and Mehta 2021).

Saudi Arabia's increasingly independent foreign policy—demonstrated through coordination with Russia via OPEC+ and expanded diplomatic ties with China—further complicated the situation. Although economic adjustment costs were central in shaping U.S. policymakers' decisions, as shown by explicit concerns over higher domestic gasoline prices and potential losses in military sales, the sanctions calculus also included security considerations. Policymakers recognized that severe sanctions could prompt Saudi Arabia to purchase weapons from geopolitical rivals. However, policymakers' explicit statements about economic disruptions suggest that economic adjustment costs remained the primary constraint, ensuring sanctions remained limited. Ultimately, sanctions were calibrated to communicate disapproval without fundamentally altering the broader security relationship or incentivizing Saudi Arabia to reduce its dependence on the United States (Fontenrose 2022).

2.5.11.3 Implementation

The sanctions imposed by the Biden administration were targeted at secondary officials and limited military sales. Utilizing the Global Magnitsky framework, the U.S. Treasury sanctioned former Saudi deputy intelligence chief Ahmad Hassan al-Asiri and the Saudi Rapid Intervention Force, the unit directly implicated in Khashoggi's death. The administration also imposed visa restrictions on 76 Saudi nationals associated with suppressing dissidents abroad (McKernan 2021; U.S. Department of the Treasury 2021a). Notably, these sanctions excluded MBS, whose direct targeting would have entailed significant adjustment costs by risking broader U.S.–Saudi security cooperation (Blanchard 2023; Fontenrose 2022;

Singh 2018).

In the economic sphere, the administration predominantly employed diplomatic engagement, exemplified by President Biden's July 2022 visit to Saudi Arabia aimed at influencing Saudi oil production policy rather than coercing it through economic sanctions (Holland 2022; Zengerle 2022).

2.5.11.4 Outcome

Saudi Arabia's subsequent actions, including openly rejecting U.S. requests on OPEC+ oil production and actively strengthening diplomatic and economic ties with China and Russia, highlighted the kingdom's ability to leverage mutual adjustment costs strategically (Blanchard 2023; Holland 2022). Saudi Arabia signaled that it could impose substantial reciprocal economic and geopolitical costs, effectively deterring harsher punitive measures from the U.S.

Although President Biden had publicly declared on the second anniversary of Khashoggi's murder that "America's commitment to democratic values and human rights" would not be compromised by economic or security interests (Biden 2020), the fundamental U.S.–Saudi security arrangement endured. An International Bar Association analyst noted, "In the aftermath of the brutal murder of Saudi journalist Jamal Khashoggi, there was a flurry of reports that the longstanding U.S.–Saudi relationship was entering uncharted territory. A few weeks later, what the Khashoggi murder has come down to is another testament to the apparently unshakable resilience of the 80-year-old relationship between the world's most vibrant democracy and the Middle East's largest absolute monarchy" (Mekay 2020). Both parties faced prohibitively high costs in significantly adjusting or severing their strategic relationship.

2.5.11.5 Comparative Analysis

The cases of U.S. sanctions against Saudi Arabia after the Khashoggi murder and the U.S.–Japan embargo of 1941 demonstrate the theory's prediction that high mutual adjustment costs significantly constrain sanctioning behavior. In each scenario, policymakers confronted substantial strategic trade-offs. Severe sanctions risked destabilizing essential

geopolitical relationships, provoking direct conflict, or causing significant domestic economic damage. As a result, sanctions imposed under mutual vulnerabilities were calibrated, incremental, and narrowly targeted. The analysis now shifts to scenarios characterized by low sender-side vulnerabilities and high target vulnerabilities.

2.5.12 Cases of Low Sender and High Target Adjustment Costs

2.5.13 Allied Naval Blockade of Germany (1914-1919)

This section examines how the Allies exploited Germany's economic vulnerabilities through blockade while also avoiding domestic costs.

2.5.13.1 Preconditions

Germany's severe dependence on imported resources and limited economic adaptation capabilities provided the Allies with substantial strategic leverage at the outset of World War I. Roughly one-third of Germany's wheat, half of its animal feed, and substantial proportions of strategic commodities such as nitrates, copper, and petroleum came from foreign sources. This left Germany particularly susceptible to economic coercion through naval blockade. Two-thirds of these imports reached Germany by maritime trade. Russia was the largest global grain exporter before 1914. The country's transportation infrastructure was ill-equipped to shift efficiently from export-oriented networks to internal wartime distribution. Consequently, Germany and Austria-Hungary rapidly undertook intensive resource mobilization efforts. Furthermore, Germany's limited naval power and minimal colonial holdings prevented effective economic adaptation and placed it at a strategic disadvantage relative to Britain and the Allies, who controlled vital global supply routes (Kramer 2020).

In contrast, the Allies benefited from substantially lower adjustment costs due to resources from extensive colonial territory networks, naval dominance, and diversified supply lines. Moreover, Britain effectively leveraged its naval superiority to secure and maintain supply routes from North America and its colonies. Consequently, the Allies experienced comparatively modest economic disruptions, as global trade networks mitigated domestic shortages and ensured sustained economic stability throughout the war (Kramer 2020).

Germany, conversely, confronted escalating adaptation challenges that severely taxed its economic capacity. Persistent shortages of food and industrial inputs intensified civilian hardships, which resulted in widespread malnutrition and unrest during the 1916–1917 Turnip Winter (Kramer 2020).

2.5.13.2 Decision

Recognizing Germany's acute economic vulnerabilities, Allied policymakers implemented a comprehensive naval blockade to maximize coercive pressure—leveraging their comparatively lower economic risks (Kramer 2020). Britain was initially hesitant to impose strict sanctions due to diplomatic concerns, especially regarding U.S. neutrality. Still, it intensified sanctions after evidence emerged that Germany was circumventing restrictions through neutral ports (Hughes and Philpott 2005). Internal British assessments emphasized Germany's dependence on imported metals, nitrates, and petroleum and recognized that disrupting these imports would impose severe economic and strategic pressures on Germany, thereby increasing the blockade's effectiveness (Kramer 2020). Consequently, Britain established a comprehensive distant blockade, enforcing trade restrictions away from German-controlled waters to minimize British military exposure while maximizing the economic impact of the blockade. This decision reflected British policymakers' recognition that Germany's economic vulnerabilities significantly exceeded their domestic economic risks. Moreover, this also allowed Britain to capitalize on Germany's vulnerabilities without significant domestic costs *or* naval conflict (Hughes and Philpott 2005; Kramer 2020).

Throughout the war, Allied decisions consistently reflected adjustment cost logic. Britain expanded blockade measures by diplomatically pressuring neutral states, the Netherlands and Sweden, to restrict indirect trade with Germany (Kramer 2020). These steps illustrate British policymakers' assessment that, despite intensified sanctions raising diplomatic tensions with neutral countries, the strategic benefits outweighed the costs (Hughes and Philpott 2005). Internal deliberations expressed confidence that economic pressures imposed by the blockade would substantially undermine Germany's wartime capacity—especially given Germany's limited ability to source substitutes for critical imports (UK Parliament 1917).

As Germany experienced worsening economic conditions, including industrial stagnation and widespread civilian malnutrition, Allied evaluations confirmed the blockade's strategic efficacy (Hughes and Philpott 2005; Kramer 2020). Thus, the continued escalation and maintenance of sanctions directly resulted from policymakers' deliberate exploitation of asymmetric adjustment costs.

2.5.13.3 Implementation

The Allies reinforced the blockade through maritime interdiction and diplomatic pressure and exploited Germany's limited capacity for economic adaptation. Britain's Royal Navy established patrol networks across the North Sea and English Channel and intercepted vessels suspected of transporting contraband or critical commodities to Germany (Kramer 2020; Osborne 2013). Intercepted cargoes underwent review by the British prize court system, which expanded the definition of contraband to include items such as metals, nitrates, and food supplies—thus significantly enhancing the blockade's economic impact (Seligmann 2024; Vincent 1985). By 1915, Britain formalized the implementation of the distant blockade, designed to maximize economic pressure (Kramer 2020; Lambert 2012).

The Allies pressured neutral states, particularly the Netherlands, Denmark, Sweden, and Norway, into restrictive trade agreements aimed at eliminating indirect commerce with Germany, thereby heightening Germany's adjustment costs (Vincent 1985). In 1916, Britain established the Ministry of Blockade to coordinate diplomatic negotiations and enforce trade restrictions through a requirement for neutral vessels to obtain certification demonstrating compliance (Osborne 2013).

Throughout the war, the Allies continually recalibrated their sanctions in response to German attempts at economic adaptation. Recognizing Germany's adjustment efforts, Britain tightened enforcement measures to sustain economic pressure and prevent adequate compensation for lost imports (Scherner 2024). Simultaneously, the Allies leveraged their lower adjustment costs, benefiting from U.S. resources and global supply networks to ensure uninterrupted imports (Kramer 2020).

2.5.13.4 Outcome

The Allied blockade severely disrupted Germany's wartime economy, directly contributing to widespread civilian hardship, economic stagnation, and strategic desperation that ultimately drove Germany's defeat. By 1918, German imports declined approximately 80 percent from prewar levels (Kramer 2020). German authorities underestimated both the blockade's duration and its intensity (Blum 2011). The blockade disrupted Germany's food supply in two primary ways. First, importing essential commodities such as food, fertilizers, seasonal labor, and animal feed across the North Sea became severely limited, as neighboring states either became adversaries or were similarly entangled in the conflict (Blum 2011). Second, Germany's domestic agricultural sector was weakened considerably, as approximately 40 percent of the male agricultural workforce, horses, and cattle were redirected toward military mobilization efforts (Huber and Fogel 1920).

Despite extensive domestic adaptations, including rationing, intensified resource extraction from occupied territories, and synthesis of substitutes such as artificial nitrates, Germany was unable to adequately offset the blockade's forced adjustment (Scherner 2024). These high adjustment costs eroded domestic morale and prompted German policymakers to make increasingly risky strategic choices. In 1917, Germany resorted to unrestricted submarine warfare. This was a strategic gamble aimed at disrupting Britain's supply lines and breaking the blockade (Osborne 2013). Instead of alleviating pressures, this decision prompted the U.S. entry into the war, which further intensified Germany's economic isolation (Seligmann 2024; Vincent 1985). Thus, Germany's efforts to mitigate the blockade's severe disruptions paradoxically heightened its own adjustment costs. Moreover, Germany's inherent vulnerabilities and limited capacity for economic adaptation amplified the blockade's coercive effectiveness—directly contributing to its collapse (Osborne 2013; Scherner 2024).

2.5.14 U.S. Oil Sanctions on Venezuela (2019)

The U.S.-Venezuela case shows these same asymmetries at work today. This section examines how asymmetries between Venezuela's extreme economic vulnerability and the

U.S.'s minimal economic exposure facilitated aggressive sanctioning strategies.

2.5.14.1 Preconditions

Venezuela's structural reliance on oil exports created substantial economic vulnerabilities that U.S. policymakers could exploit due to minimal domestic adjustment costs. Before the implementation of U.S. sanctions, oil revenues accounted for approximately 95–99 percent of Venezuela's total exports and funded nearly two-thirds of government expenditures (Berg 2021; Roy and Cheatham 2024). This single-commodity dependence made Venezuela highly vulnerable to exogenous economic shocks—a vulnerability starkly revealed by the collapse in global oil prices from 2014 to 2016. This collapse correlated with severe GDP contraction and hyperinflation, which reached 130,000 percent by 2018 (Roy and Cheatham 2024). Compounding these vulnerabilities was the persistent neglect of oil infrastructure investment, which limited domestic refining capacity and intensified Venezuela's reliance on foreign markets.

Conversely, the United States faced minimal adjustment costs in imposing sanctions. By 2018, the U.S. had become the world's leading oil producer, and Venezuelan crude imports represented roughly 500,000 barrels per day, a volume readily substitutable through alternative suppliers, including Canada, Colombia, Saudi Arabia, or increased domestic production (Eaton and Cohen 2019; U.S. Energy Information Administration 2023). U.S. Treasury Secretary Steven Mnuchin said he did not expect U.S. consumers to see higher prices at the gas pumps as a result of new sanctions on Venezuela, adding he was sure "many of our friends in the Middle East will be happy to make up the supply as we push down Venezuela's supply" (Associated Press 2019). This flexibility allowed U.S. policymakers significant latitude to implement sanctions without risking major domestic economic disruption.

2.5.14.2 Implementation

U.S. policymakers intensified sanctions against Venezuela, targeting its oil sector to maximize coercive economic pressure while managing domestic costs. U.S. sanctions on Venezuela unfolded incrementally between 2017 and 2019. Initial measures under Ex-

ecutive Order 13808 (August 2017) implemented targeted financial restrictions and curtailed Venezuela's access to U.S. capital markets without immediately impacting oil exports (Seelke 2024). These initial sanctions included humanitarian exemptions permitting transactions related to food, medicine, and other critical imports to minimize unintended humanitarian consequences (United States Government Accountability Office 2021). A significant escalation occurred on November 1, 2018, with the issuance of Executive Order 13850, which established a framework to block assets and prohibit transactions involving individuals identified by the Treasury as operating within key Venezuelan economic sectors or engaged in corruption associated with the Maduro government (Congressional Research Service 2024).

The most consequential step followed on January 28, 2019, when the U.S. sanctioned Venezuela's state oil company, PDVSA, effectively freezing Venezuelan oil assets and barring U.S. entities from further petroleum trade (Seelke 2024). A member of the Maduro cabinet stated, "The United States has blocked our economy," adding that "the cost of this blockade is over $30 billion—and they are sending this so-called humanitarian aid for $20 million. So what is this? I'm choking you, I'm killing you, and then I'm giving you a cookie? So that's a show" (The Washington Times 2019).

To prevent Venezuela from redirecting exports no longer destined for the U.S., officials applied diplomatic pressure on PDVSA's other international customers. As a result, in March 2019, Reliance Industries, Venezuela's largest customer in India, confirmed its U.S. subsidiary had ceased transactions with Venezuela and committed not to increase global crude purchases from PDVSA after consultations with U.S. authorities and explicit warnings from the Indian government (Rodríguez 2022). The Azeri energy ministry, citing Venezuelan oil minister and president of state-run oil company PDVSA, Manuel Quevedo, noted that "in order to prevent a sharp reduction, various measures are being implemented and diversification of the export market is underway," adding that "Russia and China are seen as the main destinations because of the suspension of oil exports to India" (Bagirova 2019).

Further intensification occurred with Executive Order 13884 in August 2019, which froze all Maduro government assets within the U.S. and broadly prohibited U.S. persons from engaging in transactions with Maduro's administration unless authorized by OFAC (Con-

gressional Research Service 2024). Consistent with the theory, U.S. policymakers calibrated sanctions to minimize domestic economic disruption by issuing general licenses, which allowed U.S. refiners a transition period until April 28, 2019, to secure alternative crude sources (Congressional Research Service 2020). Thus, strategic timing and sequencing enabled the U.S. to exploit Venezuela's structural economic vulnerabilities while controlling its costs.

2.5.14.3 Outcome

Economically, U.S. sanctions intensified Venezuela's ongoing crisis by compounding GDP contraction, hyperinflation, and severe shortages of essential goods. Venezuela entered hyperinflation in November 2017, when monthly inflation surpassed 50 percent, driven primarily by rapid government spending and monetary supply expansions. By 2018, inflation exceeded 1.6 million percent, placing extraordinary strain on government revenues (Huertas 2019). The 2019 oil embargo further accelerated economic deterioration and contributed to an overall GDP contraction of approximately 75 percent between 2014 and 2021 (Roy and Cheatham 2024). Oil production dropped sharply, falling from around 1.5 million barrels per day to roughly 337,000 barrels by mid-2020, reflecting severe economic pressure from sanctions (Muci 2024). By February 2019, Venezuelan oil exports to the U.S. ceased entirely (Rodríguez 2022). Although internal mismanagement and earlier economic shocks were fundamental drivers of Venezuela's collapse, sanctions significantly worsened these effects and severely undermined the country's capacity to sustain basic economic functions.

Politically, however, sanctions failed to achieve the stated goal of regime change. Maduro's government demonstrated resilience by adapting through illicit networks for oil exports and deepening economic relationships with U.S. adversaries. Venezuela increasingly relied on China, Russia, and Iran to circumvent sanctions. This partially offset revenue losses and stabilized the regime both economically and politically (Tobin 2025).

Ultimately, the Venezuelan case suggests that imposing high target adjustment costs alone does not guarantee successful coercion. The political outcome significantly depends on the target's ability to absorb, mitigate, or redistribute economic pressures created by sanctions.

2.5.14.4 Comparative Analysis

The Allied blockade of Germany during World War I illustrates the theory's core argument: coercion works best when it is cheap for the sender and painful for the target. The Allies' negligible economic exposure enabled policymakers to impose extensive sanctions, directly exploiting Germany's dependence on imported food and industrial resources without significant domestic repercussions. Germany's limited capacity for adaptation highlights how asymmetries in adjustment costs amplify the coercive power of sanctions.

If Germany had supplied essential resources, such as steel or petroleum, to Britain and its allies during World War I, sender-side adjustment costs would have increased dramatically, severely restricting the scope and intensity of the blockade. Instead of enforcing comprehensive economic isolation, British and French policymakers likely would have employed incremental, targeted sanctions, similar to contemporary measures such as the EU's 2022 price cap on Russian oil, aimed at restricting German economic rents without fully disrupting resource flows critical to their own war effort.

Extending this theoretical logic further, had the United States heavily depended on Venezuelan oil while Venezuela possessed a diversified economic structure, U.S. policymakers would similarly face significant constraints on the severity of sanctions. The theory predicts that higher sender-side costs, such as domestic market disruptions, would substantially reduce U.S. incentives to pursue comprehensive oil embargoes. Instead, targeted or incremental sanctions would become rationally preferable. Consequently, sanctions would primarily function as diplomatic instruments rather than coercive tools, consistent with the theory's predictions that high sender-side costs severely limit sanctions' coercive potential.

2.6 Discussion

This section maps the observations onto the four hypotheses.

2.6.1 Evaluating Hypothesis 1: Sender Adjustment Costs

When sender adjustment costs are high, states opt for cautious, symbolic, or incremental sanctions. The League of Nations' sanctions on Italy in 1935–1936 illustrate pre-

cisely this calculus. British and French policymakers deliberated about their own economic vulnerabilities—especially their dependence on imported petroleum through vulnerable Mediterranean routes. Previously discussed archival records outline policymakers' reluctance to implement comprehensive measures, such as an oil embargo. These records also highlight overriding concerns about substantial domestic costs. This directly led to limited, incremental sanctions.

Similarly, the contemporary case of EU sanctions against Russian natural gas following the 2022 Ukraine invasion reinforces this finding. EU officials confronted major domestic economic vulnerabilities due to Europe's substantial dependence on Russian pipeline gas. Policymakers publicly acknowledged that immediate and comprehensive sanctions would lead to industrial shutdowns and sharp increases in energy prices. Consequently, EU sanctions were adopted in an incremental manner rather than through maximal economic coercion.

Moreover, even in cases with substantial domestic normative pressures, such as U.S. sanctions on Saudi Arabia after the Khashoggi murder, policymakers clearly expressed concerns regarding domestic economic and strategic vulnerabilities. Given Saudi Arabia's central role in global oil markets and defense contracts, U.S. policymakers imposed limited sanctions and sought to avoid significant domestic costs.

2.6.2 Evaluating Hypothesis 2: Target Adjustment Costs

When target adjustment costs are high, sender states exploit them. Policymakers evaluate whether the target's dependence on critical imports, absence of domestic alternatives, and limited economic resilience will amplify sanctions. The Allied blockade of Germany during World War I shows this logic. German dependence on essential imports—food, nitrates, and industrial metals—created vulnerabilities that informed Allied decisions to pursue comprehensive sanctions. Archival records suggest that British policymakers calibrated the naval blockade to exploit Germany's resource dependence.

U.S. sanctions on Venezuela also reveal how target vulnerabilities shape policy. Recognizing Venezuela's structural economic dependence on petroleum exports, U.S. policymakers

targeted this sector to amplify economic disruption. By progressively restricting Venezuela's access to crucial export markets, the U.S. exploited Venezuela's limited adaptive capacity.

Moreover, cases involving mutual economic vulnerability, such as U.S.–Japan sanctions, demonstrate that policymakers evaluated the magnitude of target vulnerability when formulating sanctions. While initially cautious due to their own economic exposure, U.S. policymakers intensified sanctions precisely as Japan's resource dependencies became increasingly acute. They believed higher coercive pressure would effectively constrain Japanese strategic expansion.

In contrast, scenarios involving targets with minimal adjustment costs, such as U.S. sanctions against Myanmar and wartime Spain, produced predominantly symbolic or diplomatic sanctions rather than economically coercive measures. Policymakers openly acknowledged the limited anticipated effectiveness due to targets' relatively insulated economies and readily available substitutes.

2.6.3 Evaluating Hypothesis 3: Adjustment Cost Disparity

Sender states exploit large asymmetries in adjustment costs. Returning to the Venezuela case, the U.S. sanctions demonstrate how significant asymmetries in adjustment costs facilitate aggressive economic coercion. Given minimal U.S. dependence on Venezuelan oil, American policymakers possessed substantial flexibility to impose comprehensive sanctions without significant domestic economic costs. Recognizing Venezuela's acute economic dependence on petroleum revenues, U.S. sanctions targeted this vulnerability through progressive measures culminating in a complete oil embargo.

By contrast, cases characterized by smaller disparities in adjustment costs yield different sanctioning strategies. For example, U.S.–Japan and U.S.–Saudi Arabia illustrate mutual vulnerabilities that constrain sender states toward cautious incrementalism rather than maximalist coercion. U.S. policymakers recognized substantial economic and strategic repercussions from severe sanctions. Here, there was little to no asymmetry, and the sanctions outcome reflects this reality.

2.6.4 Evaluating Hypothesis 4: Comparative Damage

The logic underpinning Hypothesis 4 is that policymakers will accept immediate, manageable domestic disruptions when they anticipate creating enduring economic and strategic vulnerabilities for adversaries. The EU's sanctions on Russian natural gas following the 2022 invasion of Ukraine illustrate this calculus. Policymakers initially perceived Europe's domestic adjustment costs to be substantial, given heavy reliance on Russian pipeline infrastructure. Public narratives and internal deliberations suggested the potential for severe short-term disruptions, including sharply increased energy prices, industrial slowdowns, and political pressures. However, policymakers identified long-term structural vulnerabilities for Russia arising from sanctions and minimal alternative markets for Russian gas exports. By adopting incremental sanctions, the EU consciously managed immediate domestic economic disruptions and progressively constrained Russia's long-term economic flexibility and resilience. Chapter 3 validates this logic through DiD-style analyses and confirms that the EU's managed domestic sensitivities were acceptable relative to Russia's enduring vulnerabilities.

While this case illustrates policymakers' sensitivity to excessive domestic costs, it simultaneously highlights their explicit comparative damage calculus: sanctions are imposed only when anticipated long-term gains clearly outweigh immediate domestic disruptions.

2.7 Conclusion

The analysis across all cases provides support for the claims in Chapter 1. It suggests that economic sanctions are strategic choices conditioned by the relative adjustment costs faced by the sender and target states.

The evidence presented here challenges conventional wisdom in three ways. First, it highlights the critical role of sender adjustment costs, addressing a gap in scholarship that disproportionately emphasizes target vulnerabilities. The case evidence shows that sender states consider their own economic resilience and exposure to disruption, and balance foreign policy objectives against domestic political and economic repercussions.

Second, this chapter validates earlier quantitative methods and examines how adjust-

ment costs shape strategic policymaking. While Chapter 1 developed a Bayesian latent variable model to refine the measurement of adjustment costs, this analysis provides empirical support by tracing the specific causal mechanisms that led to those sanctioning outcomes.

Finally, this analysis highlights the complexity and context-dependence of sanction decisions. Sanctions are neither uniformly effective nor purely symbolic; instead, they consistently reflect a calculus shaped by economic interdependence and vulnerabilities. Policymakers do not mechanically respond to crises; instead, they exploit asymmetries in economic resilience and calibrate sanctions to achieve diplomatic signaling or coercive objectives, depending on relative adjustment costs. Yet a critical puzzle remains: despite policymakers' demonstrated sensitivity to adjustment costs, states sometimes still impose costly sanctions. Chapter 3 addresses this exception.

Chapter 3

Adjustment Costs and Sanctions Severity: A Descriptive Analysis

3.1 Introduction

Chapter 1 provided suggestive evidence that policymakers calibrate sanction severity according to the aggregate adjustment costs of both the sender and the target. Chapter 2 further developed this framework qualitatively and traced how policymakers perceive and respond to sector-level adjustment costs. However, a central puzzle remains unresolved. Why do states impose economically costly sanctions in strategically critical sectors—seemingly contradicting the aggregate-level predictions of Chapter 1?

Initially, the EU's sanctions against Russian natural gas seem perplexing. EU member states faced immediate disruptions in domestic energy markets, which suggests high sender adjustment costs. I resolve this paradox by distinguishing between short-term sectoral sensitivity and long-term structural vulnerability, and by showing how high political stakes raise states' tolerance for adjustment costs.

Specifically, I address the contradiction through a comparative damage framework (Hypothesis 4). The theory suggests that stakeholders rationally accept temporary sector-specific economic disruptions (sensitivity costs) when these are outweighed by greater, enduring vulnerabilities imposed on the target state (vulnerability costs). The sanctioning decision emerges from the interaction between political value and dynamic adjustment costs, and is then moderated by institutional capacity. When political stakes are exceptionally high—as with deterring Russian territorial expansion—states demonstrate greater willingness to absorb economic disruptions that would be prohibitive in routine disputes. The logic underlying comparative damage applies particularly to strategically critical sectors. For example, in sectors such as energy, immediate disruptions are domestically salient but institutionally manageable. Temporary domestic costs can buy long-term strategic advantages.

I examine this using a descriptive comparison similar to a traditional difference-in-differences (DiD) design. I examine EU sanctions on the Russian natural-gas sector imposed after the 2022 invasion of Ukraine. The findings suggest temporary disruptions for EU member states, which were mitigated through institutional mechanisms including market diversification, price caps, and collective purchasing power. These disruptions contrast with Russia's enduring vulnerabilities—most notably the drop in export revenues. The EU's institutional capacity enabled it to transform potential economic vulnerabilities into manageable sensitivities.

3.2 Literature Review

Why do states impose costly sanctions when doing so generates substantial domestic disruptions? Traditional sanctions literature has approached this question from two distinct angles—examining either sender costs or target vulnerabilities—but rarely how these two interact. This approach misses how states strategically manage mutual vulnerabilities through institutional mechanisms *and* temporal considerations. Although scholars acknowledge that sanctions hurt both the sender and the target (Hufbauer et al. 2007; Pape 1997), current theories struggle to explain why states, such as the EU in 2022, sometimes sanction sectors in which they have high exposure for domestic blowback.

Chapter 2's literature section emphasized how domestic constraints—sectoral interests, industry lobbying, and anticipated economic disruptions—limit policymakers' capacity to impose severe sanctions (Drezner 2003; Martin 1992; McLean and Whang 2014; Preble 2020). The chapter also demonstrated how target vulnerabilities from trade dependencies and structural economic weaknesses increase susceptibility to coercion (Dashti-Gibson et al. 1997; Morgan and Schwebach 1997). Chapter 2 applied Gent and Crescenzi's (2021) distinction between *sensitivity* costs and *vulnerability* costs, which clarifies policymakers' strategic calculus in balancing short-term disruptions against longer-term coercive gains. The chapter also outlined the symbolic and political motivations underlying sanction decisions, including signaling resolve and responding to domestic political demands (Drezner 1999; Eland 1995). This chapter proposes comparative damage logic as an explanation for

sanctioning behavior, where states incur immediate economic losses to leverage long-term vulnerabilities of adversaries.

3.2.1 The Absolute-Relative Gains Debate

Comparative damage logic builds on the absolute versus relative gains debate. Neoliberal institutionalism emphasizes pursuing absolute gains through cooperative institutions and economic interdependence, where states seek agreements that yield mutual benefits, regardless of relative distribution (Keohane 2005; Keohane and Nye 2012). Neorealism prioritizes relative capabilities under international anarchy. Here, states seek comparative power advantages to secure strategic positions, which limits cooperation to instances where a state is preserving or enhancing relative power (Grieco et al. 1993; Grieco 1988a,b; Snidal 1991a,b; Waltz 1979). Comparative damage builds on this tension. It clarifies when states incur substantial absolute economic costs to impose disproportionately greater relative costs on adversaries.

Grieco (1993; 1988a; 1988b) argued that anarchy compels states to emphasize relative gains, as security concerns constrain cooperation. Powell challenged this claim, showing that concerns over relative gains are conditional. When conflict costs are low and war can be executed decisively, states prioritize relative gains to guard against vulnerabilities. When conflict costs are prohibitively high, states shift toward absolute gains—which can also facilitate cooperation. Ultimately, Powell's analysis delineates conditions under which states alternate between absolute- and relative-gains orientations (1991; 1993).

The theory assumes that states operate under relative gains logic when imposing economic sanctions and prioritize comparative advantage over absolute utility. Building on this assumption, this chapter examines two hypotheses. Hypothesis 3 examines how adjustment cost disparities between sender and target states influence sanction severity. Hypothesis 4, the comparative damage hypothesis, explores conditions under which states incur substantial sensitivity costs to impose disproportionately greater vulnerability costs on adversaries.

When power transitions appear imminent and adversarial gains threaten to create irreversible strategic disadvantages, states demonstrate a greater willingness to engage in

preemptive economic warfare (Mastanduno 1991; Matthews 1996). Prospect theory suggests that, in the loss domain, decision-makers become risk-acceptant when failing to act would risk further decline (Kahneman and Tversky 1979; Levy 1996, 2003). Berejikian (1997; 2002) extends this logic and demonstrates that states facing potential losses from ascendant rivals pursue aggressive strategies beyond traditional expected utilities.

While behavioral factors might explain some sanctioning decisions—particularly hasty responses driven by public outrage—the EU's approach to managing adjustment costs appears more consistent with rational optimization. This distinction matters: if policymakers rationally accept short-term costs for long-term gains, then improving institutional capacity to manage transitions becomes the key policy lever.

3.2.2 Weaponized Interdependence and Network Power

Domestic structures enable economic coercion. The literature on weaponized interdependence provides a starting point. Farrell and Newman (2019) identify how states controlling critical network hubs—such as SWIFT financial messaging or manufacturing chokepoints—transform structural positions into coercive leverage. Their subsequent research (2023) emphasizes that effective weaponization demands not only network centrality but also domestic institutional capacities to withstand reciprocal disruptions. For the comparative damage framework to operate effectively, states need both structural advantages and institutional capacity to sustain the economic pressure over time.

Critical infrastructure sectors illustrate these dynamics especially well. Energy networks represent paradigmatic cases where physical infrastructure, market concentration, and strategic importance all converge—which generates both opportunities and vulnerabilities simultaneously (Goldthau and Sitter 2015; Goldthau et al. 2018). The EU-Russia natural gas relationship prior to 2022 epitomized mutual vulnerability: Europe's heavy dependence on Russian supplies appeared to preclude aggressive sanctions. Yet, this chapter will demonstrate that the EU's institutional capacity to coordinate alternative energy sources and manage price volatility allowed policymakers to accept substantial short-term economic disruptions to impose sanctions on Russia. However, even with structural ad-

vantages and institutional capacity, the domestic political economy places constraints on sanctions.

3.2.3 Domestic Economic Constraints on Sanctioning Behavior

Even with structural advantages, domestic political and economic factors limit states' ability to weaponize interdependence. Even hegemonic powers incur substantial adjustment costs when severing economic ties, as stakeholders in influential sectors resist policies that jeopardize profits, employment, or supply chain continuity (Drezner 2003; Kirshner 1997). Previous research highlights the salience of these domestic costs; Whang, McLean, and Kuberski (2013) demonstrate that anticipated domestic economic backlash reduces the severity of imposed sanctions, while McLean and Whang (2014) find measurable impacts from industrial lobbying efforts, which shape sanctions designs to mitigate domestic disruptions. These dynamics explain why sanctions sometimes appear incremental, targeted, or characterized by countless exemptions and carve-outs. Rather than reflecting irrational behavior, these outcomes reflect binding constraints on states' ability to leverage their power.

3.2.4 Contributions

Three gaps in the existing literature motivate the comparative damage framework. First, separating sender and target costs obscures how their interaction shapes a state's strategy. Second, static measures miss how institutions transform costs over time—turning vulnerability today into a manageable sensitivity tomorrow. Third, the role of political stakes in shifting acceptable cost thresholds remains undertheorized—why states accept costs in high-stakes conflicts they would avoid in routine disputes.

These gaps are not merely academic. As states increasingly weaponize economic interdependence, understanding how they calculate and manage adjustment costs becomes essential for predicting sanctions behavior. The 2022 EU-Russia case exemplifies this need: existing theories predicted the EU would avoid sanctioning Russian gas due to high dependencies, yet comprehensive sanctions followed. Alternative explanations—such as domestic politics, signaling, or moral imperatives—cannot fully account for the EU's calculated acceptance of

severe economic disruptions.

This dissertation contributes to sanctions scholarship by analyzing how the interaction between sender and target adjustment costs shapes sanctions severity. First, it builds upon complex interdependence (Keohane and Nye 2012) and weaponized interdependence (Farrell and Newman 2023, 2019), which demonstrates how states exploit network centrality while managing their own structural vulnerabilities. Second, it advances adjustment cost literature beyond traditional single-actor models (Autor et al. 2016; Rodrik 1998) by introducing a composite measure that integrates both sender and target vulnerabilities. Third, this chapter explains sanctioning behavior through a purely economic-rational lens. In the next section, I formalize the comparative damage framework to clarify when and why states accept domestic adjustment costs under a standard cost-benefit framework.

3.3 Theoretical Framework

Chapter 1 provided suggestive evidence that policymakers calibrate sanction severity according to the aggregate adjustment costs of both the sender and the target. Chapter 2 further developed and illustrated sector-specific factors. These chapters established a crucial baseline: states generally avoid imposing sanctions when facing high domestic adjustment costs and exploit target vulnerabilities when possible.

Yet states sometimes impose economically costly sanctions in strategically critical sectors—seemingly contradicting these aggregate-level predictions. The EU's sanctions illustrate this deviation. EU member states faced disruptions in domestic energy markets. The composite measure from Chapter 1 and media narratives would predict high aggregate sender adjustment costs and, consequently, sanctions avoidance or minimal severity. Yet the EU imposed comprehensive sanctions and targeted the very sector where its own sensitivities were present.

This exception requires theoretical refinement—not because the earlier findings were wrong, but because static, aggregate measures miss critical dynamics that emerge when political stakes are elevated. The aggregate adjustment cost measure captures a static snapshot of relative adjustment costs. It treats vulnerability as fixed rather than as something that

evolves. Moreover, it cannot account for how institutional mechanisms might transform what would otherwise be crippling disruptions into a manageable transition. Similarly, the sector-specific analysis from Chapter 2, while identifying concentrated vulnerabilities, does not fully explain why states would deliberately target sectors where mutual dependence is highest. Here, I acknowledge that adding a measure of institutional capacity would strengthen the findings of Chapter 1. Addressing this limitation would require qualitatively validating institutional capacity and building a new composite measure—tasks for future research.

Yet, this paradox resolves when we recognize that adjustment costs change over time and vary by direction. When political stakes are exceptionally high—as with deterring Russian territorial expansion—states often demonstrate greater willingness to absorb economic disruptions. Moreover, the capacity to manage these disruptions varies based on available institutional mechanisms that the static measures cannot capture. The EU's collective bargaining power, market interventions, and ability to source perfect substitutes for Russian gas enabled sanctions despite the short-term costs. In contrast, Russia's energy leverage was constrained by its dependence on exporting a commodity that, while fungible, could only be sold to a limited set of politically aligned buyers.

Three minor refinements explain when and why states deviate from baseline expectations. First, political value functions as a threshold modifier that shifts states' tolerance for adjustment costs. Second, institutional capacity serves as the key mechanism transforming potential economic vulnerabilities into manageable sensitivities. Third, comparative damage calculations explain why states rationally accept substantial short-term costs when these enable the imposition of disproportionately greater structural damage on adversaries. These refinements do not contradict the earlier findings; rather, they reveal the conditions under which the static predictions from Chapters 1 and 2 no longer hold. Building on this distinction, the sanctioning decision is driven by the interaction of three mechanisms:

3.3.1 Political Value

The political value of contested issues functions as a background condition that fundamentally alters states' tolerance for adjustment costs. When political stakes are routine—trade disputes, protests, or minor territorial disagreements—states exhibit low tolerance for domestic economic disruption. However, when political value is exceptionally high—preventing territorial expansion, deterring aggression against allies, or defending core security interests—the adjustment cost threshold shifts dramatically. What might be prohibitive costs in routine disputes become acceptable when critical security interests are threatened. The political value of deterring Russia was not merely high; it represented an existential threat to the European security order—which then fundamentally altered the cost-benefit calculation. In short, political value is present in all sanctioning decisions, even if it is not directly observable. Chapter 2's case studies all include some element of political value shaping the sender's response. In the Myanmar case, for instance, U.S. sanctions could have been significantly more severe, regardless of the underlying adjustment costs, but the political value was low. Yet because political value cannot be quantified using the composite index, this research focuses on measurable economic indicators. I outline one way to address this limitation by incorporating political salience into a formal model in the future research section.

3.3.2 Institutional Capacity

Institutional capacity serves as the key mechanism that transforms potential economic vulnerabilities into manageable sensitivities. This capacity operates through multiple channels. First, collective bargaining power enables coordinated negotiations with alternative suppliers—the EU, as one of the world's largest natural gas purchasing blocs, could secure favorable purchase terms that are unavailable to individual states. Moreover, the EU relies on external sources for over 85% of its gas consumption, which grants it significant market power (Liuhto 2022). Second, market intervention mechanisms allow for price smoothing and burden sharing across member states. Third, regulatory flexibility accelerates LNG construction and emergency gas-sharing.

Specifically, the EU accomplished this transformation through the REPowerEU plan. This plan reflected the commission's broader attempt to institutionalize the mitigation of adjustment costs through market coordination. In response to the crisis, the EU Commission encouraged member states to adopt coordinated joint buying through the EU's centralized gas purchasing platform. It also proposed mandatory storage targets backed by state aid (European Commission 2022c,d). These efforts were not simply reactive—they signaled a shift toward collective economic management of energy dependencies. Rather than leaving market outcomes to decentralized adjustment, the EU leveraged collective buying power and pooled demand—this clearly shows the EU sought to manage adjustment costs. The EU's ability to transform its gas market structure within months rather than years demonstrates how institutional capacity can compress adjustment timelines and distribute costs across the member states.

3.3.3 Short-term Sensitivities and Long-term Vulnerabilities

Sender states with robust institutions can shoulder temporary sensitivity costs—price spikes, supply disruptions, market volatility—because these burdens dissipate as markets adjust. Target states facing vulnerability costs experience persistent structural damage—loss of market share and stranded infrastructure assets—and these vulnerabilities compound over time.

The EU's natural gas price spikes were acute but temporary. Russia's loss of European gas markets represents lasting structural damage—pipeline infrastructure now becomes a stranded asset, and alternative markets offer lower prices. The temporal dimension explains why states rationally accept severe short-term costs: temporary pain can purchase long-term advantage.

3.3.4 Comparative Damage

These three mechanisms interact. High political value expands the range of acceptable sensitivity costs, while institutional capacity determines how effectively states can transform potential vulnerabilities. The temporal dimension provides the strategic logic: accepting

short-term costs for long-term gains becomes rational when institutional mechanisms can manage the transition effectively. Together, these mechanisms explain when states deviate from the static predictions of Chapters 1 and 2. Here, adjustment costs are neither fixed nor deterministic but rather subject to political calculation and institutional management.

The comparative damage framework builds directly on the debate between absolute and relative gains. A rational-choice sketch clarifies the point. Consider a discount factor $\delta \in (0,1)$ where sanctions impose costs for t periods followed by net benefits from period $t+1$ onward. For δ sufficiently close to 1—indicating that policymakers value future payoffs nearly as much as present ones—accepting short-term costs becomes optimal when long-term benefits dominate. The decision to sanction reflects a comparison between immediate sensitivity costs and future strategic gains from target vulnerabilities.

The logic operates through relative gains calculations. States evaluate not whether sanctions will hurt—they invariably do—but whether the distribution of pain favors their position. When institutional capacity enables sender states to manage sensitivity costs while target states face enduring vulnerabilities, the relative gains logic dominates.

I offer three conditions for the comparative damage calculation. First, the relative magnitude of costs, sender sensitivity costs, should be substantially lower than target vulnerability costs. Second, the temporal distribution, sender costs must be front-loaded and temporary, while target costs persist and compound. Third, the institutional capacity to manage transitions, sender states must possess mechanisms to transform potential vulnerabilities into sensitivities. When these conditions align, states rationally accept short-term disruptions.

3.3.5 Hypothesis Development

This chapter's theory generates two hypotheses that test the comparative damage logic.

3.3.5.1 Adjustment Cost Disparity

When sender states possess high institutional capacity while target states exhibit structural vulnerabilities, the gap in adjustment costs creates expanded strategic space for

aggressive sanctions. This disparity operates through the three mechanisms. First, the sender's institutional capacity transforms potential vulnerabilities. Second, target structural constraints—limited market alternatives and infrastructure dependencies amplify vulnerability. Third, the magnitude of this disparity largely determines sanction severity: greater gaps enable more aggressive sanctions.

Hypothesis 3 (Adjustment Cost Disparity): Greater disparities in aggregate adjustment costs between sender and target states amplify sanction severity. Economically resilient sender states impose more aggressive sanctions on economically vulnerable targets. This hypothesis extends the logic of H1 and H2 by examining the question: *How badly can I hurt them while minimizing harm to myself?*

3.3.5.2 Comparative Damage

The comparative damage hypothesis is formed from the temporal aspect and the distinction between sensitivity and vulnerability. When political stakes are sufficiently high, sender states rationally accept short-term sensitivity costs if these enable them to impose disproportionately greater and long-term vulnerability costs on targets. This calculation operates through a temporal asymmetry: sender costs are front-loaded but manageable through institutional mechanisms, while the target's costs persist and likely compound over time.

Hypothesis 4 (Comparative Damage): Sender states may impose sanctions in sectors where their immediate economic adjustment costs are substantial, provided these costs remain temporary and manageable relative to the enduring vulnerabilities imposed on target states. This represents an extension of the previous calculation: *Can I leverage temporary pain to inflict lasting damage?*

3.3.6 Expectations

If the comparative damage logic operates as expected, several patterns should emerge. For the Disparity hypothesis (H3), we should observe clear divergence in economic trends. At the aggregate level, EU export flows are expected to initially decrease following the im-

plementation of sanctions, then recover through diversification. In contrast, Russian exports are projected to shift toward alternative markets, such as China and India, but are expected to contract overall. Consumer price indices should similarly diverge over time—EU inflation should be temporary and manageable as institutional mechanisms take effect—versus a sustained rise in the consumer price index reflecting long-term structural damage in Russia. Institutional mechanisms such as collective purchasing agreements and coordinated market interventions should correlate with lower adjustment costs for sanctioning states relative to non-sanctioning states. This should be especially pronounced in the non-household gas sector, where EU market-making mechanisms are strongest.

For the Comparative Damage hypothesis (H4), the empirical analysis should reveal that in the immediate aftermath of sanctions, household gas prices in sanctioning states should spike relative to those in non-sanctioning states. This confirms that policymakers anticipated and accepted these sensitivity costs. However, industrial gas prices should show an inversion, as sanctioning states achieve lower prices than non-sanctioning states. This demonstrates the institutional capacity to protect strategic sectors. This sectoral divergence is crucial: it reveals cost management rather than helpless acceptance of economic damage. Over time, these initial price disadvantages for sanctioning states should diminish or even reverse as adaptation mechanisms take full effect. At the aggregate EU level, both household and industrial prices are expected to ultimately prove lower than in non-sanctioning states.

The DiD-style design captures these dynamics. Bilateral comparisons isolate immediate sensitivity costs and validate public perceptions of disruption. Group-level analysis examines whether institutional coordination is effective beyond major economies. Aggregate EU analysis shows the full power of collective action in transforming vulnerabilities. The critical empirical test is not whether costs emerge—they will—but whether the temporal pattern confirms successful institutional management. If the theory holds, we should observe front-loaded sender costs that diminish over time. This is contrasted with persistent or escalating target vulnerabilities that compound.

3.4 Research Design

3.4.1 Descriptive Approach

To evaluate these hypotheses, I use a DiD-style framework without the causal interpretation that accompanies a traditional DiD design. This approach leverages temporal and group-level variation created by the EU sanctions targeting Russia's natural gas sector following its 2022 invasion of Ukraine. Specifically, the imposition of sanctions in early 2022 constitutes a shock that enables the identification of sanction-based effects.

I test the comparative damage framework through bilateral price comparisons: first, Slovenia versus Bosnia, then Germany versus Bosnia. These cases reveal household-level price impacts following the sanctions shock. Second, I conduct parallel bilateral analyses comparing non-household (industrial) gas prices—again, Slovenia versus Bosnia, and Germany versus Bosnia—which demonstrate institutional capacity to manage vulnerabilities more effectively relative to non-sanctioning states. Third, I broaden the analysis to group-level comparisons and evaluate combined smaller EU sanctioning states (Sweden, Denmark, Romania, Latvia) against comparable non-sanctioning states (Georgia, Moldova) in both household and non-household sectors. The analysis then incorporates a descriptive exercise utilizing macroeconomic indicators to further validate broader strategic claims. Specifically, I compare aggregate export flows from Russia and the EU to examine patterns of economic reorientation. Additionally, consumer price indices are used as an externally observable measure to compare economic trajectories between the sender (EU) and target (Russia) states.

3.4.1.1 Identification Strategy

In a conventional DiD design, economic sanctions would typically be characterized as an *exogenous shock*. However, recognizing that sanctions are inherently a political choice—and therefore partially endogenous—this analysis uses a similar framework to provide suggestive evidence of sanctions' material impacts.

A key methodological concern arises regarding potential anticipation effects that could invalidate the empirical assumptions. In addressing this, I argue that although the EU an-

ticipated potential sanctions due to escalating geopolitical tensions, the limited timeframe between the recognition of a credible threat and the actual imposition of sanctions constrained any substantial structural shifts or reduction in natural gas import dependence on Russia. Thus, even with some anticipation, the EU was practically unable to mitigate their domestic vulnerabilities sufficiently to alter the fundamental nature of the sanctions as a substantial economic shock.

Evidence from natural gas futures markets supports this interpretation. Data from the International Monetary Fund (2025) on EU natural gas prices demonstrates several anticipatory price spikes preceding the implementation of sanctions, which is consistent with market sensitivity to potential supply disruptions (Figure 3.1). This price volatility reflects market speculation rather than strategic structural adjustments by EU economies, which suggests that meaningful adjustments to EU energy dependency and vulnerability were minimal prior to sanctions implementation.

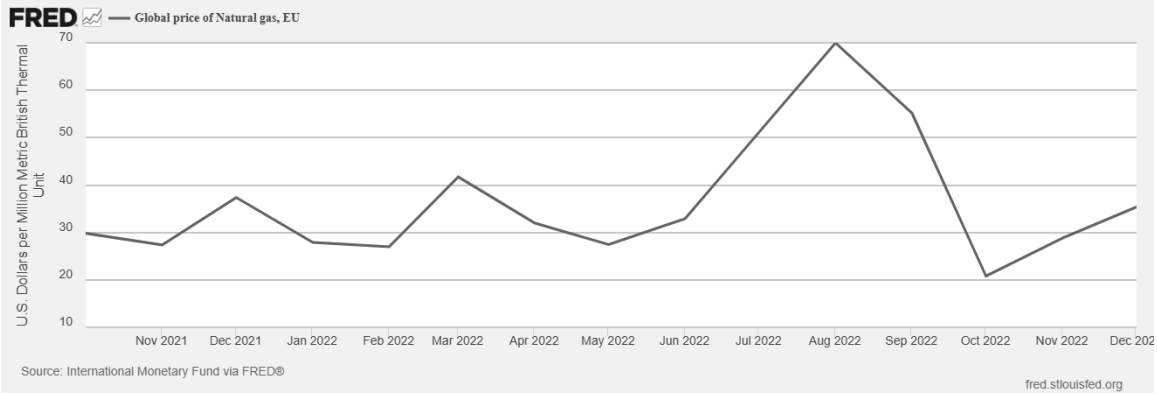

Figure 3.1. EU Natural Gas Price Volatility

Political developments leading up to the invasion underscore widespread miscalculation and a significant lack of preparedness among European policymakers. Only days before Russia's invasion, Ukrainian President Volodymyr Zelensky urged Western leaders not to induce panic, suggesting that despite the visible Russian military buildup, Ukraine's government did not perceive an invasion as imminent or unavoidable. At the same time, U.S. Defense Secretary Lloyd Austin outlined a case for diplomacy, stating, "Conflict is not inevitable. There is still time and space for diplomacy" (British Broadcasting Corporation 2022b).

Recent scholarship also corroborates the perception of surprise among European elites. Michaels (2024) highlights Germany's lack of preparedness, emphasizing Chancellor Scholz's optimistic public messaging shortly before the invasion, and noting Finance Minister Christian Lindner's and Bavarian State Premier Markus Söder's explicit public statements expressing disbelief and surprise upon Russia's actions. This suggests that anticipatory economic adjustments were limited at best and unlikely to substantially bias the results.

Finally, empirical trade data further strengthens this argument. Figure 3.2, illustrates Eurostat data (2022a) on EU-Russia trade volumes measured in billions of Euros and seasonally adjusted and shows minimal variation prior to the imposition of sanctions—indicating an absence of significant anticipatory adjustments. This supports the argument that the sanctions constituted a genuine economic shock. Although I temper claims of strict causal identification due to the political nature of sanctions, the DiD-style framework remains helpful in testing the theory's predictions.

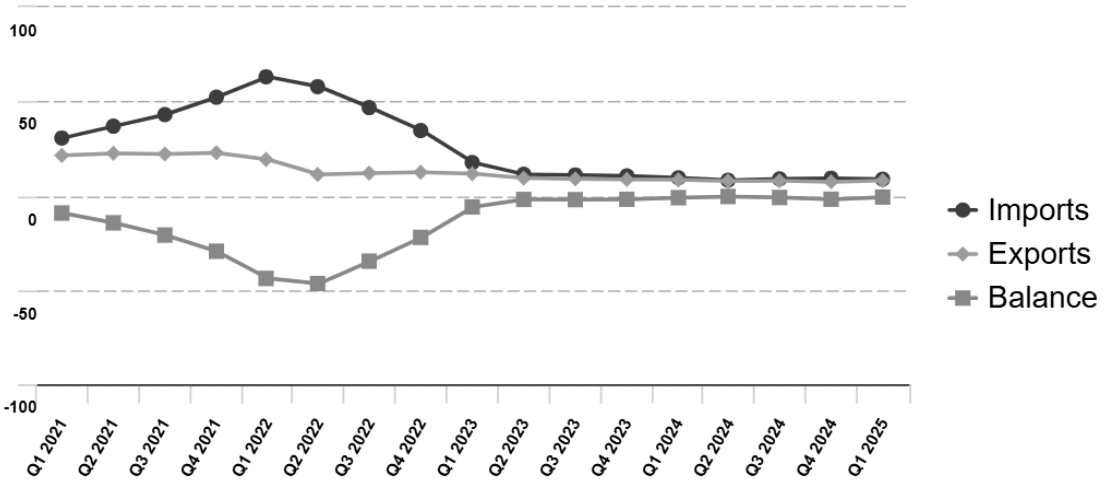

Figure 3.2. EU-Russia Trade Volumes (Euro)

3.4.2 Data Sources

This analysis primarily utilizes two datasets obtained from Eurostat, supplemented by macroeconomic indicators from CEIC datasets. The primary Eurostat datasets, 202 (2022c) (household natural gas prices) and 203 (2022b) (non-household natural gas prices), provide semiannual price data measured in Euros from the first half of 2017 through the second

half of 2024. The household gas prices dataset includes bi-annual consumption levels, and the non-household dataset categorizes price data based on industrial energy consumption levels.

I selected states primarily on data reliability. Slovenia and Germany were chosen as representative EU states due to their contrasting economic scales and differing dependencies on Russian natural gas: Germany is heavily reliant and infrastructure-sensitive, whereas Slovenia is smaller and comparatively less dependent. Bosnia serves as a suitable non-EU control state, selected for its comparable pre-sanction gas price trends. Data availability significantly influenced this selection process. Variations in reporting standards among non-EU states posed methodological challenges. By restricting the analysis to non-EU states, specifically Bosnia, Georgia, and Moldova, which are consistently included in the Eurostat database, I mitigate the risks associated with inconsistent data and measurement discrepancies that arise from integrating multiple, variably sourced datasets.

To complement these sector-specific pricing data and substantiate broader theoretical claims regarding economic vulnerability, I also incorporate macroeconomic data sourced from CEIC. These data include annual Consumer Price Index (CPI) (2024a) growth and annual Industrial Production Index (IPI) (2024b) growth for both the EU and Russia—critical indicators reflecting vulnerabilities. The CEIC CPI growth data for the EU are calculated annually by CEIC from Eurostat's monthly Harmonized Index of Consumer Prices (HICP). The CPI growth data for Russia are calculated annually by CEIC using the annual CPI series provided by Russia's Federal State Statistics Service. The CEIC Industrial Production Index (IPI) growth data for the EU are calculated annually by CEIC based on Eurostat's monthly Industrial Production Index. For Russia, annual IPI growth is calculated by CEIC from monthly data reported by Russia's Federal State Statistics Service. Additionally, export flow data was sourced from Eurostat's international trade database (2025).

3.4.3 Variable Construction

3.4.3.1 Dependent Variables

The primary dependent variable is the semiannual natural gas price, measured in Euros, from the Eurostat datasets for both household and non-household sectors. As complementary dependent variables, annual macroeconomic indicators—specifically the Consumer Price Index (CPI) growth and Industrial Production Index (IPI) growth are also utilized. CPI growth is operationalized as the year-over-year percentage change derived from Eurostat's Harmonized Index of Consumer Prices. Similarly, IPI growth is defined as the year-over-year percentage change in seasonally adjusted industrial production indices. Aggregate and bilateral export flows measured annually provide additional macro-level dependent variables. Here, export flows operationalize economic reorientation by capturing the ability of sender and target states to adjust their trade relationships following sanction implementation.

3.4.3.2 Independent Variables

Treatment: This is a binary indicator that denotes sanctioning states (treated = 1) and non-sanctioning states (treated = 0). The treated group includes EU countries—Germany, Slovenia, and aggregate small-country EU groups (Sweden, Denmark, Romania, and Latvia), as well as an aggregated EU grouping. Non-sanctioning states comprise Bosnia and Herzegovina, Georgia, and Moldova. A dummy variable captures the sanction implementation period beginning with the first half of 2022 (coded as post = 1 from 2022 onwards, and post = 0 before). Moreover, I also re-estimate the models using non-sanctioning states, including different small-country groupings, to confirm that the results remain stable regardless of variations in the composition of the control group. Specifically, re-evaluating sanctioning groups (e.g., Germany and Slovenia individually versus collectively grouped EU states) against varying non-sanctioning benchmarks (Bosnia individually and Georgia-Moldova combined) suggests that the observed differences are not attributable to preexisting differences between sanctioning and non-sanctioning states.

The independent variable is the interaction term between the treatment and post-

sanction period. This term operationalizes the comparative damage logic by capturing the differential impact of sanctions over time between treated and control states. A negative coefficient on the interaction term of the non-household gas price would provide implied support for Hypothesis 4 (Comparative Damage). Robustness checks include alternate groupings of sanctioning and non-sanctioning states. Robust standard errors (HC2) are utilized consistently across models to address potential heteroskedasticity.

3.4.4 Methodological Limitations

Spillovers can partially violate the parallel trends assumption central to the descriptive analysis and complicate the isolation of direct sanction effects. When such a substantial economic bloc restricts natural gas imports, global energy markets inevitably respond with price increases that affect all buyers—including non-sanctioning states. The control group also experiences these price shocks despite not participating in sanctions.

These spillovers strengthen the institutional capacity and comparative damage argument. The key insight is not whether prices rise—they do, globally—but how different states manage these disruptions. The EU's institutional mechanisms enable member states to absorb and mitigate price shocks more effectively than non-sanctioning states that experience similar price increases.

Consider the mechanism. When EU sanctions create global price volatility, all natural gas importers face higher prices. However, the EU deploys collective bargaining through the EU Energy Platform and accelerates LNG terminal construction. Non-sanctioning states lack these institutional tools. They suffer the economic disruption without the compensating strategic benefits or domestic mitigation mechanisms. This capacity to manage identical market shocks reveals precisely what the composite adjustment cost measure from Chapter 1 could not capture—the ability of institutions to transform vulnerabilities.

Furthermore, the spillover effect provides an even stronger test of Hypothesis 4 (Comparative Damage). If the EU can successfully manage sanctions despite bearing both the direct costs of severing Russian gas imports and the indirect costs of global price spillovers, this demonstrates remarkable institutional resilience. Considering that non-sanctioning states

struggle with merely the spillover effects—without the primary disruption of losing a major supplier—highlights the EU's adaptive capacity.

The EU's willingness to impose sanctions, despite anticipating both direct and spillover costs, reflects the exceptionally high political value of deterring Russian aggression, multiplied by its confidence in the institutional mechanisms. Non-sanctioning states, facing only spillover costs without the political imperative, provide the ideal comparison group for isolating the effect of institutional capacity.

Additionally, the small sample size of analyzed countries—constrained by reporting requirements and data availability—further restricts the robustness and external validity of the findings. The limited country-level sample size poses challenges in accurately estimating standard errors. Specifically, the inability to adequately cluster standard errors by country increases the risk of underestimating uncertainty due to potential unaccounted for within-country correlation. Finally, concerns may arise about a post-COVID inflation shock potentially affecting the observed outcomes in the descriptive analysis. I assume that this inflationary spike should uniformly impact both treated and control states, and should not pose a threat to the design.

3.5 Results

The primary rationale for beginning with household prices is their prominence in public and media discourse. Visible price shocks are often perceived as indicators of high domestic adjustment costs. The narrative typically constructed in media outlets highlighted severe and immediate household-level disruptions due to sanctions (British Broadcasting Corporation 2022a; Inman 2022; Oltermann 2022; Twidale 2022). By analyzing these prices, I test these prevalent public perceptions.

However, as argued in Chapter 2, publicly salient household-level impacts often overstate actual aggregate adjustment costs, which may be lower due to institutional mitigation strategies. While critics may argue that sustained household energy price increases constitute genuine vulnerabilities due to their electoral and macroeconomic implications, the key distinction lies in institutional capacity for management and temporal scope. By separately

analyzing household and industrial natural gas prices, this analysis aims to evaluate prevalent public perceptions and distinguishes publicly perceived sensitivities—which, though politically significant, remain institutionally manageable through targeted interventions.

Figure 3.3 provides evidence that household gas prices in Slovenia and Bosnia exhibited parallel trends before the shock—EU sanctions on Russia in 2022. Post-sanctions, Slovenian prices noticeably spiked above those of Bosnia, reflecting a substantial, short-term increase (estimate: 1.209, $p = 0.212$). Despite the lack of statistical significance—likely attributable to the limited number of data points—the magnitude of the observed price divergence aligns with public expectations of immediate sectoral sensitivities following sanctions implementation.

To address potential concerns that this observed effect may be a small-country phenomenon, Figure 3.4 replicates the analysis using Germany, a larger economy with documented infrastructure limitations and a significant dependence on Russian natural gas. The results again demonstrate a substantial post-sanction increase in household gas prices compared to Bosnia (estimate: 1.587, $p = 0.160$), suggesting that the relationship is not solely confined to smaller economies. Rather, the parallel response in Germany corroborates the broader theoretical expectation that household-level adjustment costs represent a generalizable sensitivity experienced across economies of different sizes within the EU.

Next, the analysis shifts to industrial (non-household) natural gas prices, which reveal a critical inversion in comparative pricing. In contrast to household prices, non-household gas prices in Slovenia did not increase as much as they did in Bosnia (Figure 3.5, estimate: -1.525, $p = 0.093$) and similarly these gas prices in Germany did not increase as much as they did in Bosnia (Figure 3.6, estimate: -1.094, $p = 0.161$). The inversion reflects EU-level coordination that helped firms reconfigure their supply chains, renegotiate contracts, and secure alternative energy sources more quickly than non-EU states could.

Central to this capability was the EU's aggregation of industrial energy demand across member states through mechanisms such as the EU Energy Platform (European Commission 2022c). However, household energy markets present structural barriers to comparable institutional coordination due to their inherently fragmented nature. By pooling natural gas purchasing power and negotiating collectively with international suppliers, the EU leveraged

its substantial market size to secure favorable pricing conditions. This collective bargaining strategy—unavailable to non-EU states—substantially reduced individual member states' exposure to price volatility.

The capability to leverage institutional resources at an EU level significantly reduced actual domestic vulnerabilities. Thus, the observed split between household and non-household sectors is critical—it highlights a differentiation between highly visible, politically sensitive consumer disruptions (household prices) and institutionally manageable industrial-level adjustments (non-household prices). Ultimately, these analyses of household and non-household natural gas prices validate the expectation that EU policymakers anticipated, managed, and mitigated the short-term economic disruptions.

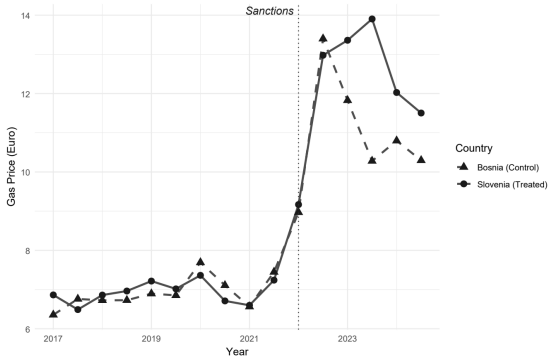

Figure 3.3. Household Natural Gas Prices: Slovenia vs. Bosnia

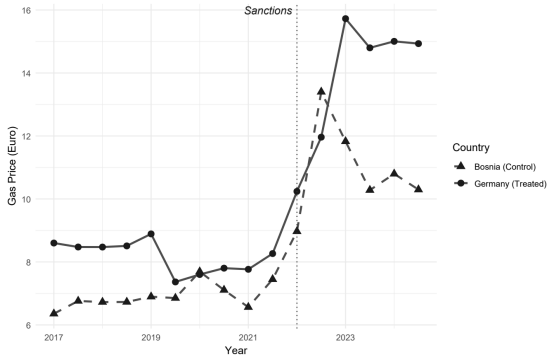

Figure 3.4. Household Natural Gas Prices: Germany vs. Bosnia

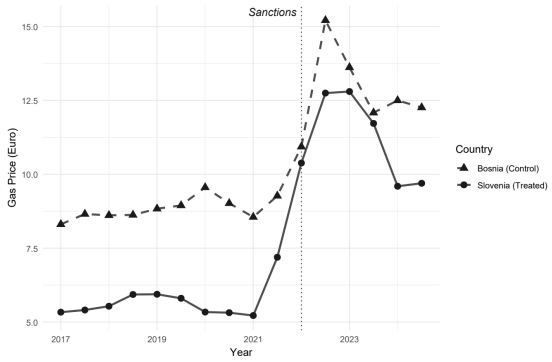

Figure 3.5. Non-Household Natural Gas Prices: Slovenia vs. Bosnia

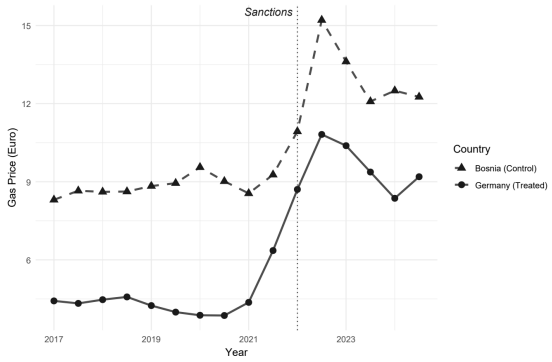

Figure 3.6. Non-Household Natural Gas Prices: Germany vs. Bosnia

As a robustness check, the subsequent analysis shifts from bilateral comparisons to a group-level design. Group-level comparisons reveal whether bilateral patterns generalize across larger sets of states. To fulfill the parallel trends assumption, candidate countries

were screened and sorted based on their pre-treatment economic trajectories. This ensured that any observed divergences in post-sanction gas prices were not due to pre-existing differences.

The sanctioning group, Sweden, Denmark, Romania, and Latvia, was selected based on similar pre-sanction price trends and compared directly to Georgia and Moldova, which exhibit comparable market size and consumption patterns. While including additional non-sanctioning states might initially appear advantageous, substantial data issues arise due to inconsistent reporting of household and industrial natural gas prices across national and international databases. Consequently, limiting the analysis to Georgia and Moldova, which are reliably reported, represents a necessary methodological trade-off to maintain data comparability.

Household gas prices (Figure 3.7) rose moderately in the sanctioning group after sanctions (estimate: 6.901, p=0.304). The household-level results align with the comparative damage framework's predictions regarding short-term economic sensitivities: while sanctioning states anticipated and indeed experienced visible price disruptions that likely influenced public perception and domestic political considerations, these disruptions were ultimately tolerable. Again, this evidence suggests that the narrative of overwhelming domestic adjustment costs—dominant in popular media discourses—likely overstated the actual strategic economic impact of sanctions.

Turning to industrial (non-household) gas prices (Figure 3.8), the results provide evidence supporting the theory. Non-sanctioning countries (Georgia and Moldova) faced higher non-household gas prices following sanctions (estimate: -7.503, p=0.038)—a direct inversion of the household-level pattern. From a theoretical perspective, this inversion highlights the previously discussed institutional and market power advantages available to EU member states.

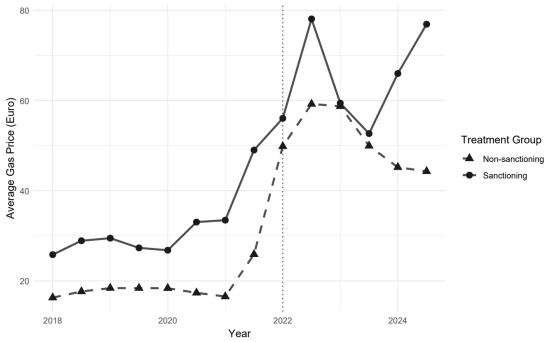

Figure 3.7. Household Natural Gas Prices: Sanctioning vs. Non-sanctioning States

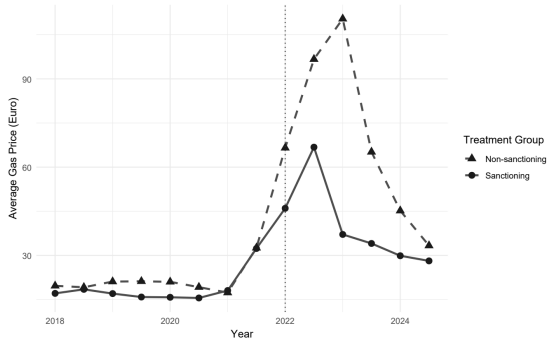

Figure 3.8. Non-Household Natural Gas Prices: Sanctioning vs. Non-sanctioning States

Chapter 2 argued that although individual sanctioning states anticipated short-term sector-specific vulnerabilities, as demonstrated by fluctuations in household gas prices. The earlier disaggregated analyses demonstrated that individual sanctioning states experienced notable household-sector disruptions, which confirmed the widely circulated public narratives and perceptions of high immediate adjustment costs. This aggregated EU-level analysis is also structured as a DiD-style design. However, the parallel trends assumption does not strictly hold in this case due to spillover effects. Therefore, this analysis primarily serves as a descriptive exercise—leveraging the framework for illustrative rather than causal inference purposes.

In the industrial sector, the pattern reverses, indicating that institutional mechanisms lowered adjustment costs. The aggregated EU-level analysis shown in Figures 3.9 and 3.10 show that the EU as a collective sanctioning body experienced lower natural gas prices than non-sanctioning states across *both* household and non-household sectors.

The results for household gas prices (Figure 3.9; estimate: -21.992, $p<0.001$) and industrial gas prices (Figure 3.10; estimate: -38.295, $p=0.005$) confirm a consistent pattern at the aggregate level.

Whereas individual sanctioning states showed pronounced household-sector disruptions, at the EU aggregate level, the extensive institutional coordination and collective bargaining power effectively mitigated these household costs, which brought both household and industrial prices to similarly manageable levels. This aggregate analysis suggests that the EU's substantial institutional capacity—leveraging its market size, multinational firm inte-

gration, and coordinated energy governance—minimized adjustment costs broadly.

Consequently, at the EU level, sanctions were perceived as imposing relatively low overall adjustment costs for the collective—which emboldened policymakers to impose sanctions.

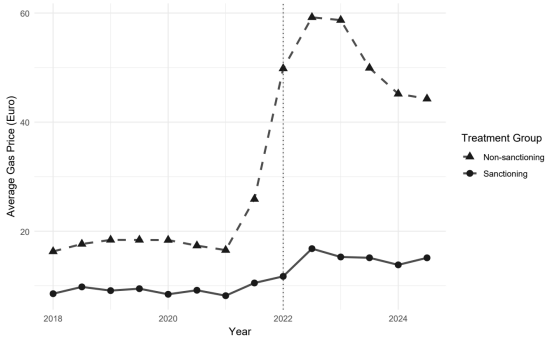

Figure 3.9. Household Natural Gas Prices: EU vs. Control States

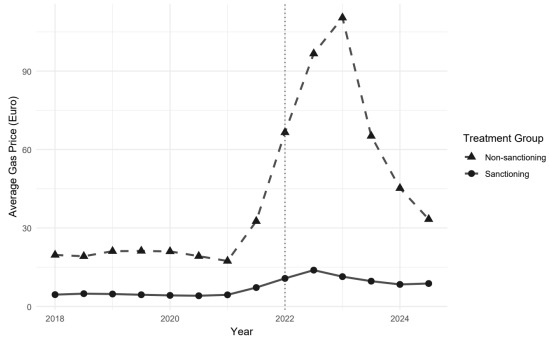

Figure 3.10. Non-Household Natural Gas Prices: EU vs. Control States

Figure 3.11 shows macro-level aggregate export data measured in billions.

Post-sanctions, the EU experienced an increase in total exports, which is indicative of its institutional resilience, adaptability, and ability to rapidly reorient trade flows away from Russia. Conversely, Russia's total exports declined during the same period—and this effect is likely even more pronounced than reported, given Russia's documented history of manipulating economic data for political purposes (Khanin and Suslov 1999). The magnitude and immediacy of this divergence illustrate the strategic logic of EU sanctions policy: by leveraging institutional mechanisms and diversification, EU policymakers not only contained domestic economic disruptions but strengthened their economic position relative to Russia. Here, the export trends suggest that the sanctions achieved their strategic purpose—leveraging domestic sensitivities to amplify Russia's vulnerabilities.

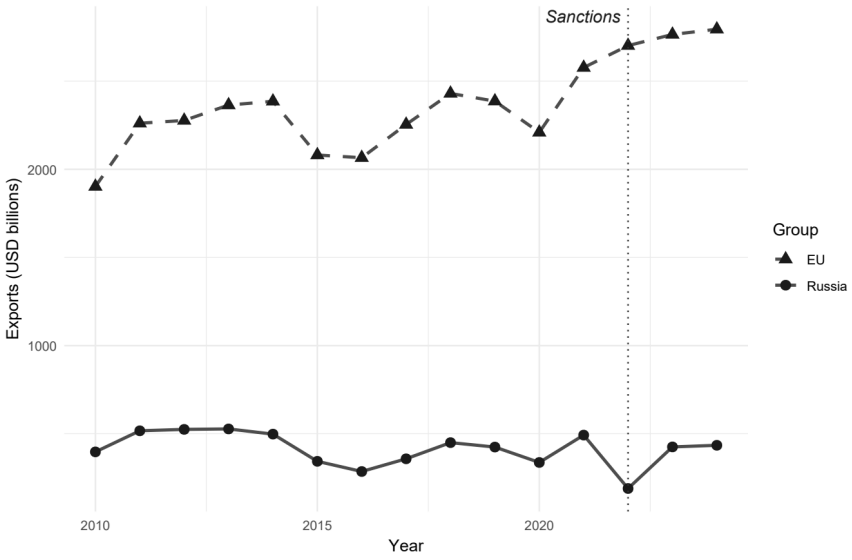

Figure 3.11. Total Exports: EU vs. Russia

Central to the theory, though largely implicit, is the idea that states respond to exogenous economic disruptions by proactively mitigating their adjustment costs through shifting trade relationships toward more favorable trading partners. Figures 3.12 and 3.13 illustrate these reconfigurations by both Russia and the EU following the sanctions imposed after Russia's 2022 invasion of Ukraine.

Figure 3.12 demonstrates that Russian exports experienced a significant strategic shift: exports to China and India markedly increased, while exports to sanctioning states, notably the EU and the U.S., dramatically declined. Theoretically, this aligns with concepts from the sanctions-busting literature, which argues that sanctioned states actively redirect economic relationships toward friendly or neutral actors to alleviate adjustment costs (Early 2009; Golub 2020). Thus, Russia's export pivot toward China and India represents a predictable response to Western sanctions—aimed at offsetting imposed economic vulnerabilities by securing alternative markets for critical exports.

Conversely, Figure 3.13 demonstrates similar strategic trade rebalancing by the EU. Specifically, EU exports to Russia decreased sharply after the sanctions, yet simultaneously, the EU significantly expanded its exports to the U.S.

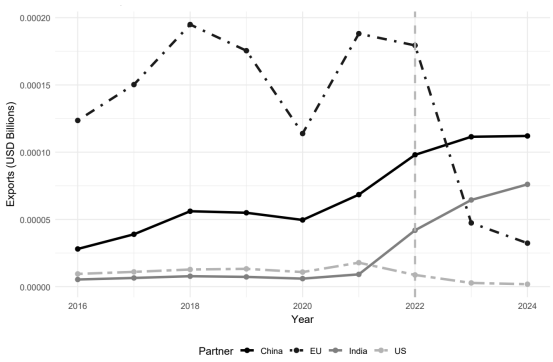

Figure 3.12. Russian Export Diversification

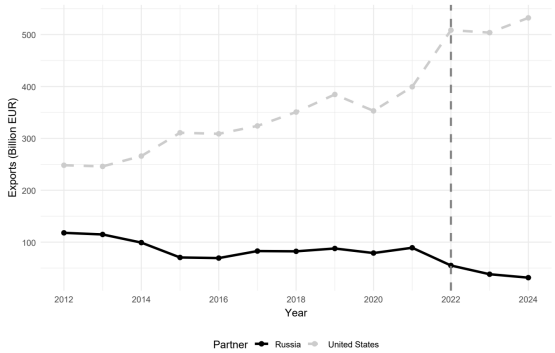

Figure 3.13. EU Export Patterns Post-Sanctions

This section outlines key data limitations. A significant methodological challenge is the absence of reliable economic reporting by the Russian government following the 2022 sanctions. Specifically, accurate data on Russian industrial outputs, exports, and domestic economic conditions have become increasingly inaccessible. Recent scholarship suggests the Russian government may be manipulating key economic indicators—such as inflation rates—to present an illusion of stability, with discrepancies between official statistics and independent price indices pointing to rampant data falsification (Plastun et al. 2024). This continues a historical pattern of statistical distortion dating back to the Soviet era, when data were routinely altered to serve political narratives (Khanin and Suslov 1999).

Figure 3.14, which depicts year-over-year growth in industrial production, highlights precisely this empirical difficulty. Based on available Russian-reported data, one would expect a noticeable decline in Russian industrial production, consistent with the sharp downturn in Russian exports previously discussed. Yet, Russian official statistics suggest relatively stable or even increased industrial output post-sanctions—a paradoxical result given the magnitude of economic isolation imposed by Western sanctions. Russian economic data has become increasingly unreliable—subject to strategic manipulation and selective disclosure designed to project domestic resilience.

However, Figure 3.15, which presents year-over-year changes in consumer prices—an externally observable metric less prone to domestic manipulation—offers a more credible validation of the sanctions' economic impact. To the extent that manipulation or underreporting persists, the observed contrast likely understates the true magnitude. The consumer

price data illustrate a divergence between the EU and Russia following the implementation of sanctions. While EU consumer prices temporarily rose, they quickly stabilized at manageable levels—reinforcing the expectation that the EU mitigated its short-term economic sensitivities. Conversely, Russian consumer prices surged significantly after sanctions and continued rising thereafter. This divergence reflects persistent structural vulnerabilities the sanctions were designed to induce. The stark difference in these externally observable trends suggests the EU's institutional capacity facilitated effective economic adjustments, whereas Russia's economy, despite official claims, experienced substantial and lasting structural disruptions.

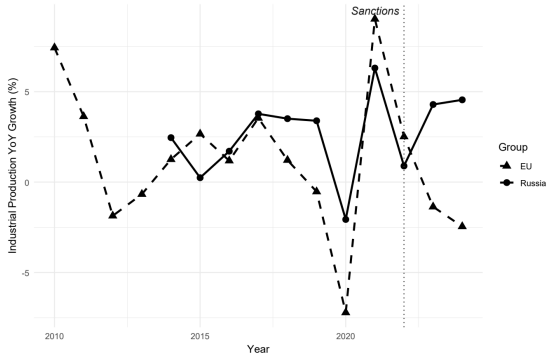

Figure 3.14. Industrial Production Growth Comparison: EU vs. Russia

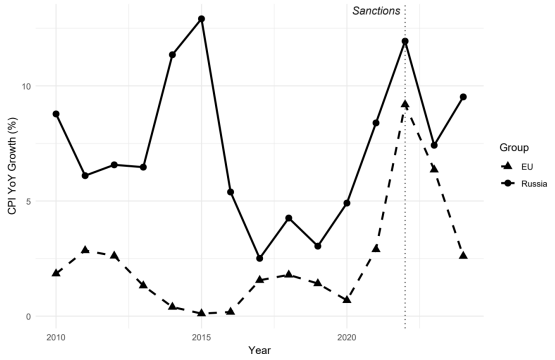

Figure 3.15. Consumer Price Index Growth Comparison: EU vs. Russia

3.6 Discussion

This discussion advances through two stages. First, I review the DiD-style evidence, which demonstrates policymakers' strategic calculus in determining sanction severity through comparative assessment of sender and target adjustment costs. Next, I synthesize evidence across all three chapters to evaluate each hypothesis.

3.6.1 Findings

The bilateral and group-level analyses reveal an inversion between household and non-household gas price dynamics: while sanctioning states experienced visible household-level price spikes that dominated public discourse and media narratives, these disruptions were tolerable due to the EU's institutional capacity to manage industrial-sector adjustment costs

through collective bargaining, market diversification, and coordinated energy governance. The aggregate EU-level data show that multinational coordination has converted potential vulnerabilities into sensitivities across both household and industrial sectors. Moreover, macroeconomic indicators, including exports and consumer price indices, suggest that sender states can accept temporary economic disruptions. The following section integrates the empirical findings from all three chapters.

3.6.2 Cross-Chapter Evidence

3.6.2.1 Evaluating Hypothesis 1: Sender Adjustment Costs

The mechanism for Hypothesis 1 operates through anticipatory strategic calculations—policymakers weigh potential coercive gains against expected domestic costs, which creates constraints on sanctioning behavior as sender vulnerabilities rise. Chapter 1's analysis establishes the empirical pattern across ordered logistic regressions, linear probability models, and ordinal Bayesian specifications—each reveals consistent *negative* relationships between the sender composite adjustment cost measure and sanction severity.

Chapter 2 shows that this dynamic is evident in the League of Nations' sanctions against Italy, where British and French policymakers avoided comprehensive oil embargoes due to their vulnerabilities in Mediterranean supply routes and concerns that Italian retaliation might disrupt their colonial trade networks. The dynamic appeared again in U.S. restraint toward Saudi Arabia after the Khashoggi murder, where Biden administration officials calculated that directly sanctioning Crown Prince MBS would jeopardize millions in arms contracts and destabilize global oil markets—resulting in carefully targeted sanctions against secondary officials while preserving the broader strategic relationship. In each case, policymakers' anticipatory calculations of domestic economic and political costs reduced sanction severity below what normative pressures or strategic objectives might otherwise have warranted.

Chapter 3's analysis illustrates that Slovenia and Germany's household gas prices spiked relative to Bosnia—validating media narratives of severe disruption—yet industrial prices showed an inversion, with sanctioning states experiencing lower increases than non-sanctioning

states. This divergence reflects EU strategy: accepting visible consumer impacts for political signaling while leveraging collective purchasing through the EU Energy Platform to shield industrial competitiveness and thereby lower adjustment costs.

3.6.2.2 Evaluating Hypothesis 2: Target Adjustment Costs

Hypothesis 2 centers on policymakers' assessment of target structural weaknesses—limited economic diversification, dependence on specific export markets, and constrained adaptive capacity—which amplify the disruptive potential of economic coercions. Chapter 1's models demonstrate *positive* relationships between target adjustment costs and sanction severity.

Chapter 2 shows this dynamic in the U.S. sanctions against Venezuela case, where policymakers identified oil as a critical export and then exploited it. The dynamic appeared again in U.S.-Japan sanctions, where U.S. policymakers recognized Japan's outsized dependence on U.S. petroleum imports and escalated from targeted measures to comprehensive oil embargoes. In each case, policymakers' assessment of target structural weaknesses—limited diversification, export dependencies, and constrained adaptive capacity—directly informed decisions to intensify sanction severity beyond what sender capabilities alone might have warranted.

Chapter 3's export flow analysis reveals successful EU trade reorientation—expanding partnerships with the United States and other allies—while Russia's exports contracted despite pivoting toward China and India. This divergence reflects asymmetries in adaptive capacity: the EU's diversified economy and institutional mechanisms enabled rapid adjustment, while Russia's resource-dependent structure and pipeline infrastructure created path dependencies that sanctions then exploited. Consumer prices provide external validation of these differential impacts—Russian inflation persisted and accelerated post-sanctions, while EU price increases proved temporary and institutionally manageable.

3.6.2.3 Evaluating Hypothesis 3: Adjustment Cost Disparity

The mechanism driving Hypothesis 3 operates through relative capability assessment. Policymakers calculate comparative vulnerabilities rather than absolute costs.

Chapter 1's analysis indirectly supports this claim by showing opposing directional effects in the ordered logistic regression: negative coefficients for senders and positive coefficients for targets. This finding suggests that mutual vulnerability scenarios produce cautious sanctioning, while pronounced asymmetries enable aggressive coercion.

Chapter 2 shows maximum asymmetry exploitation in the Allied blockade of Germany during World War I, where Germany's acute import dependencies—one-third of wheat, half of animal feed, critical industrial inputs—contrasted sharply with Allied advantages, including naval supremacy and global trade networks. We also observe a similar logic in contemporary U.S.-Venezuela sanctions. Here, Venezuela's substantial oil export dependence, compared to negligible U.S. import reliance, created a disparity that enabled comprehensive embargoes without significant domestic price impacts.

Conversely, strategic restraint is also present in cases with mutual vulnerability—U.S.-Japan sanctions and U.S.-Saudi Arabia sanctions—where comparable dependencies compressed the strategic space: Japan's dependence on U.S. oil supplies balanced against substantial American commercial interests in Japan, and Saudi Arabia's influence over global oil markets counterbalanced by arms contracts and security guarantees. In each case, the magnitude of relative vulnerabilities rather than absolute costs determined whether policymakers pursued maximum coercion or strategic restraint.

Chapter 3's empirical models reveal how institutional capabilities amplify underlying economic asymmetries. At the aggregate level, EU coordination transformed apparent vulnerabilities—member states' gas dependencies—into collective market power, which achieved lower prices than non-sanctioning states across both household and industrial sectors. This institutional advantage contrasts with Russia's structural constraints: export data demonstrate successful EU trade reorientation, while Russian exports contracted despite pivoting toward alternative markets. Moreover, this disparity appears again in the consumer pricing index trajectories—temporary EU price spikes followed by stabilization versus sustained Russian consumer price acceleration. These divergent paths validate policymakers' ex-ante disparity calculations: the EU's economic complexity, institutional mechanisms, and market alternatives created resilience that Russia's resource-dependent, infrastructure-constrained economy could simply not match.

3.6.2.4 Evaluating Hypothesis 4: Comparative Damage

Hypothesis 4 explains the apparent paradox of states accepting short-term costs to leverage long-term vulnerabilities.

Chapter 2 shows the comparative damage logic in the EU-Russia gas sanctions case. Chancellor Scholz's public acknowledgment of adjustment costs represented strategic transparency about anticipated sensitivity costs. This was followed by deliberate institutional design—phased implementation, LNG terminal construction, collective purchasing mechanisms—to transform potential vulnerabilities into manageable disruptions while imposing structural damage on Russia. We also observe failed comparative damage calculations. The dynamic appeared differently in U.S.-Japan sanctions, where American policymakers miscalculated by assuming oil embargo sensitivity costs would coerce rather than provoke Japan. Here, the U.S. underestimated the target's willingness to escalate to military conflict rather than accept economic capitulation. In each case, the success or failure of comparative damage logic depended on policymakers' institutional capacity to manage domestic sensitivity costs and their accuracy in assessing whether temporary domestic disruptions would yield disproportionately greater costs on the target.

Chapter 3's analysis captures the household price spikes in Slovenia and Germany, validating policymakers' anticipation of visible sensitivity costs. Here, sanctioning states experienced lower industrial gas prices than non-sanctioning states, which reveals how EU institutional mechanisms insulated strategic economic sectors while accepting consumer-level impacts. The aggregate analysis confirms institutional transformation of vulnerabilities—the EU achieved lower overall prices than non-sanctioning states despite initial bilateral disadvantages. Russia's trajectory validates the comparative logic: export contraction and persistent price inflation demonstrate structural damage that exceeded temporary EU sensitivities.

3.7 Conclusion

As far as existing scholarship shows, this research is the first to integrate sender and target vulnerabilities into a composite Bayesian analysis. The composite adjustment cost

measure, validated through quantitative modeling and qualitative process tracing, offers a baseline methodology for analyzing how mutual economic vulnerabilities shape state sanctioning behavior. Moreover, this research establishes a simple theory of adjustment costs for future scholars, think tanks, and policymakers to evaluate a state's true vulnerabilities relative to their targets.

3.7.1 Future Research Directions

This section highlights several pathways for future research that could address the limitations of this dissertation and extend the application of adjustment cost theory.

First, addressing spillover effects in a DiD-style design requires identifying macroeconomic indicators less sensitive to energy price fluctuations. While GDP proves unsuitable due to direct impacts on gas prices, there are likely other macroeconomic health indicators, such as sector-level foreign direct investment, that might better isolate the economic trajectories between sanctioning and non-sanctioning states. Additionally, broadening the pool of treatment and control countries would substantially enhance the credibility of the causal inferences. This could be achieved through qualitative coding of supplementary datasets to validate both household and non-household gas price measures, which would allow for their integration into the existing dataset.

Second, the distinction between sensitivity and vulnerability costs should include sector-level measurement aggregated at the state level. Chapter 1's composite measure provides a useful first approximation—but true adjustment costs emerge from sector-specific dependencies within each bilateral relationship. Future work should map critical sectors for each state—semiconductors for Taiwan, energy for Russia—and assess both their vulnerability to disruption and capacity to target opponents' critical sectors. This dyadic-sectoral approach would recognize that adjustment costs are fundamentally relational: states lacking advanced semiconductor usage or supply chain inputs cannot credibly threaten a state's advanced semiconductor industry, regardless of aggregate economic size. Moreover, incorporating alliance obligations and security commitments into the typology would help explain why some states absorb higher economic burdens in defense of broader strategic goals.

Third, political value remains undertheorized despite its central role in the EU–Russia case. Adjustment costs are both calculated and conceptualized in relation to the political salience and perceived importance of the issue at hand. Future research could formalize this through a formal model where political importance $\theta \in [0, 1]$ interacts with adjustment costs. High θ values would expand the parameter space where states accept temporary costs, while low θ values would constrain sanctions to cases of minimal sender costs. Future models should also incorporate repeated interactions and domestic audience costs—both of which alter sanctioning strategies but are not captured in this research. Alternatively, researchers could employ sentiment analysis to generate time-varying measures of political salience, which would then allow researchers to predict when states will likely deviate from purely economic calculations.

Fourth, extending the temporal scope would offer insight into the evolution of adjustment costs over time. Do initial sensitivities transform into vulnerabilities if sanctions persist? How quickly can states develop institutional workarounds? Panel data tracking for sanctioning episodes over 5-10 year horizons could reveal whether comparative damage calculations prove accurate ex post. This would validate whether policymakers correctly anticipated their capacity to transform short-term costs into long-term strategic advantages.

These extensions would move beyond asking whether adjustment costs matter—to understanding precisely how states calculate, manage, and exploit economic interdependencies.

Adjustment Costs Beyond Sanctions

Sanctions offer clarity for evaluating adjustment costs. For this reason, sanctions serve as the focal point of this study. But adjustment costs are not unique to sanctions. They emerge across the full spectrum of economic instruments—tariffs, export controls, investments, capital restrictions, and diplomatic relationships. The real challenge for future research is to develop adjustment cost theory into a comprehensive framework that bridges system-level thinking, political science, and economics. If poorly understood, adjustment costs can lead to cascading failures. If properly perceived by leaders, cogent adjustment cost policy can protect the most vulnerable actors in the political economy—small businesses and consumers. Sanctions offer one entry point. However, the next generation of research must

shift toward sector-level models that take into account institutional capacity, multinational corporations, foreign direct investment, and consumer equity markets. This research is a first step in that direction.

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