The Power to Hurt and the Effectiveness of International Sanctions*

Kerim Can Kavaklı†
J. Tyson Chatagnier‡
Emre Hatipoğlu§

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Abstract

Although costs of trade disruption play a central role in theories of interstate conflict, scholars have had difficulty in constructing appropriate measures of trade wars, and few have explored how states can mitigate the resulting costs, reducing vulnerability to economic coercion. We study these questions in the context of economic sanctions, arguing that during a crisis, each side's comparative advantage in exports and domestic production capabilities determine its ability to minimize costs while maximizing its power to hurt the adversary. We find support for our hypotheses, using commodity-level trade data. Sanctions are more likely to succeed when sanctioners have a comparative advantage in the goods they export to the target, but more likely to fail if the target's export portfolio is diverse or the target has a comparative advantage in exports. This is particularly true once sanctions are imposed. These findings open up the black box of sanction costs and improve our understanding of when economic coercion is likely to succeed.

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†Department of Political Science, Bocconi University. Email: kerimcan@gmail.com
‡Department of Political Science, University of Houston. Email: jtchatagnier@uh.edu
§Faculty of Arts and Social Sciences, Sabancı University. Email: ehatipoglu@sabanciuniv.edu

In the aftermath of the February 2014 Ukrainian Revolution, a crisis began to unfold in the south of the country. Days after Russian-speaking Ukrainians held a series of anti-revolutionary protests, Russian forces entered Crimea and by March, the peninsula had joined the Russian Federation, following a fraudulent referendum. The West responded with a series of economic sanctions intended to force Russia to change its Ukrainian policy. Initially, this move was criticized as ineffective[1] or even counterproductive.[2] But during the second half of 2014, crude oil prices plummeted more than 50% and Russia, a major oil exporter, found itself plunged into economic crisis. Suddenly, commentators were much more optimistic about the effectiveness of economic sanctions against Russia and argued that now was the time to press Putin for compromise.[3]

The confidence with which many commentators immediately denounced the sanctions as ineffective when implemented, and subsequently praised them following the oil crash highlights the fact that we know relatively little about when and why trade sanctions work. This is an important shortcoming of our discipline, because economic sanctions present an attractive alternative to the use of force, and are used with increasing frequency around the world. For instance, whereas sanctions were rarely mentioned in U.S. National Security Strategy documents prior to 2010, they received nine mentions in 2015 alone. But sanctions are used widely throughout the rest of the world as well. Russia imposed a broad range of sanctions against Turkey in 2015 after the latter shot down a Russian military jet. In recent years, China has used trade embargoes to punish countries that host critics of the regime or have border disputes with China. Lastly, in the summer of 2017, four Arab countries led by Saudi Arabia imposed

[1] See, for example, Chapman, Steve. 9 March, 2014. "Sanctions on Russia won't work." *Chicago Tribune*

[2] Sher, Gerson. 6 March 2014. "Russia, Ukraine And Sanctions: A Double-Edged Sword." *International Business Times*

[3] For example, Saunders, Paul J. 21 August 2014. "When Sanctions Lead to War." *The New York Times*

a blockade against Qatar, accusing it of supporting terrorism and Iran in the Middle East.[4] In this global context it is clearly important for scholars to analyze the conditions under which economic sanctions succeed.

An important, yet underexplored, topic is how states adapt to the disruption of trade. When sanctions are imposed, we often see target states attempt to minimize their losses and impose costs on the sanctioner in order to avoid acquiescing. In an early article, Galtung (1967) suggested that sanction success depends on how easily a target can replace its sanctioning trade partners. Even a major trade partner will not have much leverage over a target if the target can easily switch to other suppliers, which is what the USSR did in 1980, when its biggest supplier of grain, the US, initiated an embargo against it (Paarlberg 1980). Despite this early attention, these ideas have not yet been integrated into a modern bargaining framework to produce testable hypotheses. Unsurprisingly, in the absence of theoretical development, existing empirical studies have resorted to problematic measures of the costliness of sanctions and arrived at sometimes-contradictory findings regarding when sanctions hurt a country's economy and how these costs translate into outcomes (Kaempfer and Lowenberg 2007). Here we provide a relevant theoretical framework—in which a sanction episode is conceptualized as a part of the bargaining process, analogous to war in the conflict bargaining literature—from which we derive novel hypotheses.

In our framework, sanctions are costly for both sides, and both the target and sanctioner will take steps to minimize their own costs while maximizing the other side's costs. The sanctioning process allows the two sides to use their respective abilities to cause economic harm to the opponent, and to prevent such harm from befalling themselves. This shapes the bargaining landscape, eventually leading the state that can no longer inflict pain upon its opponent to

[4]For Russian sanctions against Turkey, see Girit, Selin. 2 January 2016. "Turkey faces big losses as Russia sanctions bite." *BBC News*; for Chinese sanctions, see Chellaney, Brahma. 26 July 2017. "China's Weaponization of Trade." *Project Syndicate*; for sanctions against Qatar, see Fattah, Zainab. 12 July 2017. "Why Punishing Qatar Could Also Hurt Its Gulf Rivals." *Bloomberg*

yield. We argue that states are able to subvert the opponent's ability to inflict pain with a combination of *external* and *internal substitution*. External substitution involves switching to new trade partners. This was the strategy of Apartheid South Africa during the 1980s, which allowed it to recover 86% of its lost export revenue within a year (General Accounting Office 1992, 14). Internal substitution is the tactic of overcoming import restrictions by producing the requisite good at home. This route was taken by Rhodesia in the 1960s and 1970s, allowing it to prosper even in the face of severe economic sanctions (Chikuhwa 2006). These tactics determine a country's outside options, but they involve costs and may not be available to all states. Even in the case of South Africa, which was one of the most successful cases of external substitution, there was still a significant loss (about 14% of export revenue). Therefore, depending on the context, cutting the same level of trade can have different effects on different states. From this perspective, it is clear that the level or change in *total trade* between countries as a result of sanctions is an ambiguous measure of the policy's costs for either side. Our framework enables us to make predictions not only about how costly sanctions will be in the aggregate, but also how these costs will be shared by former trade partners. In particular, we highlight the importance of three factors: market power (a combination of export volume and comparative advantage), domestic production capabilities, and export portfolio variety.

Our empirical contribution is to operationalize and test explicit mechanisms that link trade to sanction success. Our measures require the type of commodity-level data that has been used in other areas of international politics (see, e.g., Li and Reuveny 2011; Chatagnier and Kavakli 2017), but has not yet been used to examine sanctions. Therefore, we employ commodity-level data on international trade between 1962 and 2000 to test our hypotheses. Our findings suggest that the more market power a trading partner has (whether sender *or* target), the more likely that that partner will achieve a favorable outcome in a sanction episode. Target states that have the ability to produce a greater variety of products are harder to defeat through sanctions. Interestingly, targets whose export portfolios are concentrated on a small number of goods do not seem to be more vulnerable to sanctions; further analyses indicate that an autocratic target

whose income from exports depends upon a limited number of goods will be *more* resilient to sanctions. These findings are robust to a variety of specifications and estimators, including a novel non-parametric estimator, which accounts for bias from selection or strategic incentives in states' decisions to threaten and impose sanctions. We also find that our measures provide a better fit with data compared to previous measures of the costliness of sanctions.

This theoretical framework and its empirical operationalization can be applied to other areas of international relations as well. For instance, scholars have argued that the potential costs from trade disruption can pacify relations between states (Russett and Oneal 2001) and motivate diplomatic and military third-party interventions (Crescenzi et al. 2011; Stojek and Chacha 2015). However, if the costs of this disruption can be managed, states may be more willing to fight trade partners and less willing to intervene in others' wars than existing work leads us to believe.

The remainder of the paper is organized as follows. We begin with a brief review of the previous research on the effect of trade ties on sanctions success. We then discuss our theoretical model of effectiveness in greater detail, present corresponding testable hypotheses, and develop our measures of economic importance. Next, we analyze the data and interpret the results. Finally, we draw conclusions and make suggestions for future research.

Determinants of Sanction Success

The logic behind economic sanctions is captured well by the bargaining model of conflict (McLean and Whang 2010; Bapat and Kwon 2015). A "sanction crisis" begins with a threat by a group of one or more sanctioning states (the "senders") to limit their economic interaction with a target unless it changes a particular policy. If the target concedes, then the crisis ends with a policy change and the two parties' utilities reflect this change in policy. If the target resists, then the sender implements sanctions and trade is disrupted until one side gives in. Once a crisis reaches this level, both sides are hurt economically and neither side knows, ex ante, which will

concede first. In other words, sanctions are a *process*, rather than a one-shot interaction.

This implies that, during crises, actors may have to display their respective abilities to inflict and bear costs in order to demonstrate their bargaining power. Indeed, Schelling (1966, v) calls "the power to hurt [...] a kind of bargaining power." It aims to compel the other side to make concessions, in order to stave off further punishment. Therefore, a sender's ability to impose painful sanctions upon a target provides it with significant leverage, allowing it to demand more from its target.

However, as Slantchev (2003) notes, if the power to hurt is bargaining power, then its denial undermines the opponent's bargaining strength. When a state realizes its inability to gain an advantage through punishment, it is more likely to yield, especially when punishing the other side is costly for the sender as well.[5] In short, both the power to hurt and the power to bear costs constitute independent sources of bargaining power.

What is needed here is a theoretical framework for the sanctioning process. In particular, we must explain how states are able to use economic tools to inflict pain on their adversaries while finding ways to avoid similar costs themselves. The theory that we outline below helps us to understand *why* states might resort to sanctions even when fully informed about the costs to both sides, and it tells us which side is likely to give in (i.e., whether the sanctions will succeed or fail). All of these insights depend critically upon an understanding of the sources of economic costs, and our conceptualization of how the power to hurt comes into play.

While both the power to inflict and bear costs are crucial, few sanction studies separate and explicate these costs in detail. The most commonly used sanction datasets, Morgan, Bapat and Kobayashi (2014) and Hufbauer et al. (2007), include ordinal measures of the costliness of sanctions for the target and the sender individually. However, the ordinal nature of these variables makes it difficult to understand which particular economic factors make sanctions more costly. These indicators are also based on subjective assessments of sanction costliness and

[5]If sanctions have symbolic value and minimal costs for the sender, then they may continue long after they are revealed to be ineffective. The best example here is the Cuban embargo.

suffer from severe missing data problems.[6] As an alternative, some scholars (e.g., McLean and Whang 2010) measure a sanction's costliness by the difference in trade levels before and after sanctions are imposed. One important drawback of this measure is that it is only available for imposed sanctions and not for cases where sanctions were threatened but not carried out. More recently, Bapat and Kwon (2015) and Peksen and Peterson (2016) have explicitly modeled costs to parties from sanction episodes using aggregate trade figures. However, such measures are unable to separate the sanctioners' and targets' costs from trade disruption—which can have diametrically opposing effects on sanction success—and they ignore the target state's ability to replace lost trade through internal substitution. To remedy these problems, we propose a model of sanctions below that defines power in terms of costs inflicted and borne.

Although we approach sanctions as an interstate interaction, we are aware that domestic politics can play an important role as well (Kobayashi Forthcoming). Sanctions are sometimes "symbolic" in the sense that senders do not expect sanctions to change target policy, but they impose them nevertheless to demonstrate their displeasure with the target to domestic and international audiences (Whang 2011). However, the existence of such cases will only make our task more challenging. In cases in which senders intentionally design weak sanction regimes by not employing their full leverage against the target, our measures of sender power should overestimate effectiveness, attenuating our estimates and making it more difficult for us to find significant results. In other cases, senders may employ sanctions against a highly resolved target

[6] Among the 1102 sanction episodes the TIES dataset includes for the time period we cover in this study, our measure provides data for 1017 episodes. The missing data in our measurement occurs in cases where the target was the EU (42 cases), a microstate, or a state enjoying its first year of independence. By contrast, using the *anticipated cost to the target* and *anticipated cost to the sender* variables of the TIES dataset leaves us with 657 cases. Additionally, these measures show little variation: for *Anticipated Sender Economic Costs*, which is missing for 30% of the TIES dataset, 95% of non-missing observations are coded as "minor." The other two categories—"major" and "severe"—make up only 5% of the *non-missing* cases.

that they expect not to acquiesce to economic coercion. An example of this might be the Arab states' sanctions against Israel in the 1980s. Although our empirical models include proxies for target resolve, the concept is difficult to measure (Kertzer 2016). Therefore, we may be unable to explain such cases adequately. Ultimately, however, this should once again bias us against finding results in the aggregate. Therefore, the true impact of the economic factors that we identify should be slightly stronger than the estimates that we provide.

Costliness of Trade Disruption

Understanding the costs associated with trade disruption requires the discussion and operationalization of the two critically important types of bargaining power: the power to inflict costs and the power to bear or mitigate costs inflicted by others. When applied to trade sanctions, however, these concepts can be disaggregated further, allowing us to generate novel hypotheses about economic coercion.

Sanctions impose costs upon both the target and the sender, as trade disruption reduces the economic benefits enjoyed by both parties. Moreover, these costs are not completely predictable. Even if the sender attempts to impose sanctions that will cause little harm to itself, it cannot ensure that disruption will be limited to those commodities included in its sanction regime. The target can retaliate by disrupting trade in commodities that are important to the sender. An example of this phenomenon is Russia's ban of agricultural imports from the EU, in response to European sanctions over the Ukraine crisis. A particularly powerful target can make it difficult for senders to maintain the sanctions, reducing their likelihood of success.[7]

[7]We do, however, see some instances of sanctions being implemented against high-power targets. Just as private information over resolve can explain war between rational states, it may also account for sanctions against powerful targets. Senders are likely to be uncertain about the target's ability to withstand costs. If the target is highly resolved, then even high-cost sanctions may fail; conversely, because substitution is costly, even states that are *able* to switch may be unwilling to do so if their resolve is not sufficiently high.

A state's ability to bear costs, either as a target or a sender, depends on its ability to find alternative buyers for its products and alternative suppliers of its imports. If a state benefits from exporting goods, then sanctions hurt by reducing profits. While a state cannot completely eliminate sanction costs, the harm will be significantly smaller if its exports are highly sought-after in the global marketplace (due either to low prices or high quality). Finding new buyers is easier when the state has a large comparative advantage in the production of that commodity. Likewise, import substitution is easier if there are other suppliers in the world who sell low-cost or high-quality versions of the relevant goods.[8]

In short, the exporter's comparative advantage affects sanction effectiveness in two ways. First, greater comparative advantage in a given good allows the exporter to find alternative buyers more easily. Second, it makes it more difficult for the importer to find alternative sellers. If the sanctioner is the exporter, comparative advantage makes sanctions costlier for the target. If the target is the exporter, it reduces the costs inflicted by the sanctions and gives the target more power to hurt the sanctioner back. The effect of trade on sanction success, then, depends on who is selling which commodity to whom, and on the seller's comparative advantage in that commodity.

Iran's countermeasures against Western sanctions illustrate the link between sender market power, target ability to resist, and the power to hurt. Despite its vast crude oil reserves, Iran's limited refining capacity forced the country to import more than 40% of its gasoline when sanctions began in 2010.[9] The sanctions aimed to exploit this weakness by banning the export of refining equipment and technology to Iran. However, the U.S. soon discovered that Western companies had limited market power in the global production of refining equipment, which allowed Iran to obtain such equipment from non-Western (mostly Chinese, Indian, and Malaysian) companies, reducing the burden of sanctions (Van de Graaf 2013).

[8] In addition to comparative advantage, dyad-specific factors (e.g., distance) may also affect trade volumes.

[9] "Iran faces global push towards more sanctions." *Financial Times*. 15 December 2009.

From our bargaining model of sanctions effectiveness, we can derive two hypotheses. First, we expect sanctions coming from sender states with greater market power to be more effective in accomplishing their goals.

Hypothesis 1. *The more easily the target can externally substitute for sender's exports, the lower the likelihood of sanctions success.*

By the same logic, senders will be less sensitive to sanction costs if their dependence on the target or target's comparative advantage is low. Under these conditions, the sender will find it easier to substitute for the target's exports externally, allowing it to bear the costs of sanctions.

Hypothesis 2. *The more easily the sender can externally substitute for target's exports, the higher the likelihood of sanctions success.*

At this point, we reemphasize that tests of Hypotheses 1 and 2 require the disaggregation of total trade into imports and exports. We expect these two (weighted) components of trade to have *opposite* effects on sanctions success. This is in stark contrast to previous works that measure target vulnerability using the amount or decline of total trade (McLean and Whang 2010; Whang 2010; Bapat and Kwon 2015).

The second major factor that determines a state's vulnerability to trade disruption is its ability to use internal substitution. A country that has the domestic capabilities to produce a large variety of goods at home should be more resilient to import restriction. A diverse industrial base will allow the targeted state to transfer technology, innovate, and commit production facilities to produce the embargoed good at home (Hausmann and Hidalgo 2011). A good example of such an adjustment was the apartheid government's Sasol initiative in South Africa. The regime's advanced production facilities in other areas of petrochemical production were key to (partially) offsetting the shortages induced by the international oil embargo as these facilities were retrofitted to produce oil from coal (Kaempfer and Lowenberg 1988). We hypothesize that countries with diverse export portfolios are more capable of internal substitution. Economists have shown that more developed countries and those that are able to produce more complex prod-

ucts tend to export a wider variety of goods in the global market (Hidalgo et al. 2007; Saviotti and Frenken 2008). Moreover, data on exports tend to be classified consistently across countries. For these reasons, we believe that diversity of exports is a good indicator of domestic production capabilities.[10] This argument anticipates our next hypothesis.

Hypothesis 3. *The greater the number of commodities exported by the target state, the lower the likelihood of sanctions success.*

Next, based on arguments about contracting costs and enforcement capability, we hypothesize that countries with more concentrated export portfolios will be easier to sanction effectively. When a target concentrates on a few exports, sanctions should be easier to design and enforce, resulting in less sanction-busting, which is important for sanction success (Early 2009).[11]

Hypothesis 4. *The more concentrated the export portfolio of the target state, the higher the likelihood of sanctions success.*

Finally, given that sanctions are a process, there is a question of *the stage at which* they will be effective. States may actually have to implement sanctions and inflict pain even if there are some observable measures of their capacity at the onset of a crisis. First, if an actor underestimates the cost of sanctions or the other side's determination to impose them, then imposing sanctions may be necessary to correct this information problem (Hovi, Huseby and Sprinz

[10] Consistent with this idea, the number of commodities exported by South Africa in 1983 was 71, more than one standard deviation above the world average of 56 that year.

[11] Our theory contends that the target may consider hurting back with counter-sanctions. Following the same line of logic, we may also posit that the sender's industrial setup and its level of export concentration may mitigate the costs imposed by sanctions. We choose not to incorporate these additional two hypotheses for the sake of brevity. Calculating these two variables for sanctioning coalitions is also problematic: various transaction costs may hinder product substitution across sender countries. Nonetheless, additional tests in the appendix show that controlling for the breadth of the sender's export portfolio does not change our main findings.

2005). Second, Slantchev (2003) shows, in an analogous scenario, that costly conflict can be an equilibrium even between fully-informed states. In this case, states prefer sanctions to certain unacceptable settlements and one side will opt to settle only when its capacity to hurt the opponent or to bear costs has been sufficiently compromised. Drawing upon these ideas, we present our last hypothesis.

Hypothesis 5. *The cost associated with a particular sanction will matter more in the imposition stage than in the threat stage.*

Research Design

Our hypotheses concern the effects of economic power on the efficacy of sanctions. Thus, our main dependent variable in our initial analysis is the success or failure of sanctions, whether threatened or imposed. We draw the sanctions data from Morgan, Bapat and Kobayashi's (2014) Threat and Imposition of Sanctions (TIES) dataset. Later we analyze these two stages (threat and imposition) separately. Our unit of analysis is the sanction episode, which includes any interaction during which one or more states imposed or threatened to impose sanctions upon another. While the TIES data range from 1945–2005, the availability of our key independent variable restricts our analysis to the years 1962–2000. We limit our set of observations to those sanctions episodes in which *export and/or import sanctions* were threatened or imposed, as these constitute the set of relevant cases for our theory; we do not expect market power to play a role in the outcome of non-economic sanctions. Empirically, we do this by omitting sanction episodes in which the threats fall solely within categories 7–10 in the TIES data.[12]

The main dependent variable in our analysis is binary: we code episodes in which the target capitulates or a negotiated settlement is reached as successful, and we code episodes in which the sender capitulates or there is a stalemate as failures. In coding this variable, we note that

[12]Categories 7–10 include, respectively: asset freezes, termination of foreign aid, travel bans, and suspension of economic agreements. Our results are robust to including category 10.

some sanctions do not definitively terminate, but simply fizzle out. Thus, we are missing data on episodes that are technically still ongoing, but have effectively ended without changing target behavior. If a sanction has not explicitly terminated, but has not been mentioned in ten years or more, we assume that the sanction has failed. As the TIES dataset ends in 2013, any sanction episode listed as *ongoing as of* 2003 or earlier is coded as a failure. We show below that our results are robust to using only those sanction episodes that definitively terminated. They are also robust to using a three-category dependent variable ("win," "lose," and "draw") analyzed with an ordered logit estimator.

To test Hypothesis 5, we first focus on "threat effectiveness": whether a sanction threat altered target behavior *without* escalating to the imposition stage. If sanctions were implemented, we count this as an ineffective or failed threat. Lastly, we analyze imposed sanctions separately. This analysis is the same as the original except that threats that were never implemented are excluded (regardless of outcome) from the sample.

Measuring Cost of Sanctions

To test our hypotheses, we employ four key independent variables. The operationalization of the variables for Hypotheses 3 and 4 is relatively straightforward. The breadth of the target's export portfolio (Hypothesis 3), is simply a measure of the number of goods that a country exports in a given year. We use Feenstra et al.'s (2005) commodity trade data set, at the two-digit level (approximately one hundred commodity types), and count the number of different commodities traded by each country in each year. This value ranges from a minimum of nine export items (Cambodia in 1988 and Rwanda in 2000) to a maximum of 79 (the Netherlands in 1986 and China in 1997). We expect higher values of this variable to be related to greater target resilience.[13] The concentration variable (Hypothesis 4) calculates the *value concentration* of

[13]The correlation between the number of exports and the total GDP generated from industrial endeavors (in logged dollars) for a country in a given year is 0.64. This correlation suggests more breadth in export portfolio indicates stronger industrial and technological base, which can be

these commodities, regardless of the absolute number of the goods traded by the target country. We create this variable by calculating the Herfindahl-Hirschman (HH) index of the target country's trade portfolio in a given year, in terms of dollars.[14] The higher this value, the more concentrated a target's export portfolio is, and the more likely that sanctions should succeed.

Our measures of relative market power (Hypotheses 1 and 2) are more complex. We begin by calculating, in each year, for each pair of states, i and j, the market power of state i over state j. This measure is a function of market size and comparative advantage, across various different commodities. In particular, we conceptualize i's market power over j in year t as a weighted measure of dependence:

$$D_{ijt} = \sum_m \left(\frac{X^m_{ijt}}{M_{jt}} \times CA^m_{it} \right) \tag{1}$$

where X^m_{ijt} represents the volume of i's exports of commodity m to country j in year t,[15] M_{jt} represents state j's total imports in year t, and CA^m_{it} is state i's comparative advantage in com-

geared toward the production of different commodities in the targeted state.

[14]For a country trading n different commodities in a given year, the HH-index is calculated as $HH = \sum_{i=1}^{n} T_i^2$, where T_i is the value of trade in commodity i. HH will be bounded by $\frac{1}{n}$ and 1.

[15]Our measure includes all commodities in each state's export portfolio, even though most sanctions and threats do not include all trade between the parties. As mentioned above, this is because neither party can be sure which goods will ultimately be restricted. Indeed, more than half of threats that made no mention of export sanctions ultimately restricted exports to the target when implemented. Additionally, the target can retaliate by restricting any export it wishes. Recent sanctions against Russia illustrate these phenomena. Even after sanctions were initially implemented, EU officials emphasized the possibility of broadening the sanctions unless Russia changed its policy. At the same time, Russia threatened symmetrical countermeasures (see, for instance, *ABC News Australia*. 13 March 2014. "Germany warns of 'massive' political, economic damage if Russia stays on course in Ukraine."). For these reasons, both sides must consider their costs and benefits from a trade disruption of all commodities. This approach is similar to the use by academics of information on a country's total military and economic resources to measure its power during a crisis, even though very few conflicts require that countries em-

modity m during year t. The ratio of state j's imports of commodity m from state i to its total imports provides a measure of dependence that accounts for total market size.[16] We obtain the value of dyadic commodity exports from the Feenstra et al. data set.

We operationalize comparative advantage as a country's *relative revealed comparative advantage* (RRCA). Revealed comparative advantage (RCA), originally developed by Balassa (1965, 103), is widely used in international economics to measure the degree of production/price advantage a state has in exporting a specific good (French 2017). We create our RRCA measure by first calculating RCA for each commodity-country-year, using Balassa's formula. A state's RCA is effectively the ratio of a state's exports in a given commodity to its total exports, divided by the global mean. Thus, in year t, for each state, i, and each commodity m:

$$RCA_{it}^{m} = \left(\frac{X_{it}^{m}}{\sum_{n \neq m} X_{it}^{n}} \right) \Bigg/ \left(\frac{\sum_{j \neq i} X_{jt}^{m}}{\sum_{j \neq i} \sum_{n \neq m} X_{jt}^{n}} \right) \tag{2}$$

where X_{it}^{m} is the value of state i's total exports of commodity m to all other states in year t.[17] We then scale the result, to get a relative measure. We do this by finding the maximum (finite) value

ploy all of their national resources in battle.

[16] Our measure of market power is somewhat similar to a measure of trade elasticity. Senders with greater power can be compared to suppliers of inelastic goods: they are able to inflict more pain upon the target, and the target can do little to ease that pain. We thank a reviewer for pointing this out. However, our measure has an important advantage in that it is global in nature. Therefore, it can account for situations in which an important trading partner can be replaced by alternatives. The grain embargo against the Soviets, mentioned above, is a good example of this phenomenon. Even though the U.S. was the USSR's largest supplier of grain, dyadic trade was highly elastic because the Soviets were able to replace the U.S. as a supplier with ease, and the sanctions had little impact.

[17] As discussed below, some values are infinite. Within the data, the finite values of RCA range from a minimum of zero, for any case in which a state did not export a particular commodity in that year, to a maximum of 179,085.

of RCA for each commodity-year, and dividing by that value. This returns a value, $RRCA_{it}^{m} \in [0,1]$, which we use to proxy for CA_{it}^{m} in Equation 1.

There are two possible cases in which the value of RCA_{it}^{m} can be infinite: if the state only exports one commodity (so that the denominator of the numerator in Equation 2 is zero), or if the state is a monopolist in a given year (in which case the denominator in Equation 2 is zero). In both cases, we simply set the value for CA_{it}^{m} to one, indicating maximum comparative advantage.

After calculating the values in Equation 1, we are left with a weighted aggregate dependence value for every directed-dyad-year. Exporters with high market power in a given year are those that make up a large proportion of their partner's imports, by selling commodities for which they have a comparative advantage.

Given that 27% of sanction threats and impositions in our sample come from a coalition of states (Morgan, Bapat and Kobayashi 2014), we use the weighted aggregate dependence values for each dyad to create a measure of the total market power of the sanctioning coalition (defined below) on the target. We do this by simply aggregating the values for all coalition members. Since each state participates in the sanctions, the target state should lose the combined value of all members. Thus, an additive measure of value is appropriate.[18] Similarly, we measure target power over a sanctioning coalition by summing the dyadic measure over each member of the sanctioning coalition. We define a sanctioning coalition as the group of all individual sender countries listed in the TIES dataset for a given sanction episode. If sanctions are initiated through an international institution, we include all of that institution's members.[19]

[18]Our measure of market power enters into our model linearly. However, given its skewness and the possibility of diminishing marginal effects, we have examined several logarithmic specifications. Our general substantive findings remain unaffected.

[19]We include sanctions initiated by the EU, but exclude sanctions where the EU is the target. The reason for this is that variables such as Target Democracy and Target's Military Capabilities are not well defined for the EU, which has supranational authority over its member states in

	Target Export Variety	Target Portfolio Concentration	Target Market Power	Sender Market Power
Successful Sanctions	63.27	0.10	2.09	3.31
Failed Sanctions	66.93	0.10	3.35	2.35
Difference	-3.66***	-0.004	-1.26	0.95***

* $p < .10$; ** $p < .05$; *** $p < .01$. All tests are two-tailed tests.

Table 1: Average values of our main variables by sanction outcome

Data

We begin by examining the initial relationship between our dependent variable and our variables of interest. Table 1 displays the mean levels of our four main independent variables for successful and failed sanctions. In two cases the differences are significant at the $p < 0.01$ level and in the expected direction.[20] A third, *Target Market Power*, shows a large effect and nearly attains statistical significance ($p < 0.11$). In general, successful sanctions are more common when target export variety and market power are low, and sender market power is high. In this bivariate analysis, levels of target export concentration do not seem to influence sanction outcomes. These basic results are consistent with the predictions of three of our hypotheses above.

The results in Table 1 are encouraging. However, this is only a first look. Our regression analysis includes a number of controls drawn from the literature.[21] Our first set of control variables accounts for target characteristics. Sanctions should be less effective on powerful states, as such countries are both more self-sufficient and better able deploy countermeasures against sanctions. We account for this with measures of both economic (the log of the target's total and per capita GDP (Gleditsch 2002)) and military power (measured by the target's CINC score (Singer 1988)). To account for the fact that democratic states may be more vulnerable to sanctions, we also include the target's Polity2 score (Marshall and Jaggers 2002), which varies be-

some issues, but has not traditionally exercised it in others, including international security.

[20]There are 606 complete observations for each variable in Table 1. As discussed above, non-trade-related sanction episodes are deleted from our sample.

[21]All data come from the TIES dataset, unless otherwise indicated.

tween −10 and 10. Additionally, we include the number of states involved in the sanctioning coalition. Large sanctioning coalitions should be more likely to face collective action problems, and are expected to be associated with lower levels of sanction success.

We also consider the context in which sanctions are imposed. Most importantly, we expect different dynamics of sanction imposition and sanction-busting in the Cold War and post-Cold War periods (Jentleson 2000). In addition, we control for security-related sanctions, as target states are likely to show greater resolve in such issues and less likely to give in (Morgan and Schwebach 1997).

The Challenge of Strategic Interaction and Nonparametric Estimation

The most straightforward way to analyze our data would be with a simple logit model, which is how many previous studies have proceeded (e.g., Ang and Peksen 2007; Bapat and Morgan 2009). So that it can be more easily compared with previous research, we begin our analysis with a logit model. However, this technique neglects two possible sources of bias: selection and strategy. Nooruddin (2002) points out that sanctions are a matter of choice, and that senders and receivers select themselves into sanctions (see also Lektzian and Souva 2007). Because the selection stage is potentially correlated with the overall outcome, failure to account for this process can result in selection bias, which is a type of specification error (Heckman 1979).

Other scholars argue that there is a *specific* structural relationship between sanction imposition and success. These authors posit that the decision to impose sanctions is based on the sender's beliefs about the target's likelihood of concession, given that sanctions are inflicted. Thus, the process is not simply one of selection, but is fully *strategic* in nature, and failure to account for the strategic aspect will bias estimates (McLean and Whang 2010; Whang 2010; Whang, McLean and Kuberski 2013).

We remain skeptical of both approaches. First, a properly specified model for either the selection or the strategic process requires that the analyst have the full universe of cases on which selection or strategic interaction could occur. In this case, this means that we must have

data on all of the episodes for which one state *might have threatened* or imposed sanctions, but opted not to do so. Without these data, we cannot correctly estimate either type of model. Second, while a structural statistical model that matches the true data generating process would be ideal, applying a model with an inappropriate structure would result in the very bias that we hope to avoid.

For this reason, we choose an alternative model specification. Both selection and strategic misspecification are tantamount to omitted variable problems, which can be conceptualized as model specification problems (see Signorino and Yilmaz 2003). For situations in which it is appropriate to treat these issues as nuisances, rather than substantively interesting features in themselves, we can obtain unbiased estimates of the other coefficients if we use methods that "allow for the estimation of functions of unknown form" (Kenkel and Signorino 2012, 2), such as fully nonparametric estimation. In this case, we are most concerned with the bias that specification error might induce with respect to our variables of interest. Thus, rather than attempt to use a structural estimator that may not be appropriate for our data, we opt for flexibility, choosing to implement local likelihood logistic regression (Fan, Heckman and Wand 1995; see also Frölich 2006; Chatagnier 2014). This is a local smoothing technique that makes no assumptions about global functional form and can model any number of processes.[22] Thus, our flexible, nonparametric estimator can account for bias from *either* selection or strategic interaction, without forcing us to apply one particular specification.[23] Estimation is similar to that of parametric logit at each point within the dataset, but the contributions of other observations are "weighted," according to their distance from the current data point. The size of the smoothing window is constant across all points, and is established beforehand, using leave-one-out cross-

[22]This includes the parametric logit. When the smoothing window becomes sufficiently large to include all observations, the local logit estimates converge to the parametric estimates. Thus, the local logit actually subsumes the conventional logit.

[23]The tradeoff that we must make is increased variance; our estimates will have wide confidence intervals.

validation. Rather than a single set of coefficients, the local logit estimator returns n different sets of coefficients. For this reason, we cannot present a simple table of parameter estimates, and must instead present results graphically.

Results

We begin by estimating a series of conventional logit models that examine the effects of our key independent variables, controlling for other factors.

Logit Analysis of Sanctions Success

The results from the parametric logit models appear in Table 2. The first three models include our primary dependent variable: sanctions success for sanctions that have terminated. In columns 4 and 5 we analyze the threat and imposition stages separately. Column 1 provides results from a baseline model that uses target trade dependence as the key independent variable.[24] Columns 2–5 show the results of regressions using the variables that capture a state's ability to inflict or withstand pain from sanctions. The results in Model 1 show a positive and significant effect for target trade dependence, suggesting that a simple measure of trade dependence is indeed associated with sanctions success. However, when looking at measures of goodness of fit, we see that the trade dependence model has significantly less explanatory power. The AIC for Model 1 is significantly higher than that of the other models, and the within-sample predictive success—as measured by the receiver operating characteristic (ROC) curve—is markedly lower.[25] The greater explanatory power for our measures is noteworthy, but not wholly unexpected. Unlike the aggregate trade measure, our variables incorporate information about the

[24]Target trade dependence is defined as the target's total trade with sender coalition over target's total GDP.

[25]The results are similar for models that use total aggregate trade, rather than trade dependence, or that use separate measures of aggregate imports and exports.

target's domestic production capabilities and each side's comparative advantages. They also disaggregate trade volume in a way that reveals its contribution to both sender and target market power, rather than trying to estimate an ambiguous net effect.

Turning to the second set of models, we first look at sender and target market power variables. As expected, sender power has a positive and target power a negative impact on sanction success, suggesting that our measures capture states' coercive abilities. These findings support both Hypotheses 1 and 2. Next, we look at the variety of the target state's export portfolio. Consistent with Hypothesis 3, the estimated effect is negative and significant, indicating that, all else equal, the greater the number of unique target exports, the less likely sanctions are to succeed.

Surprisingly, while we expected target portfolio concentration to have a positive effect, the estimate is negative and statistically significant at the $p < .01$ level. To understand this estimate better we took a closer look at "deviant cases" (i.e., sanction failures against targets with highly-concentrated export portfolios). We find that almost all of those targets are full autocracies. To be sure, most countries with highly-concentrated export portfolios are autocratic, but the few democracies among them give in to sanctions.[26] Based on this observation, Model 3 includes an interaction between *Target Portfolio Concentration* and *Target Democracy*, to test whether the effect of a target's export concentration depends upon its regime type. This interaction term is statistically significant and we interpret the substantive effects graphically in Figure 1 below. Model comparisons show that including this interaction improves model fit. We also checked whether interactions between *Target Democracy* and any other economic variables should be included, but these additional interactions did not produce significant effects, and AIC values suggested that they did not fit the data as well.

[26]For instance, there are 29 sanction target countries with a concentration higher than 0.5. Of those 29 sanctions, 16 succeeded and 13 failed. Of the 13 targets that refused to give in to sanctions, only 1 has a *Polity* score higher than 0 (Mali 1999). By contrast, 5 of the 16 targets that gave in to sanctions had scores above 0.

Table 2: **Logit Analysis of Sanctions Success**

	Trade Dependence (1)	Power to Hurt (2)	Interaction Term (3)	Threat Effectiveness (4)	Only Imposed Sanctions (5)
Trade Dependence	6.797*				
	(4.006)				
Sender Market Power over Target		0.126**	0.128**	−0.019	0.228***
		(0.050)	(0.050)	(0.044)	(0.065)
Target Market Power over Sender		−0.021*	−0.020*	−0.023*	−0.037**
		(0.011)	(0.011)	(0.013)	(0.015)
Target Export Variety		−0.051***	−0.054***	−0.009	−0.084***
		(0.018)	(0.019)	(0.016)	(0.029)
Target Portfolio Concentration		−2.057***	−0.544	1.072	−2.421
		(0.710)	(0.772)	(0.821)	(1.556)
Target Portfolio Concentration			0.287***	0.433***	0.014
× Target Democracy			(0.102)	(0.109)	(0.189)
Target's Total GDP	−0.145	0.022	0.088	0.015	0.037
	(0.114)	(0.131)	(0.137)	(0.101)	(0.180)
Target's GDP per capita	−0.015	0.174	0.291**	0.418***	0.059
	(0.147)	(0.128)	(0.139)	(0.130)	(0.204)
CINC	4.970**	2.880	1.975	4.250	3.551
	(2.376)	(2.628)	(2.692)	(2.598)	(3.838)
Target Democracy	−0.021	−0.043**	−0.076***	−0.101***	0.005
	(0.019)	(0.018)	(0.020)	(0.023)	(0.033)
Cold War	−0.119	0.040	0.050	0.344	0.335
	(0.199)	(0.222)	(0.225)	(0.239)	(0.343)
Security Issue	−0.461**	−0.301	−0.231	−0.431	−0.100
	(0.220)	(0.225)	(0.240)	(0.291)	(0.378)
Coalition Size	0.004	−0.003	−0.004	0.007	0.009
	(0.004)	(0.007)	(0.007)	(0.007)	(0.009)
Constant	2.883	1.414	−0.695	−4.403**	3.511
	(1.849)	(1.881)	(2.023)	(1.851)	(2.777)
N	594	594	594	573	312
Log-Likelihood	−401.249	−387.939	−384.342	−306.418	−182.157
AIC	820.498	799.878	794.684	638.835	390.314
Area Under ROC Curve	0.62	0.67	0.68	0.65	0.74

Robust standard errors clustered on target in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. All tests are two-tailed tests.
In Model 4 our dependent variable is whether a sanction threat succeeds. Sanctions imposed without a threat are excluded.
In Model 5 our dependent variable is whether an imposed sanction succeeds. Sanctions that were threatened but not imposed are excluded.

Before we turn to substantive effects we investigate Hypothesis 5 by examining threat effectiveness and *imposed* sanction effectiveness separately. According to Models 4 and 5, *Target Market Power over Sender* has similar effects in each stage and *Target Portfolio Concentration* (conditional on target's democracy level) matters primarily in the threat stage. On the other hand, *Sender Market Power over Target* and *Target Export Variety* matter solely at the imposition stage. These two variables measure a target's ability to substitute for imports from the sender coalition. Consistent with Hypothesis 5, this pattern suggests that negotiations at the threat stage are not sufficiently informative about the costliness of conflict to compel acquiescence from the target. Sometimes actors must escalate and actually impose economic pain in order to demonstrate their bargaining power.

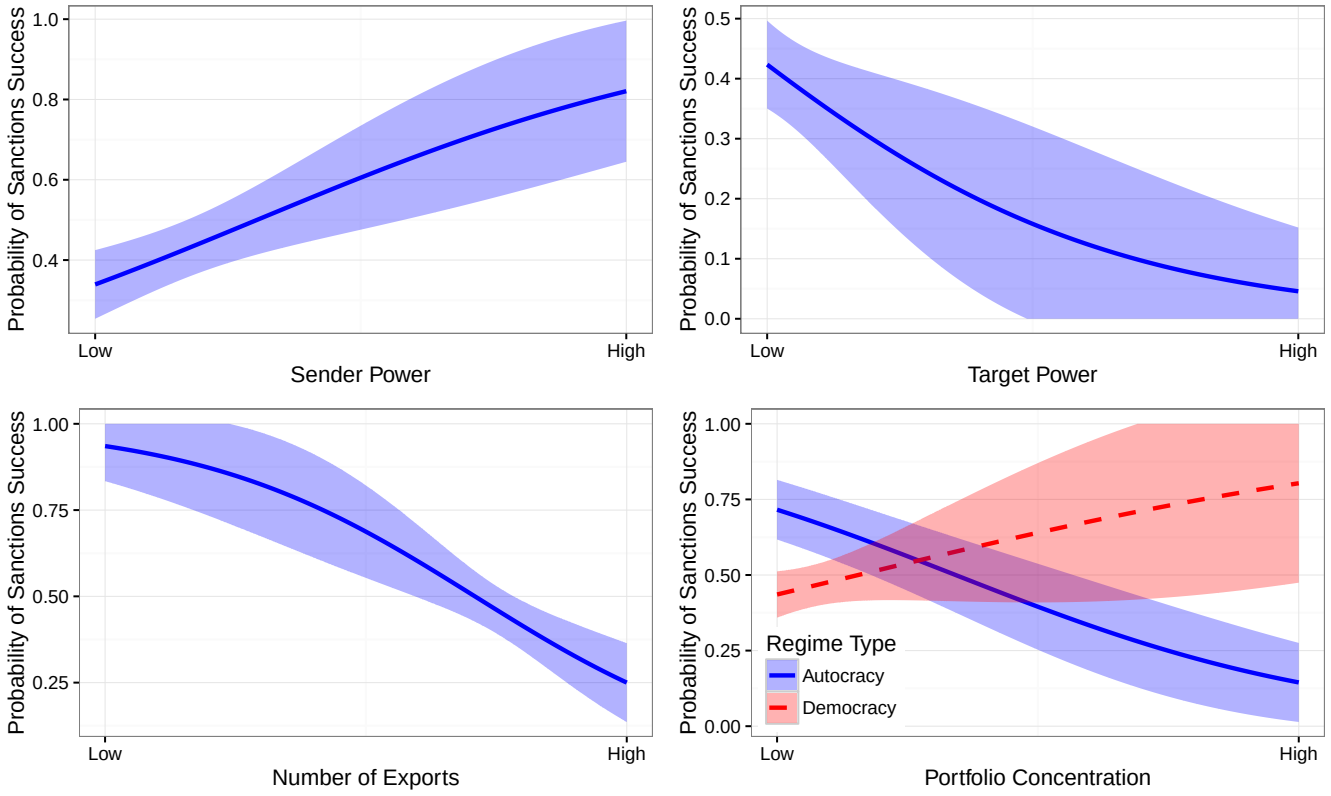

Figure 1: Logit predicted probabilities

Moving to the substantive interpretation of our results, we provide depictions of Model 3 in Table 2 in Figure 1. We plot the results with continuous variables set to their means and discrete

variables to their medians. We then vary the factor of interest. We set dichotomous variables to zero.[27] The plotted lines represent the predicted probability of sanctions success, while the shaded regions are 90% confidence intervals. The substantive results are strong. As the sender's market power increases from our empirical minimum to our empirical maximum the probability of sanction success more than doubles. Meanwhile, varying target power from its minimum to maximum value reduces the probability of success by about 90%.[28] Portfolio size has a similarly powerful effect. Whereas sanctions against a state that exports only a few goods (the minimum value in our data set is nine) are virtually assured of success, sanctions against a country with an especially broad trading portfolio (the maximum in our data is 79) face about a 75% chance of failing. Finally, when examining the effect of portfolio concentration, we see the role of regime type. For democratic states, we obtain the expected pattern: sanctions against targets with highly concentrated trade portfolios are almost guaranteed to succeed (though the confidence interval is large at the high end), while those against targets with diverse portfolios are more likely to fail. For autocracies, the effect is reversed. Sanctions against autocratic targets with heavily-concentrated portfolios are almost certain to fail, while those against targets with diverse portfolios have a high likelihood of success. Note that these findings regarding portfolio concentration are not driven by oil exporters, and are robust to controlling for a target's oil exports and whether the target is an OPEC member.

The finding that among targets with a more concentrated portfolio, autocracies have an advantage is consistent with previous work (Lektzian and Souva 2003, 2007). When a target with a concentrated economy faces deep trade cuts, authoritarian governments with stronger control over the economy may more easily weather the shock. In contrast, a broader economy is harder to control by force. When a country with a diverse economy is targeted by sanctions,

[27] To account for the interaction effect, we plot portfolio concentration results using Polity2 scores at both −8 and 8.

[28] As discussed in the online appendix, the effects of sender and target power are similar to those of target democracy and IGO involvement.

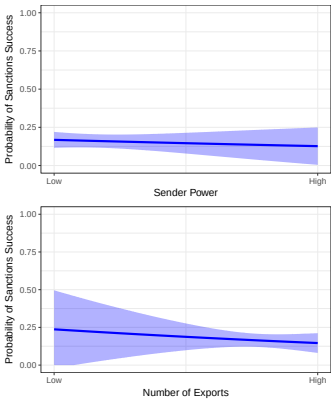

Figure 2: Sanction threats

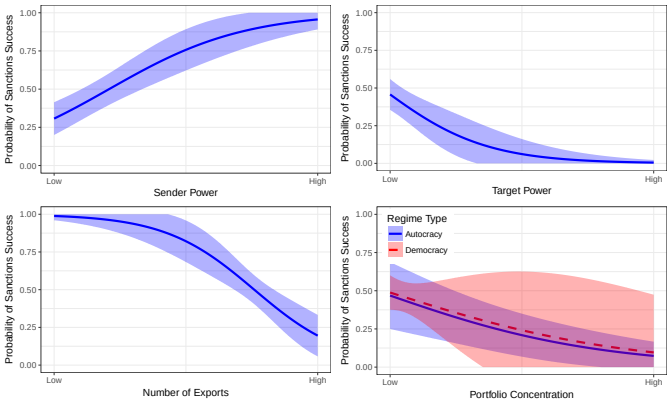

Figure 3: Imposed sanctions

some amount of popular participation and democratic legitimacy may be necessary to mobilize the public.

Figures 2 and 3 depict the effects seen in Models 4 and 5 of Table 2, separating out threatened and imposed sanctions, respectively. In general, these plots suggest that the effects that we see in Figure 1 are primarily driven by imposition. For sanction threats, the results are mostly flat, though we see minor effects for target power. The role of portfolio concentration appears to be similar to that seen in Figure 1. Moving to actual sanctions (Figure 3), we see strong predicted effects that look similar to the substantive results presented above. The one difference is portfolio concentration, particularly among democracies. For autocracies, we see a roughly similar effect of target portfolio concentration that is similar to the predictions in Figure 1. Turning to sanctions imposed upon democracies, however, we see an effect that is nearly identical to that of autocracies, though estimated imprecisely. This may be because there are relatively few cases in which sanctions were imposed upon democracies with high levels of portfolio concentration. Ultimately, the substantive results in Figures 2 and 3 suggest that the *realization* of the power to hurt economically is crucial for sanction effectiveness.

As a complement to our statistical evidence, we can illustrate our arguments with real-world cases of sanctions. Take, for instance, the 1969 Football War between Honduras and El Salvador. In July 1969, the two countries fought a brief war, during which the Salvadoran army invaded

Honduras. When Salvadoran troops proved reluctant to depart after the hostilities ended, the Organization of American States (OAS) had to threaten El Salvador with economic sanctions unless it withdrew. Within our data, this is a case where the sender coalition had significant market power over the target—target vulnerability was within the top 5% of observations—and its threat should have compelled the target to comply. Indeed, according to James (1990, 61), "it took a tacit threat of [OAS] sanctions to persuade El Salvador to withdraw."

We can contrast this case with the unsuccessful sanction threat that Egypt and its allies issued against the United States in early 1970 in an effort to curb the latter's material support to Israel. The U.S. refused to alter its policy, and the sanctions were never implemented. This is unsurprising, as the coalition—which was not comprised of all OPEC members, notably lacking actors such as Saudi Arabia, Iran, and Libya—possessed relatively little market power over the U.S., falling just outside of the lowest quartile within our data. Meanwhile, the U.S. held significant power over the coalition, falling well within the top decile of the dataset. Thus, the fact that the threat failed is consistent with our arguments.

In addition to the results here, we conduct a number of robustness checks, provided in the online appendix. These include models that use alternative model specifications, alternative definitions of both the dependent variable ("sanction success") and the sanctioning coalition, and additional checks on raw measures of trade dependence. In most cases, our results are substantively similar to what we report above. As a further robustness check, we estimate an auxiliary model that includes three additional variables: whether sanctions were brought to bear under the aegis of an international governmental organization, whether "smart" sanctions (asset freezes, travel bans, etc.) were used or threatened, and whether the U.S. was among the primary senders in the coalition.

We also run our model on various subsamples of the data. We first restrict our sample to sanctions involving high-politics issues, finding that our results remain robust. We then analyze different types of sanction threats (import vs. export restrictions) separately. Our main analysis treats each sanction as threatening the total trade between countries because sanc-

tions can (and often do) grow as a crisis evolves, meaning that neither side can be certain which commodities can continue to be traded freely. However, we may wonder whether different economic factors matter when senders threaten import restrictions versus export restrictions. We find that this is not the case; all of our variables have similar effects across sanction threat types, which supports the validity of our research design. Next, we divide the data temporally to explore whether the end of the Cold War and the growing use of smart sanctions in recent decades have changed the effects of our variables. Our substantive results hold across both periods, but the effect of *Target Export Variety* was stronger during the Cold War than after.

As with the results in Table 1, these findings support our hypotheses, but they are also tentative. Estimating a standard logit model raises the possibility of specification error due to the strategic nature of the sanctioning decision. For this reason, we now turn to an analysis using the nonparametric approach described above.

Local Logit Analysis of Strategic Interaction

The local logit estimator provides separate estimated effects at each profile of values for our independent variables. As mentioned above, this means that we cannot report a single table of coefficient estimates, as we did with the parametric estimator. Instead, we must select a profile of values and estimate effects locally, given a predetermined set of smoothing parameters.[29] To illustrate our results, we use the same variable profiles used in Figure 1.

Figure 4 shows the results from our nonparametric estimation. As before, we plot predicted probabilities of sanctions success as we vary each of the relevant independent variables from their minimum to maximum values, along with 90% confidence intervals. The results are encouragingly similar to those in Figure 1.[30] As before, the results for three of our variables of

[29] We choose optimal bandwidth parameters using leave-one-out cross-validation.

[30] These specification here is analogous to Model 3, which pools threatened and imposed sanctions. In the interest of space, we place local logit results from the differentiation of the two in the appendix. Their relation to Figures 2 and 3 is similar to the relationship between Figures 1

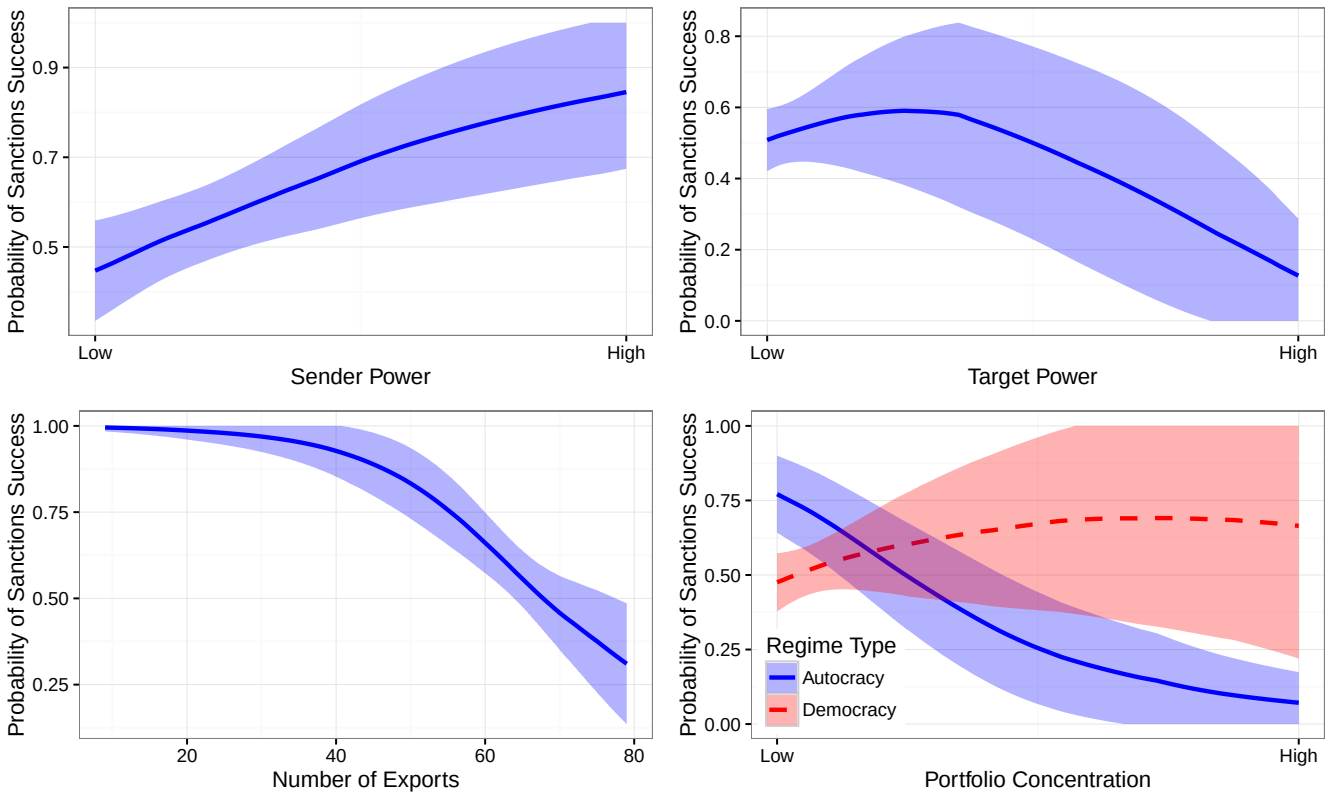

Figure 4: Local logit estimation

interest are supportive of our hypotheses. The results for sender power are virtually unaffected, but we see greater levels of concavity for both target power and portfolio breadth. In the case of target power, the result is even nonmonotonic: at very low levels of target market power, sanctions are (slightly) *more* likely to succeed as power increases. However, we caution against reading too much into the result, as the nonmonotonicity occurs entirely within the 90% confidence region.

The results relating to the portfolio concentration of target exports once again do not quite conform to our expectations. In this instance, the estimated effects are less linear, and in the case of democracies, non-significant. As mentioned above, there are several cases in the data in which sanctions failed against autocracies with heavily-concentrated trade portfolios (largely OPEC members). Meanwhile, there are few cases of democracies with highly concentrated port-

and 4.

folios. Despite the fact that we observe a substantial increase in the predicted probability of success as we vary from the lowest to highest level of portfolio concentration (from approximately 0.48 to 0.66), our confidence interval is too large to draw any firm conclusions.

The primary result that follows from both sets of analyses is that the power to hurt and to bear harm from trade disruption matters for sanction success. Sanctions are most successful when senders have more market power over targets than vice versa and when targets have relatively narrow export portfolios. Moreover, it appears that states must *use* their power in order for it to be effective. The strong effects for sender and target power are limited to cases of imposition, and not threat.

Conclusion

This paper studied the question of when trade sanctions can be effective by proposing a framework based on the Schelling maxim that the power to hurt (and to bear hurt) is a source of bargaining power. This idea implies that international crises (economic or military) are decided by each side's ability to inflict costs on the adversary and to nullify the other side's attempts to impose costs in return. Using disaggregated trade data we operationalize the two ways by which a state can minimize the costs of trade disruption: switching to alternative partners (external substitution) and adapting domestic industries to new needs (internal substitution). We also test whether the level of concentration of a target's export portfolio has a positive effect on sanction success, because a more concentrated portfolio means fewer goods to monitor in order to block most of a target's exports. Finally, we examine whether these factors matter at the threat stage, the imposition stage, or both.

Our empirical results mostly bear out our theoretical expectations. Sender market power increases sanction success, while target market power and portfolio diversity are negatively related to success. Our findings on portfolio concentration prove to be conditional and, where significant, run contrary to our hypothesis. Export portfolio concentration makes autocracies

more resilient to sanctions and have no effect on democracies.[31] We believe that this finding warrants further study. We also find that these results tend to hold for the imposition stage, but not for the threat stage, suggesting that states may need to exercise their power to hurt and deny their opponent the same power in order to reach an agreement. In addition to parametric estimators, we implement a flexible nonparametric estimator to account for the effects of potential model specification issues. Our results from this latter analysis are broadly consistent with the parametric results.

Our findings carry interesting policy implications for sanction design. All else equal, our results suggest that employing smart sanctions may be more effective against advanced economies, because these targets can more easily find alternative export markets and convert domestic industries to replace banned imports. Another implication for sanction design is that primary sanctioners should strategically select their coalition partners to maximize their comparative advantage in the traded goods. This involves looking beyond the target's *current* trade partners, focusing on whom the target could *turn to*, and blocking those channels of external substitution.

Finally, this study has several implications for future research. First, our conception of market power and the related empirical measure provide scholars with an opportunity to test important hypotheses about the politics of economic sanctions. For example, within the TIES data, approximately 30% of trade-related sanctions episodes involve multiple senders. We might suspect that senders with relatively little market power would be more likely to form coalitions, and would generally form larger coalitions.[32] Our measure would allow researchers to examine this directly. Second, scholars have argued that states maintain peaceful relations with their trade partners and engage in third-party interventions in order to avoid costly trade disrup-

[31] An interesting recent example is the resilience of Qatar, an authoritarian monarchy whose economy is highly reliant on petroleum and natural gas, in the face of a trade embargo by its neighbors.

[32] We thank an anonymous reviewer for pointing this out.

tion (Russett and Oneal 2001; Crescenzi et al. 2011). If this is true, then states that can manage the costs of trade disruption should be more war-prone and less willing to intervene in other countries' disputes. Our measures allow researchers to test these ideas more directly. Third, we can explore whether a country's ability to manage the costs of trade sanctions is related to its domestic political setup. We have already shown that the effect of one factor—the target's export concentration—depends upon the target's democracy level. Future work should take additional steps in integrating the domestic politics and international interaction perspectives on sanctions by combining our measures with nuanced typologies of domestic institutions. Finally, financial sanctions are outside of this paper's scope, but future work should study how targets of financial sanctions minimize their pain and develop empirical measures to capture these mechanisms.

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