Economic Coercion and the Problem of Sanctions-Proofing*

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Abstract

Although sanctions generate economic costs, target states may "sanction-proof" their regime by borrowing capital from abroad. While some targets obtain interest free capital from black knight states, others may need to borrow with interest from international credit markets. These interest rates may sometimes make borrowing cost prohibitive, giving targets no choice but to acquiesce to the demands of the sender. However, since senders cannot observe if black knight states are assisting target states, targets have an incentive to misrepresent their source of external capital. In an effort to deter sanctions, targets that must borrow at high interest rates may signal that they have black knight support and are sanctions-proof. We formally and empirically demonstrate that in this uncertain environment, senders are more likely to impose sanctions on targets with low credit ratings, but only do so if the target places a relatively low value on uninterrupted economic transactions with the sender.

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"From left and from right, they adopt sanctions, but for us they are annoying flies, like a used tissue."

Iranian President Ahmadinejad, referring to new U.N. sanctions against Iran, 10 June 2010.

In the postwar era, states are increasingly utilizing economic sanctions as a tool of coercive diplomacy. Theoretically, the threat of sanctions should convince target governments to acquiesce to the sender's demands, if credible (Smith 1995; Drezner 2003). However, a remarkable observation about economic sanctions is that they often fail to generate significant costs. According to the Threat and Imposition of Sanctions (TIES) dataset, 82% of imposed sanctions between 1945-2005 produced only minor costs to the target state (646/788).[1] This observation may explain why Iranian President Ahmadinejad[2], North Korea's Chairman King Jong-Un[3], and Venezuelan President Nicolas Maduro[4] all dismissed sanctions as toothless and ineffective. These leaders appeared confident that they could sanction-proof their state by accessing capital from abroad. These observations raise a troubling implication. If targets compensate for the cost of sanctions by accessing external capital, sanctions generate little coercive power, but will harm the sender's own businesses and citizens by raising prices. This begs the question: why would senders impose sanctions, given that targets can sanction-proof their regimes by accessing external capital?

This study addresses this question using both a game theoretic model and empirical analysis. We argue that while targets can sanctions-proof their regime by accessing foreign capital, senders may be uncertain about the price to the targets for this capital. Although black knight states may support some targets, other targets may lack such a benefactor, and will need to borrow from international credit markets. Since the interest payments on these

[1]Morgan, Bapat and Kobayashi (2014).

[2]"Iran dismisses new UN sanctions as a used hanky" (2010, June 10), *The Telegraph.* Retrieved from: `http://www.telegraph.co.uk/news/worldnews/middleeast/iran/7816395/Iran-dismisses-new-UN-sanctions-as-a-used-hanky.html`

[3]Westcott, Ben and Junko Ogura. "North Korea slams 'Obama and his lackeys' in furious response to sanctions" (2016, December 2), *CNN World.* Retrieved from: `http://www.cnn.com/2016/12/01/asia/north-korea-sanctions-reaction/`

[4]"US Congress passes bill to impose Venezuela sanctions" (2014, December 11), *BBC News.* Retrieved from: `http://www.bbc.com/news/world-latin-america-30426439`

loans may be quite large, targets may therefore prefer to acquiesce to the sender's demands rather than make large interest payments in the future. However, senders cannot perfectly determine if targets will gain black knight support following imposition. This creates an incentive for targets to misrepresent the cost of sanctions-proofing their regime by claiming that they are able to access ample interest-free capital to withstand sanctions. Using a game theoretic model, we argue that senders attempt to determine if targets truly have black knight support using two sources of information: the target's assessed borrowing costs and the value the target places on its uninterrupted economic transactions with the sender. The model demonstrates that senders are more likely to impose sanctions against targets with higher borrowing costs. These states cannot repay their loans unless they have black knight support. However, senders will only impose sanctions if their targets place a relatively lower value on economic transactions with the sender. If the target believes that its economic transactions with the sender are more valuable, it will acquiesce to the senders demands to avoid compromising its relationship, thereby avoiding sanctions altogether.

We develop this argument in several steps. First, we present an overview of the literature on economic sanctions, and discuss how targets can use external capital to sanction-proof their regimes. We next present the formal model to identify when senders impose sanctions, given their uncertainty about the target's ability to access capital from black knights. Following the model's discussion, we present an empirical test analyzing U.S. sanctions episodes from 1980-2005.

Sanctions and the Financing of Foreign Policy Challenges

Let us first define explicitly what economic sanctions are and how they create costs. Economic sanctions are actions taken by one or more states to limit or end economic transactions with a particular target state in order to compel a policy change (Morgan, Bapat and Kobayashi 2014).[5] These actions may range from very minor actions, such as the raising

[5]See also DeGennaro (2005); Greenwald and Stiglitz (1993); Hufbauer et al. (2007); Morgan, Bapat and Krustev (2009).

of tariffs on the target's imports, to significant military actions, such as a formal blockade. Sanctions represent a form of blackmail: while both the sender and the target benefit from economic transactions, the sender threatens to harm these transactions to obtain a policy concession from the target (Wagner 1988; Drezner 2003). Much of the current sanctions literature conceptualizes these disputes as bargaining problems (Bapat and Kwon 2015; David and Lopez 2002; Hufbauer et al. 2007; Morgan and Schwebach 1997). Since sanctions generate both inefficiency and costs, both senders and targets should prefer some negotiated solution prior to imposition (Fearon 1995).

Empirically, sanctions have a mixed record, with estimated success rates ranging from a very low 5% to a higher 37.2% (Pape 1997; Hufbauer et al. 2007; Morgan, Bapat and Kobayashi 2014). The greater success rates of sanctions typically occur if they are costly, multilateral, has the support of the target country's major trading partners and imposed through an international institution (Allen 2009; Bapat and Morgan 2009; Bonetti 1998; Drezner 2000; Kaempfer and Lowenberg 2003; Lektzian and Souva 2007; Bapat et al. 2013; McLean and Whang 2010). Although these factors improve the probability of success, sanctions are more likely to fail than succeed. A common explanation for the failure of sanctions focuses on the strategic behavior of third parties in response to sanctions imposed on a given target (Naylor 2001; Early 2011, 2015; Lektzian and Biglaiser 2013; Kaempfer and Ross 2004). Once a sender imposes sanctions, its firms become less competitive, giving the firms of third party states the opportunity to steal contracts. These "black knights" offset the damage created by the sender by increasing their trade and investment with the target (Peksen and Peterson 2015; Early 2015), or by directly providing interest free loans. These arrangements may render target states sanctions-proof.

If targets lack sufficient support from black knights, an alternative strategy to sanctions-proof their regime is to borrow from the international credit market (Reinhart and Rogoff 2011; Tomz and Wright 2013). These loans, however, require the target to repay the lenders with level of interest that is often higher from loans coming from supportive black knight

states. International lenders may be more sensitive than black knight states to risk that the target will default, either due to internal politics or a lack of resources to repay (Broner, Martin and Ventura 2010; Broner and Ventura 2011; Gelpern and Setser 2004; Guembel and Sussman 2009). Therefore, investors are concerned about minimizing the risk of default, and the loss of real value of their assets (Tomz 2007). Given the complexity and profusion of information available to base their investment decisions on, investors often rely on shortcuts, such as reliance on sovereign credit risk ratings, to make investment decisions (Brooks, Cunha and Mosley 2015). If targets are viewed as untrustworthy and have poor credit ratings, they will be given higher interest payments. Those targets, therefore, need to pay higher costs to sanctions-proof their states, which may make the price of sanctions proofing prohibitive. Without a black knight to support them, targets with poor credit ratings may therefore have no choice but to acquiesce to the demands of the sender.

We should therefore expect targets with black knight supporters to resist sanctions, whereas targets that lack black knight supporters and must pay high interest rates should acquiesce. The problem, however, is that senders cannot anticipate whether or not targets will receive capital from black knights. This uncertainty provides an incentive to targets to misrepresent their ability to obtain the necessary capital to sanctions-proof their regime. Targets may insist that they have enough black knight partners to weather any sanctions effort. These signals indicate sanctions will only end up harming the sender's firms and individuals. The purpose of this signal is to deter senders from imposing sanctions by convincing them that sanctions will be fruitless. If successful, targets that do need loans from international credit markets can avoid taking on this debt, while simultaneously reaping the benefits of their successful foreign policy challenge.

Yet, if sanctions are imposed, targets that lack sufficient black knight support may be forced to acquiesce. To illustrate, consider the case of Iran in 2010. Iran seemed to have the ability to withstand American sanctions, and many experts were skeptical that sanctions would stop Iran's nuclear program. We now know that sanctions, particularly the denial of

Iranian access to SWIFT, produced chronic shortages and an inability to access its foreign currency in Iranian territory. The imposition of sanctions in 2012 led to a loss of $17.1 billion in export revenue from 2012 to 2014, the equivalent of 4.5 percent of Iran's GDP, and, the economy contracted at a rate of 6.8 percent in 2012 (Devarajan and Mottaghi 2015). However, belligerent statements from both Ahmadinejad and Ayatollah Khameini essentially turned Iran into an international pariah with a few allies. When the price of oil collapsed in 2014, Iran's inability to raise capital forced it to acquiesce to international monitoring of its nuclear program in exchange for sanctions relief.

We therefore see a rational reason why senders may impose sanctions, despite the ability of targets to offset economic damages. Prior to imposition, all states may claim that they can obtain the capital they need to withstand sanctions. However, senders cannot verify these claims ex-ante, and can only know if this is true following imposition. Therefore, senders may periodically impose sanctions when there is a strong enough possibility that the target is bluffing about its ability to borrow capital and sustain its foreign policy challenge. To identify these conditions specifically, let us now turn to the formal model.

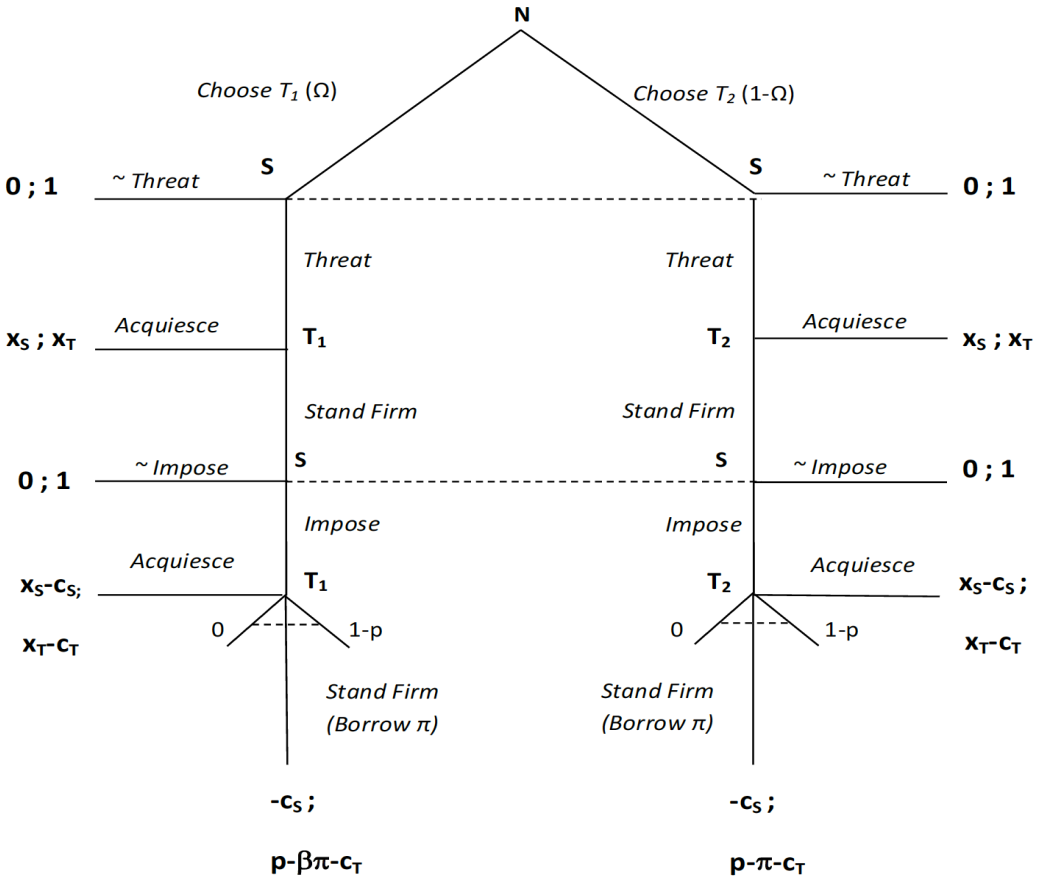
Theoretical Model

Figure 1 presents a stylized model of a political dispute between a sender S, which is treated as a unitary actor, and the leadership of a target state T.[6] Prior to the start of the game, T engages in some behavior that is popular with his political supporters, but is viewed as offensive or threatening by S. Some examples of such offensive behavior might include moving an embassy to a disputed capital, conducting a nuclear test, intervening into a civil war, or persecuting an ethnic minority. T's policy leads S to threaten sanctions against T if he does not reverse his behavior. These sanctions may fine individuals that do business with T, may ban individuals from T from visiting S's territory, or may restrict the ability of banks to conduct transfers to entities within T's territory. Regardless, the sanctions will add transaction costs to economic exchanges between S and T. These costs create short

[6]We refer to the sender S as "she" and the target T as "he".

term economic inefficiencies, which in turn contribute to some reduction in T's available revenue. This loss of revenue may jeopardize T's political power by compromising his ability to provide public and private goods to his supporters. From S's perspective, this instability will compel T into reversing his offensive policy. This reversal will in turn end sanctions, allow T to collect revenue from continued economic exchanges between the two states, and use this revenue to satisfy his winning coalition.[7]

Figure 1: Sanctions Imposition Game



The game proceeds in five moves. Nature begins by selecting the target state's type. The first type of target state (T_1) is unable to obtain an interest free loan from either one or more black knight states. In order to finance his offensive policy, T_1 must therefore borrow capital from foreign creditors, and must subsequently pay this loan back with interest. On

[7]See Bueno de Mesquita et al. (2005) for a complete account of the Selectorate Theory analyzing the role of public and private goods in keeping winning coalitions of governments satisfied.

the other hand, the second type of target state (T_2) receives an interest-free loan from one or more black knight states.[8] The black knight(s) support the offensive behavior of T_2, and is willing to assist him in opposing S's efforts at coercion. Nature chooses a target that must repay his foreign creditors with interest (T_1) with probability Ω and targets with a black knight supporter that can repay loans interest-free (T_2) with probability $(1 - \Omega)$.

Once Nature makes its choice, S observes T's offensive policy, and decides whether to initiate a Threat to impose sanctions. If S chooses to play $\sim$ Threat, she accepts the political change caused by T's offensive policy, but continues her economic exchanges with T. From T's perspective, this is the best possible outcome in the game: he is able to change the political status quo in his favor while simultaneously maintaining his economic relationship with S. Let us therefore normalize T's payoff for this outcome to 1, and normalize S's payoff for this outcome to 0.

On the other hand, if S does issue a threat to impose sanctions on T if he does not reverse his offensive behavior, T next decides to either Acquiesce to S's threat, or to Stand Firm and defy S's demands. If T plays Acquiesce, the game ends with both T and S receiving a payoff of $(x_S; x_T)$. This payoff represents the value both S and T place on reversing T's offensive policy while continuing their economic transactions uninterrupted. If T Acquiesces, sanctions are not imposed, and the two states continue to enjoy the benefits of their economic transactions. T, however, loses the benefit of changing the political status quo, whereas S's utility improves from maintaining it.

On the other hand, if $T_{(1,2)}$ Stands firm, he refuses to change his offensive policy in response to S's threat. The game then moves to S's second decision node. The information set between S's two nodes indicates that she is uncertain if the target must pay back loans

[8]The result from the simplified game is identical to a model that includes the black knight state as a strategic player. Since our focus is the development of empirically testable hypotheses, we therefore present the simplified version. The addition of a third player makes the solution more cumbersome without adding new theoretical or empirical insight. We also assume that no third parties give support to target for free. While not all require re-payment, third parties may instead require policy concessions that are equivalent to the support they get. We, therefore, specify that even T_2 must pay back the reserve it receives from black knights, but can do so without interest (β).

with interest, or if the target obtains an interest free loan. Substantively, the sender is uncertain if the target must pay back loans with interest, or if the target obtains an interest free loan from black knights. S's first option is to play $\sim$ Impose and retreat from her sanctions threat. Should she do so, she receives a payoff of 0 for tolerating T's offensive behavior while maintaining its economic transactions. On the other hand, T receives a payoff of 1 since he is able to maintain his offensive behavior while avoiding sanctions.

Table 1: Model Parameters and Ranges

Parameter	**Interpretation**	**Range**
Ω	S's prior belief that $T = T_1$	$\Omega \in [0, 1]$
$1 - \Omega$	S's prior belief that $T = T_2$	$\Omega \in [0, 1]$
p	T's probability of political survival	$p \in (0, 1)$
π	The level of capital raised by T	$\pi \in (0, 1 - p)$
β	T's cost of borrowing	$\beta \in (1, 2)$
$c_{(S,T)}$	Transaction costs of sanctions	$c_{(S,T)} \in (0, 1)$
$x_{(S,T)}$	The value placed on economic transactions	$x > 0$

However, if S plays Impose, her sanctions produce transaction costs that affect exchanges between herself and T. Let us represent these transaction costs to both S (c_S) and T (c_T), where $c_{(S,T)} \in (0, 1)$. Once sanctions are imposed, the game moves to $T_{(1,2)}$'s second choice node, where he makes the decision to either Acquiesce to S's demands or continue to Stand Firm. If T plays Acquiesce, the game ends with a payoff of $(x_S - c_S; x_T - c_T)$. This payoff at this outcome represents both S and T's value for resuming the economic transactions $(x_S; x_T)$, minus the transaction costs $(-c_S; -c_T)$. Substantively, the target's acquiescence resumes transactions between the two states, but both suffer some damage due to the temporary disruption caused by sanctions. The alternative choice for $T_{(1,2)}$ is to continue to play Stand Firm and absorb the damage of sanctions. In this case, the economic dislocation caused by T's disruption of the economic transactions may lead to some level of political instability. The leadership in T is able to hold onto power through this instability with some probability p, but loses power with the corresponding probability $(1 - p)$.

Although the loss of revenue may put T's regime at risk, T may borrow capital π to sanctions-proof his state and offset some of the damages caused by sanctions. Formally, assume that if T borrows π, T's probability of holding onto power increases from p to $\frac{p}{(1-\pi)}$.[9] The model assumes that T's choice of how much capital to borrow is endogenous, meaning that T can either borrow no capital ($\pi = 0$), or raise enough to guarantee that he holds onto power ($\pi = 1-p$). Since T_1 must pay back the capital he borrows with interest, his payoff for standing firm is reduced by $-\beta\pi$, which represents the amount T_1 borrows multiplied by his interest rate $\beta \in (1, 2)$. T_2 with stronger reputations enjoy lower interest rates on borrowed capital ($\beta \to 1$), whereas T_1 with poor reputations must pay higher interest rates ($\beta \to 2$). Since T_2 must also pay back the capital he borrows, but does not need to pay interest, T_2's payoff is only reduced by $-\pi$, which represents an interest free loan from his black knight(s).

Solution

The game is solved using the Perfect Bayesian Solution Concept.[10] We begin by analyzing the final decisions by both targets to either Acquiesce, or raise some level of capital π and Stand Firm. We identify the amount of capital both T borrow (π^*) by maximizing both T's payoffs from playing Stand Firm with respect to π.[11] Both types of T choose to borrow the same amount $\pi^* = 1 - p$. This level of capital guarantees that both T retain power since $\frac{p}{(1-(1-p))} = 1$. This suggests that while sanctions jeopardize T's hold on power, T may borrow π^* to offset these damages. By borrowing π^*, the payoff to T_1 for playing Stand Firm in his final move is equal to $1 - \beta(1 - p)$, whereas the payoff for T_2 for playing Stand Firm is equal to $1 - (1 - p) = p$. T_1 therefore plays Acquiesce if $1 - \beta(1 - p) - c_T > x_T - c_T$, or:

$$\frac{1 - x_T}{1 - p} > \beta \tag{1}$$

[9] Since p cannot exceed 1, assume that $\pi \leq 1 - p$.

[10] This section presents the intuition behind the solution. The formal solution is presented in Appendix A.

[11] We present a more complete discussion in Appendix A.

T_2, on the other hand, plays Stand Firm if $p - c_T > x_T - c_T$, which simplifies to:

$$p > x_T \tag{2}$$

Using comparative statics, we see that both Conditions 1 and 2 are more likely to be fulfilled if the value of x_T is relatively lower. Substantively, this indicates that if T places a very low value on his economic transactions with S, sanctions cannot be sufficient to induce him to change his behavior. On the other hand, if x_T is relatively higher, T may prefer to Acquiesce to S's demands rather than disrupt his lucrative economic relationship. This establishes that for sanctions to work, T must view his economic transactions with S as significant and valuable.

The third key condition in characterizing the equilibrium behavior is whether or not S's threat to play Impose is credible. S's payoff for accepting T's offensive behavior is normalized to 0. On the other hand, if S plays Impose, she receives a payoff c_S if T plays Stand Firm following imposition. Since $-c_S < 0$, we see that S will not impose sanctions on T if she knows that T will not alter his behavior. However, S's payoff for successful sanctions is therefore equal to $x_S - c_S$. If $x_S - c_S < 0$, these economic disruptions are so costly that S will never impose sanctions, even if she knew they would alter T's behavior. In these cases, T's offensive behavior is simply not problematic enough to warrant a disruption of uninterrupted economic transactions. Therefore, for S to impose sanctions, T's behavior must be offensive enough such that S's payoff for successful sanctions exceeds her payoff for simply accepting the change in the status quo. This establishes a third key condition necessary to characterize the solution:

$$x_S > c_S \tag{3}$$

If Condition 3 is not fulfilled, there are no conditions under which S will impose sanctions. The sender is not resolute enough regarding the issue in dispute to disrupt economic

transactions. However, if Condition 3 is fulfilled, and S's threat to impose is credible. Assuming Condition 3 is true, we now characterize the model's solution based on the other two conditions.[12]

Case 1. T_1 pays Low Interest ($\frac{1-x_T}{1-p} > \beta$)

From Condition 1, and the above discussion, we know that T_1 will always Stand Firm. If T_1 pays more in borrowing costs, but is still willing to Stand Firm in response to sanctions, it follows that T_2 will also Stand Firm in response to sanctions, given that these targets pay no interest on their loans. If both types of T refuse to Acquiesce, the maximum payoff to S from playing Impose is equal to $\frac{1-p}{(1-(1-p))-c_S} = -c_S$. Sanctions therefore only harm the sender by disrupting her transactions with the target. Alternatively, the sender receives a payoff of 0 for playing $\sim$ Impose and accepting the target's offensive behavior. Since $0 > -c_S$, S plays $\sim$ Impose. Substantively, this demonstrates that if targets can obtain loans at low interest, senders will not impose sanctions and targets will pursue their offensive behavior.

Case 2. Targets place High Value on Uninterrupted Transactions ($x_T > p$).

In these cases, where Condition 2 is not fulfilled, both T_1 and T_2 place significant value on maintaining their economic transactions with S, and seek to avoid sanctions entirely. T_2 receives a payoff of p if he plays Stand Firm. On the other hand, if T_2 plays Acquiesce in his first move, he receives a payoff of x_T. Since $x_T > p$, T_2 prefers to Acquiesce. If T_2 prefers to acquiesce immediately, it follows that T_1 should also prefer to do so, given that T_1's payoff for playing Stand Firm is worse since he must pay interest. Substantively, this case demonstrates that targets with deep, extensive, and valuable economic relationships with the sender are likely to give in to threats and avoid sanctions. Empirically, we should therefore expect that sanctions are less likely to be imposed in cases where the target places a high value on uninterrupted economic transactions with the sender.

[12]We present this result in more detail in Appendix A.

Case 3. T_1 pays Higher Interest and places Low Value on Uninterrupted Transactions ($\beta > \frac{1-x_T}{1-p}; p > x_T$)

The two cases above demonstrate that we should not observe sanctions if targets pay low interest rates on borrowed capital, if the target's value for uninterrupted transactions is high, or if the sender's value of uninterrupted transactions is low. However, the model demonstrates that sanctions can occur with some positive probability if 1) senders place a relatively higher value on maintaining the political status quo 2) targets are less creditworthy and pay higher borrowing costs, and do not place a high value on uninterrupted economic transactions. In this set of cases, T_2 can always Stand Firm since Condition 2 is fulfilled and he maintains black knight support. T_1, on the other hand, prefers to Acquiesce if sanctions are imposed since he must pay substantial interest on the capital he borrows. The high interest undermines any value T_1 gains from defying S and therefore compels him to cease the offensive behavior.

If S imposes sanctions, the best payoff she can receive is $x_S - c_S$, which occurs if T acquiesces following imposition. For S's threat to impose to be credible, it therefore must be the case that $x_S - c_S > 0$. The payoff for imposition must be greater than the payoff for accepting T's offensive behavior with uninterrupted transactions. Substantively, this means that for S's threat to be credible, she must place a significant value on reversing T's behavior such that she is willing to disrupt the flow of economic exchanges using sanctions.

If S's threat is credible, and she is willing to impose sanctions, S prefers to play Impose on T_1 that pay interest, but would play $\sim$ Impose on T_2 that can withstand sanctions. The problem, however, is that S is uncertain about T's type. Since S does not have complete information, T_1, who must pay interest, may have incentives to mimic the behavior of T_2, who can defy sanctions without paying interest. This dynamic may explain why targets, like Ahmadinejad and Kim Jung Un ridicule sanctions efforts. Targets may strategically signal that any sanctions effort will be ineffective since they maintain black knight support.

Given this uncertainty, S imposes sanctions if: $\Omega(x) + (1 - \Omega)(0) - c_S > 0$. We identify

the belief Ω^* where S is indifferent between playing Impose and $\sim$ Impose:

$$\Omega^* = \frac{c_S}{x_S + c_S} \tag{4}$$

S plays Impose if $\Omega > \Omega^*$ and $\sim$ Impose otherwise. Substantively, if $\Omega < \Omega^*$, S's prior belief informs her that the target can borrow without interest, or that she is facing T_2. S should therefore prefer playing $\sim$ Impose to Impose. This behavior creates a pooling equilibrium for both T_1 and T_2, where both play Stand Firm in their first move. Substantively, this suggests that if a sender believes that sanctions will fail, all potential targets will have incentives to initiate foreign policy challenges.

On the other hand, if $\Omega > \Omega^*$, S has a prior belief that she is facing T_1, and that the target prefers to comply with her demands rather than pay interest on the capital he borrows. In these cases, T_1 is forced to Acquiesce in his first move, whereas T_2 plays Stand Firm. This separation creates an interesting dynamic. Since T_1 always plays Acquiesce whereas T_2 plays Stand Firm, S will update its belief that any T that plays Stand Firm must be T_2. In other words, if S observes any T playing Stand Firm, she will update that $\Omega = 0$, and that she is facing a target that can withstand sanctions. If this is the case, S should prefer to switch her strategy from Impose to $\sim$ Impose. However, if S does make this switch, T_1 will no longer be deterred, and will also switch his strategy to Stand Firm. We therefore see that there is no stable pure strategy equilibrium if $\Omega > \Omega^*$. Instead, we can characterize the solution in these cases as a semi-separating Perfect Bayesian Equilibrium. T_1's mixed strategy is to play Stand Firm with probability q and play Acquiesce with probability $(1 - q)$, where q is defined as $\frac{\Omega(q)}{[\Omega(q)+(1-\Omega)1]} = \frac{c_S}{(x_S+c_S)}$, or:

$$q = \frac{[c_s(1 - \Omega)]}{[\Omega(x_S)]} \tag{5}$$

S responds by playing Impose with probability j and $\sim$ Impose with probability $(1 - j)$,

where j is defined as $x_T = j(x_T - c_T) + (1 - j)1$, or:

$$j = \frac{(1 - x_T)}{(1 - x_T + c_T)} \tag{6}$$

Empirical Implications

The model therefore leads to several interesting empirical implications. First, we must consider whether the sender is willing to impose sanctions. This is determined by two factors. First, the target's behavior must be offensive enough to the sender that the latter is willing to disrupt normal economic transactions and impose sanctions. Empirically, senders are likely more resolute in their threats to impose sanctions when dealing with strategic adversaries, as opposed to strategic partners or allies. For example, if Iran supported terrorist movements, it is likely the U.S. would respond with a threat to impose sanctions. It is also likely that this threat is credible, given the determination of the U.S. to contain Iranian aggressiveness in the Middle East. However, if an American partner in the region, such as Saudi Arabia or Qatar, engaged in similar behaviors and supported terrorist movements, it is unlikely that the U.S. would either threaten or impose sanctions. In these cases, the U.S. would likely just ignore these states' behavior, even though it challenges American efforts to fight terrorism in the Middle East. Theoretically, we might think of c_S taking on a higher value when dealing with Saudi Arabia or Qatar, but a lower value when taking on Iran. This leads us to our first hypothesis:

Hypothesis 1. Senders are more likely to issue threats to impose sanctions as their affinity with target states decreases.

Second, senders should only be willing to impose sanctions in cases where there is some positive probability that doing so will alter the target's behavior. Formally, T will only alter his behavior in response to sanctions if either Conditions 1 or 2 are false. Substantively, this occurs if the value T places on his economic transactions with S is relatively greater ($x_T \rightarrow$

1). In cases where T does not view his transactions with S as valuable, any threat that S makes to sever these transactions by imposing sanctions will have no coercive effect. If this is the case, we should not observe a threat or an imposition of sanctions, given that S has no strategic reason to engage in this behavior. On the other hand, if T views his economic transactions with S as valuable and lucrative ($x_T \rightarrow 1$), T may acquiesce to S's threats to disrupt these exchanges with sanctions. Strategically, this indicates that we are more likely to observe threats to impose sanctions in cases where the target views its economic transactions with the sender as relatively more valuable.

Hypothesis 2. Senders are more likely to issue threats to impose sanctions as the value the target places on its economic transactions with the sender increases.

Hypotheses 1-2 identify the conditions under which senders are likely to threaten a target state. Let us now consider when target states defy sender demands, and senders follow through with their threats to impose sanctions. First, the model demonstrates that we are less likely to see sanctions in cases where targets place a high value on maintaining economic transactions with the sender. To avoid disruptions, targets in these cases are likely to acquiesce to the sender's demands and avoid imposition following a threat.[13]

On the other hand, we are more likely to observe the imposition of sanctions in cases where transactions between the sender and the target are less valuable, if and only if the target must pay considerable interest to borrow capital. In these cases, senders know that without black knight support, the price of interest may compel targets into abandoning their foreign policy challenges. Since targets strategically signal that they do have black knight support, senders may periodically impose sanctions to determine if targets really can withstand the loss of their economic transactions. Although this may lead to failed sanctions against targets that can borrow cheaply, we may periodically see successful cases where targets will acquiesce to avoid paying high interest sustain their foreign policy challenges.

[13]This leads to the expectation that the probability of target acquiescence at the threat stage increases as the value that the target places on uninterrupted economic transactions with the sender increases. Since our main focus is on sanctions imposition, we leave the empirical analysis of this implication to Appendix B.

Hypothesis 3. When the target's credit rating is poor the probability of sanctions imposition increases if and only if the value the target places on uninterrupted economic transactions with the sender is relatively low.

Data and Methods

To test Hypothesis 1-3, we create our sample using the Threat and Imposition of Economic Sanctions (TIES) dataset (Morgan, Bapat and Kobayashi 2014) for the years between 1980-2005.[14] TIES dataset identifies sanction threats that did not lead to the imposition of sanctions as well as threats that led to sanctions. The information recorded on threats allows us to avoid selection bias, by including cases to our sample in which the sender chooses not to threaten sanctions.

Our sample consists of all United States dyads in our time frame. We use the directed-dyad-year as our unit of analysis, where the first state represents the United States as the sender, and the second state represents the potential target.[15] This data structure allows us to include all dyad-years in which there is a chance for the U.S. to issue a sanction threat. If a threat is issued, we then code whether we also observe an imposition.

We limit our sample to US-dyads for two reasons. First, the U.S. is considered to be the central hub of the international financial system (Oatley et al. 2013). This implies that not all senders are capable of influencing targets' access to credit and cost of borrowing, but the United States is. In addition to our theoretical justification, limiting the analysis to US-dyads has significant empirical advantages. Expanding our dataset to a sample of all country dyads would lead to the inclusion of thousands of additional dyad-years with no real chance of sanctions occurrence. This would subsequently bias the results by increasing the sample size with very little information content, and by inflating the number of zeros in our dependent variables. Therefore, focusing on U.S. dyads allows us to prevent a rare events data structure that can bias the results (King and Zeng 2001). It is important to note

[14]The TIES data records sanctions episodes from 1945 to 2005; however, the availability of credit ratings data, one of our main independent variables, limits the temporal domain of the study.

[15]We generate our sample using Eugene Version 3.204 (Scott and Stam 2000).

that 67% (234/348) of the security related sanctions recorded in the TIES dataset in the post-1980 period are initiated by the United States. Thus, despite the sample restriction, we account for the majority of sanctions episodes. Our final dataset consists of 4558 yearly observations, where the U.S. as the sender country has 196 unique potential targets in the years between 1980 and 2005.

Our theoretical model makes predictions about when senders threaten a target state with sanctions and when they follow through with sanctions imposition. Theoretically, the decision to impose sanctions is not random, but is determined by the sender's choices to threaten the target with sanctions in the first place and whether the target stands firm or defies sender's demands. Therefore, we empirically model a two-stage process; initiation of a threat as the first stage, and imposition of sanctions given a threat had been issued as the second stage. We utilize a probit model with sample selection, also known as a Heckman probit model (Heckman 1979). We first estimate the probability of issuing threats as the selection equation, using information for the years in which sanctions were threatened, as well as sanctions could have been threatened. Observations where a threat is issued are then selected into the outcome stage, which investigates when economic sanctions are imposed.

Dependent Variable

While Hypothesis 1 and 2 identify when senders are more likely to threaten targets with sanctions, Hypothesis 3 identifies when senders follow through with sanctions. Therefore, we code whether the U.S. issues sanction threats in a given year as the dependent variable of the selection equation and whether the U.S. follows through with sanctions imposition as the dependent variable of the outcome equation.

In order to code *Threat* or *Imposition* variables as 1, we adopt two coding rules. First, we record threats and impositions initiated *primarily* by the United States. This includes unilateral U.S. sanctions, multilateral sanctions where the U.S. is identified as the "primary sender" and builds a sanctioning coalition with other sender states, and sanctions episodes initiated through an international organization where the U.S. is identified as the "primary

sender". TIES Dataset defines "primary sender" as the country that is primarily responsible for the threatening or the imposition of sanctions against the target. If a case has multiple senders, the primary sender is coded as the state that proposes sanctions, initiates the threat, or is responsible for mobilizing other states to initiate sanctions. We only exclude cases if the sole sender or the target was an international organization. If the sole sender was an international organization, but the TIES dataset does not identify a primary sender, we do not code our dependent variables as 1, even if the U.S. joins the sanctioning efforts.[16] Lastly, we exclude the cases from our sample if the sole target was an international organization, even if the primary sender was the United States.[17] This allows us to preserve the dyadic structure of our data, where the sender is the U.S. and the target is a country identified by COW's State System Membership Dataset.

Second, we code *Threat* and *Imposition* variables as 1 for security related sanctions cases[18] and highly costly trade related episodes initiated by the U.S. TIES dataset codes "Anticipated Target Economic Costs" and "Target Economic Costs" for each sanctions episode as minor (1), major (2), and severe (3), where the former measures the expected costs of economic sanctions at the threat stage, and the latter measures the ex-post costs of sanctions on targets' economy. We exclude trade disputes that are anticipated to create or create only minor costs to the target. In other words, we record all security related sanctions episodes along with major and severe cost trade sanctions. Minimally costly trade sanctions are often limited in their scope and ability to disrupt targets' economy as a whole. Therefore, they are not likely to leave targets in need of support from black knights or international borrowing to sanction-proof their regime. Adopting this restriction fits our theoretical scope where sanctions do create some harm and instability to the target, which must subsequently be

[16]There are only five cases in which the European Economy Community (EEC)/European Union (EU) is coded as the primary sender, while the U.S. is listed as a member of the sanctioning coalition.

[17]There are only five such cases recorded in the TIES Dataset where the U.S. is the primary sender and the target is the EEC/EU.

[18]Sanctions are considered to be security-related if the goal is to contain political influence and military behavior, destabilize regimes, solve territorial disputes, deny strategic materials, retaliate for alliance choices, improve human rights, end weapons proliferation, terminate support of non-state actors, and deter or punish drug trafficking practices.

offset by some external loans or assistance.

Threat is the dependent variable of the selection equation, capturing whether the U.S. threatens a potential target state with sanctions in a given year. TIES dataset records instances in which senders declares that sanctions are a possibility against a target state. According to the dataset, threats "may be initiated in several ways, such as verbal statements of government officials, drafting of legislation against a target state, or the passage of a conditional law stipulating that sanctions will be imposed if certain target behaviors are not changed." Using this information, *Threat*, is coded as 1 if the United States threatens a target state with sanctions that are expected to generate major and severe costs in any given year, and 0 otherwise.

Imposition is the dependent variable of the outcome equation, capturing whether or not the U.S. follows through on its threat with sanctions imposition in a given year. The dichotomous variable is coded as 1 if the U.S. imposes sanctions, and 0 otherwise.

Table 2: Descriptive Statistics - *Threat* and *Imposition*

Selection Equation DV: *Threat*		
Threat	Frequency	Percent
0	4359	95.63
1	199	4.37
Outcome Equation DV: *Imposition*		
Imposition	Frequency	Percent
0	110	55.28
1	89	44.72

Table 2 presents descriptive statistics for *Threat* and *Imposition* dependent variables. Our dataset consists of 4558 yearly observations. *Threat* is coded as 1 in 199 of those observations, which corresponds to 4.3% of the sample. Out of the 199 threats issued between the years 1980 and 2005, the U.S followed through with sanctions in 89 (45%) cases, and acquiesced in 110 (55%) cases.

Independent Variables

Hypothesis 1 and 2 identify the conditions under which senders are more likely to threaten a target state with sanctions. Hypothesis 1 predicts that senders are more likely to issue threats to impose sanctions as their affinity with target states decreases. To capture this dynamic, we use a measure of target state's foreign policy similarity with the United States, using S-scores, assembled from UN General Assembly votes (Voeten, Strezhnev and Bailey 2009). The variable ranges from -1 (least similar interests) to 1 (most similar interests). Values closer to 1 indicate a higher foreign policy similarity and a potential for being strategic allies, whereas values closer to -1 indicate conflicting foreign policy views and a potential for being adversaries. We argue that senders are less likely to call out the offensive behavior of their strategic partners; while more likely to threaten their adversaries with sanctions in response to their foreign policy challenges. Therefore, we expect *Foreign Policy Similarity* to be negative and statistically significant in the selection equation of our model.

Foreign Policy Similarity also serves as our exclusion restriction that is required to generate credible estimates in Heckman selection models. There must be at least one variable that is included in the selection equation, but not in the outcome equation (Sartori 2003). Our theory suggests that senders are more likely to issue threats to impose sanctions as their affinity with the target states decreases. However, once a threat is issued and the observations are selected into the outcome stage, we do not expect affinity to influence the subsequent imposition decision.

Hypothesis 2 predicts that senders are more likely to threaten targets with sanctions if the value the target places on his economic transactions with the sender is relatively high. If the target does not view his transactions with the sender as valuable, sanction threats may not have a strong coercive effect, thereby eliminating the sender's strategic reason to impose sanctions. To capture the value the target places on uninterrupted economic transactions with the sender, we measure targets' trade dependence to the United States, using COW's Bilateral Trade Dataset (v4.0) (Barbieri and Keshk 2012). *Trade Dependence* in a given year

is coded using the following formula: *(T's exports to S + T's imports from S) / (T's exports + imports)*. It is a continuous variable between 0 and 1 that captures the ratio of the target's trade volume with the U.S to its total trade volume in a given year. Higher values indicate denser trade ties with the U.S, which allow the U.S. to have leverage over its targets' policy choices. Therefore, we expect *Trade Dependence* to be positive and statistically significant in the selection equation of our model.

While the first two hypotheses identify when the U.S. is more likely to threaten a potential target state with sanctions, Hypothesis 3 identifies when targets defy sender demands, and senders follow through on their threats to impose sanctions. More specifically, Hypothesis 3 predicts that we are more likely to observe an imposition if the target's cost of borrowing is high and only if the target places a relatively low value on uninterrupted economic transactions with the sender. This requires us to operationalize cost of borrowing, and interact it with *Trade Dependence*. To capture targets' cost of borrowing, we use credit ratings as a proxy of shortcuts used by investors to determine the interest rates at which the loan will need to be repaid. Investors set interest rates on government loans based upon the market's evaluation of the government's likelihood of default. Governments with favorable market assessments will enjoy lower costs of borrowing than their counterparts that are considered to be risky investments.

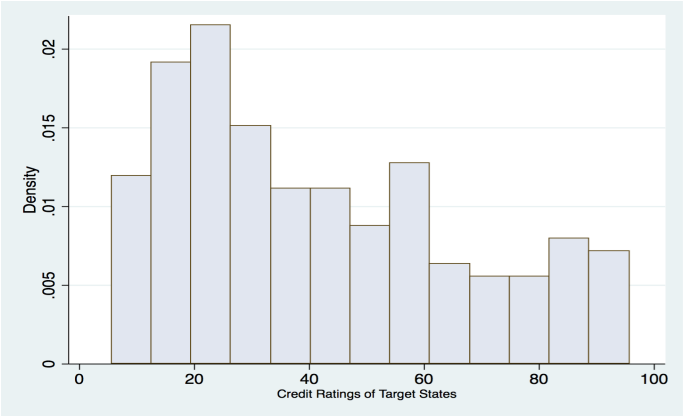
Researchers have commonly relied on the sovereign credit ratings data collected by private agencies such as Fitch, Standard & Poor's and Moody's (Sinclair 2007; Brooks, Cunha and Mosley 2015). However, using these agencies' sovereign ratings data creates two problems for our analysis: First, the available data often excludes states that lack sufficient creditor interest and states that are not highly credit-worthy. Since the pool of target states in our analysis includes a substantial amount of countries with low levels of creditworthiness, using private agencies' data drastically limits the amount of sanctions we can account for and biases the sample towards the inclusion of more targets with stronger credit ratings. Second, the sovereign ratings data from private agencies is only available for the post-1990 period.

In sum, using private agencies' ratings data significantly limits the temporal and the spatial scope of our analysis.

As a more feasible alternative, we use Institutional Investor's Country Credit Ratings, following DiGuiseppe (2015). The Institutional Investor Ratings dataset has two main advantages. First, its temporal coverage goes back to 1980. Second, it offers credit analysis for a broad sample of countries in our dataset. In our dataset, there are 199 sanctions episodes initiated by the United States with a threat, and using Institutional Investor's Country Credit ratings data provides us information for 181 of those cases.[19] If we were to use Fitch credit ratings data, we would be able to account for only 40 of those cases.

The ratings are based on the information provided by senior economists and sovereign risk analysts at leading global banks and money management firms. The polled experts assess each state's risk of default and grade them on a scale of 0 to 100, with higher values representing lower likelihood of default and lower costs of borrowing. In our dataset, *Credit Ratings* ranges from 5 to 95 and is dispersed over the range. Figure 2 presents the histogram of the credit ratings of U.S. targets and portrays that the variable has a good amount of variation and the distribution is not skewed towards targets with high credit scores.

Figure 2: Histogram: Credit Ratings of Targets of the U.S.



[19]The Institutional Investor Ratings Dataset lacks credit information on 16 targets recorded in TIES: Dominica, St. Vincent and the Grenadines, Antigua and Barbuda, Liechtenstein, Andorra, Belize, San Marino, Bosnia and Herzegovina, Gambia, Central African Republic, Burundi, Fiji, Djibouti, Eritrea, East Timor, and Samoa.

We expect that senders are less likely to impose economic sanctions against targets with higher credit scores that can acquire inexpensive capital. These targets are able to sanctions-proof their regime and withstand the costs of sanctions; thereby rendering senders' economic coercion efforts ineffective. Our theoretical model also predicts that the reductive effect of credit ratings on the probability of sanctions onset holds only if the value the target places on uninterrupted economic transactions with the sender is relatively low. To capture this dynamic, we interact *Credit Rating* and *Trade Dependence* variables.

Control Variables

We further include several control variables from the extant literature on threat and imposition of economic sanctions. We first include a measure of the regime type of potential targets, both to the selection equation and the outcome equation. Past studies have applied insights from the democratic peace to show that democracies are less likely to use economic coercion against one another (Cox and Drury 2006) and the pacifying effects of joint democracy only operate for security related sanctions (Wallace 2013). Therefore, we first include a measure of potential targets' regime type using the Polity IV scale. The variable ranges from -10 to 10, with higher levels indicating greater levels of democracy (Marshall, Jaggers and Gurr 2013). We code the variable as 1, if the target is scored 6 or higher, and 0 otherwise. We expect that the U.S. is less likely to initiate sanctions against its democratic counterparts.

Second, we control for the relative strength of the U.S. to the target, using CINC scores, taken from the COW's National Material Capabilities dataset (v5.0) (Singer 1987). Values greater than 1 indicate that the U.S. is more powerful than its target. There are only 19 dyad-years in which *CINC Ratio* is less than 1; however, the values vary widely. This variation allows us to capture the extent of the power disparity between the U.S. and its potential targets. In order to smooth the distribution of the variable, we use the natural logarithm of the variable.[20] The inclusion of *CINC Ratio* aims to capture targets' ability to withstand the cost of sanctions and the likelihood to make concessions at the threat stage.

[20]The histrogram of the variable is presented in Appendix B.

As the power disparity between the U.S. and its targets increases, targets are expected to acquiesce (Cox and Drury 2006).

We also include a dummy variable capturing whether a given year is before or after the end of the Cold War. This variable, included in both stages of the Heckman model, allows us to capture unmeasured temporal effects, and increased use of economic sanctions over time, especially in the post-1990 period (Morgan, Bapat and Kobayashi 2014).

We further control for whether the U.S. had previously initiated a sanctions episode on the target or not. If *Previous Imposition* variable is coded as 1, this can be an indication of a higher likelihood of a future economic conflict. Moreover, controlling for previous episodes allows us to account for a potential reason why some targets' trade dependence to the U.S. is relatively low.

We include the *Multilateral* variable to the outcome equation and it is coded as 1 if a sanctions episode has other senders besides the U.S. or is initiated through an international organization, and 0 if it is unilateral. Multilateral sanctions tend to be more effective than unilateral ones (Bapat and Morgan 2009), especially if the target country's major trading partners support the sanctioning efforts (McLean and Whang 2010). Therefore, multilateral sanctions are expected to perform better at convincing the target state to concede at the threat stage, thereby decreasing the likelihood of sanctions imposition (Whang, McLean and Kuberski 2013).

Lastly, we include temporal control variables to the selection equation. Since we have a temporarily related data, and the yearly observations for a dyad are not independent from one another (Poirier and Ruud 1988), we include a variable counting the number of years since the last economic sanctions threat, its square and its cube, suggested by Carter and Signorino (2010).[21]

[21]Results remain the same if we use temporal splines, following Beck, Katz and Tucker (1998). Robustness check results are presented in Appendix B.

Empirical Findings

Table 3: Heckman Selection Model: Sanction Threats and Impositions by the United States

	Outcome Equation: (DV: Imposition)	Selection Equation: (DV: Threat)
Credit Rating	-0.005**	
	(0.002)	
Trade Dependence	-1.152**	0.664***
	(0.414)	(0.177)
Rating x Trade Dependence	0.022**	
	(0.008)	
Foreign Policy Similarity		-0.266***
		(0.070)
Democratic Target	0.053	0.179
	(0.116)	(0.093)
CINC Ratio (ln)	0.194***	-0.172***
	(0.034)	(0.029)
Previous Imposition	-0.065	0.071
	(0.145)	(0.113)
Cold War	0.564***	-0.470***
	(0.116)	(0.104)
Multilateral	0.410*	
	(0.162)	
Constant	1.254***	-1.287***
	(0.215)	(0.200)
ρ	-1	
	(5.08e-12)	
Number of Observations	3407	
Number of Censored Observations	3254	
Number of Uncensored Observations	153	

- Standard errors are in paranthesis. Estimates are derived from a heckman selection model with standard errors clustered on the target state.
- Significance levels: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$
- Temporal controls (t, t^2, t^3) are omitted.

Table 3 presents a probit model with sample selection, also known as a Heckman selection model. The first stage of the Heckman model, the selection stage, accounts for when the U.S. threatens its potential targets with sanctions. Observations where we see a sanctions threat are then selected into the outcome stage. This second stage investigates when targets

defy sender demands, and senders follow through on their threats with sanctions. The first column of Table 3 presents the results of the outcome equation where the dependent variable is sanctions imposition given a threat had been issued, and the second column presents the results of the selection equation where the dependent variable is sanction threats.

Our theoretical model leads to two main empirical implications about the threat stage. Hypothesis 1 predicts that senders are less likely to issue threats to impose sanctions as their affinity with the target increases. Consistent with Hypothesis 1, *Foreign Policy Similarity* is negative and statistically significant in the selection equation. This suggests that the U.S is less likely to threaten its strategic allies with sanctions. This can be due to two reasons. Countries that share similar foreign policy views with the U.S. might be less likely to engage in a behavior that is offensive to the United States, or the U.S. might choose to turn a blind eye to its strategic allies' offensive behavior, even if it is against American interests.

Hypothesis 2 predicts that senders are more likely to issue threats to impose sanctions as targets' trade dependence to the U.S. increases. Consistent with Hypothesis 2, *Trade Dependence* is positive and statistically significant in the selection equation. The U.S is expected to threaten targets with sanctions only if it is expected to have some coercive effect. If the target views his economic transactions with the sender as lucrative, threats are more likely to have a meaningful coercive power; thereby making the threatening of sanctions a potentially effective strategy for the United States.

The selection equation presents the results for when the U.S. is more likely to issue a threat to impose sanctions. Observations where a threat is issued by the U.S. are then selected into the outcome stage of the model, which investigates when economic sanctions are imposed. Our expectation about the imposition stage is that the likelihood of sanctions imposition increases against targets with poor credit ratings and only if the target's trade dependence to the sender is relatively low.

The coefficient of *Credit Rating* is negative and statistically significant, indicating the lower likelihood of sanctions imposition for targets with higher credit scores. These targets

are able to sanctions-proof their regimes, either by receiving support from black knights or by acquiring inexpensive capital from international markets. Therefore, senders are less likely to impose inefficient sanctions against targets that are able to pursue their offensive behavior even under harsh sanctions. The coefficient on the interaction term is positive and statistically significant. Even if this lends support to our conditional hypothesis, to be able to fully interpret the interaction term results, computing marginal effects is necessary.

Table 4: Probit Models: Sanction Threats and Impositions by the United States

	Probit Model 1 (DV: Imposition)	Probit Model 2 (DV: Threat)
Credit Rating	-0.018**	
	(0.006)	
Trade Dependence	-0.945	0.626***
	(0.932)	(0.182)
Rating x Trade Dependence	0.039*	
	(0.015)	
Foreign Policy Similarity		-0.271*
		(0.121)
Multilateral	0.747*	
	(0.336)	
Democratic Target	0.350	0.140
	(0.240)	(0.103)
CINC Ratio (ln)	0.101	-0.155***
	(0.071)	(0.032)
Cold War	0.153	-0.473***
	(0.303)	(0.100)
Previous Imposition	0.004	0.067
	(0.286)	(0.112)
Constant	-0.229	-1.196***
	(0.513)	(0.219)
Number of Observations	167	3412

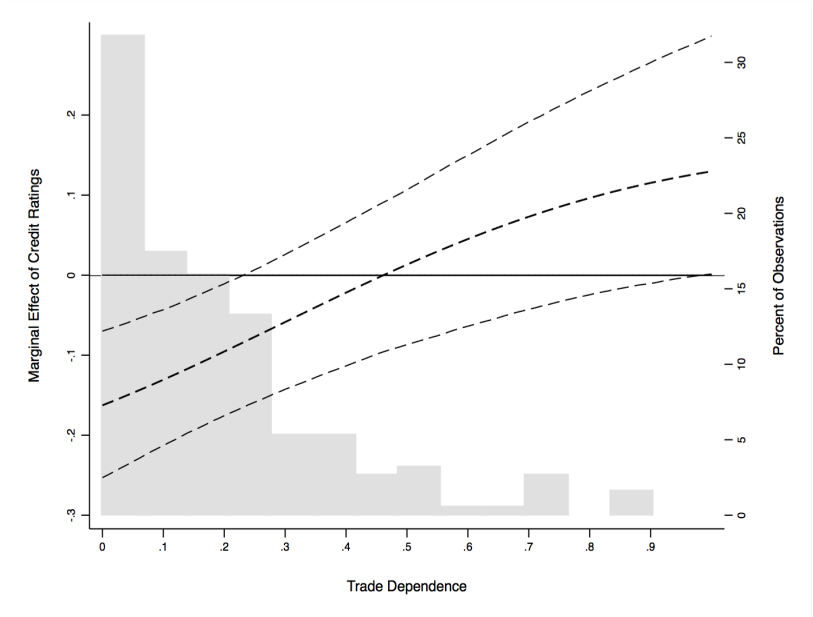
- Estimates are derived from probit model with standard errors (in paranthesis) clustered on the target.
- Significance levels: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$
- Temporal controls (t, t^2, t^3) that were used for Model 2 are omitted from the table.

In order to compute the marginal effects, we ran separate probit models for the two stages of the Heckman model. The rho coefficient of the Heckman probit model is not statistically significant, indicating that the error terms of the selection and the outcome equation are not

correlated. Therefore, running probit models to analyze the threat and the imposition stages separately is appropriate. Table 4 presents the results for the two probit models, where the second column estimates United States' likelihood of issuing a threat and the first column estimates its likelihood of following through on its threat. We see that the key independent variables in both models are significant and facing the expected directions.

Similar to the Heckman model results, the coefficient estimate for *Credit Ratings* is negative and statistically significant, and the coefficient estimate for the interaction term is positive and statistically significant. As shown in Brambor, Clark and Golder (2006), "we cannot infer whether our variable of interest has a meaningful conditional effect on the dependent variable from the magnitude and significance of the coefficient on the interaction term" (p.74). While the information provided in Table 3 and 4 is informative, it remains limited in its ability to confirm or deny the statistical and substantial significance of our results. To be able to fully interpret the results, Figure 3 portrays the marginal effects of credit ratings on the probability of sanctions imposition across the observed range of *Trade Dependence*.

Figure 3: The Marginal Effect of Credit Ratings on Sanctions Imposition



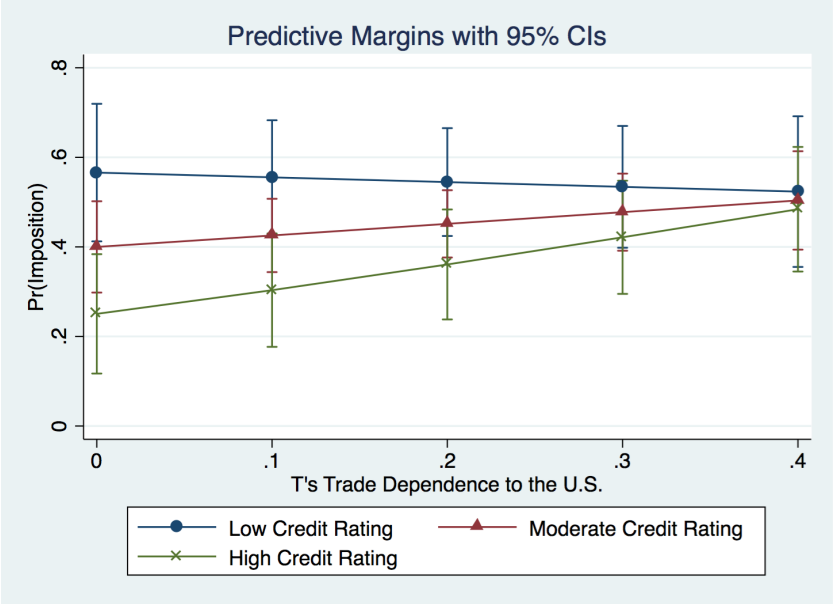
The x-axis represents the observed range of targets' trade dependence to the sender, ranging from 0 to 0.9, and the y-axis represents the marginal effect of credit ratings on the probability of sanctions imposition. The bold dashed line shows how the marginal effect of *Credit Rating* changes as *Trade Dependence* increases. 95% confidence interval drawn around the bold dashed line determines whether this effect is significant. The effect of credit ratings is significant for all the values of trade dependence where the upper and the lower bounds of the confidence interval are both below the zero line. The plot indicates that credit ratings have a statistically significant reductive effect on the probability of sanctions imposition only when the target's trade dependence to the sender is low. It confirms Hypothesis 3, suggesting that the probability of sanctions imposition decreases as targets' credit ratings increases, but only if the value the target places on economic transactions with the sender is low.

Credit ratings stop having a statistically significant reductive effect on the probability of sanctions onset once targets' trade dependence to the sender goes above 0.25. The histogram behind the plot presents the distribution of *Trade Dependence* and it shows that the majority of targets have relatively low trade dependence to the United States. However, the targets that have more than 25% trade dependence to the U.S account for 26.5% of the cases. Therefore, we can argue that the non-significant results for higher levels of *Trade Dependence* is not driven by the low density of observations for these cases.

As an additional illustration of the substantive implications of our theoretical model, Figure 4 depicts the effect of credit ratings on the predicted probability of sanctions imposition as a function of targets' trade dependence. It demonstrates that the probability of sanctions imposition is lower against targets with high credit ratings. As our theoretical model predicts and empirical results confirm, the U.S. chooses not to impose inefficient sanctions against targets that can withstand the costs and sanctions-proof their regime through inexpensive capital. We also see that credit ratings is losing its significant effect on the probability of sanctions imposition for higher values of trade dependence to the United States. Targets whose trade volume is highly dependent on the American economy value their uninterrupted

economic transactions with the United States. Therefore, these targets are more likely to acquiesce to the demands prior to imposition, thereby avoiding sanctions altogether.

Figure 4: Predicted Effects of Credit Ratings on the Probability of Sanctions Imposition



Taken together, our results confirm that the U.S. is more likely to issue threats to impose sanctions to its adversaries, as opposed to its strategic partners. Moreover, a country's high levels of trade dependence to the U.S. makes the country more vulnerable to U.S. sanction threats. When we consider the conditions under which target states defy the demands when faced with threats and the conditions under which this leads to sanctions imposition, we find that countries with poor credit ratings and low trade dependence to the U.S. are the ones with the highest likelihood of being targets of U.S. sanctions. These targets can afford to stand firm without the worry of disrupting its lucrative economic transactions with the U.S. Moreover, they will not have an ability to acquire inexpensive capital to offset the costs of sanctions; which makes them viable targets for economic coercion.

Conclusion

This study aims to answer a two-fold question. First, when do senders threaten targets with economic sanctions? Second, when do targets defy sender demands and when does

this challenge lead to sanctions imposition? To answer the first question, we theoretically consider when senders are actually willing to impose sanctions and when they expect to have coercive power with threats. To answer the second question, we consider the puzzle about why senders impose economic sanctions, given that targets can sanctions-proof their regimes by accessing capital from abroad? We use a game theoretic model that captures the two-stage sanctioning process, modeling both the threat and the imposition stages, and test the implications our model with a Heckman selection model.

Our theoretical model highlights the uncertainty that senders face about targets' ability to offset the costs of sanctions by accessing inexpensive foreign capital. This uncertainty is coupled with targets' incentives to misrepresent their ability to access interest free capital from black knights to sanctions-proof their regime, and withstand the costs of sanctions. We show that senders assess the true ability of targets to offset the damages of economic sanctions using two main sources of information: the target's assessed borrowing costs and the value the target places on uninterrupted economic transactions with the sender.

We show that the United States is more likely to issue threats to impose sanctions on its adversaries, as opposed to its strategic partners. Moreover, we find that the U.S. is more likely to threaten a potential target if the threat is expected to have coercive power. These are the cases in which the target's trade volume is dependent on U.S. markets. If targets can afford to harm economic interactions with the U.S., sanction threats cannot alter targets' behavior, thereby eliminating the strategic reason to issue sanction threats.

We also find that the U.S. is more resolute in its threat to impose sanctions against targets with poor credit ratings that face higher costs of borrowing. Targets with higher credit ratings are often able to sanctions-proof their regime through international lending, even if they do not have black knight support. These targets' ability to acquire inexpensive capital diminishes the leverage of U.S. sanctions and therefore, sanctions ceases to be an effective strategy. We further demonstrate that the U.S. is more likely to impose sanctions against targets with poor credit ratings, only if targets place a relatively lower value on

uninterrupted economic interactions with the U.S. The targets that are highly dependent on American markets will acquiesce to the demands to avoid the disruption of valuable economic interactions.

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Appendix A: Supplementary Mathematical Appendix

The game is solved using the Perfect Bayesian Equilibrium Solution concept, which specifies that the players' strategies are sequentially rational given their beliefs, which are calculated using Bayes' Rule. The model is intended to show that senders are more likely to initiate sanctions threats if their resolve to reverse the target's foreign policy behavior becomes stronger (lower values of c_s) and the target places a higher value on economic transactions with the sender (higher values of x_T). The model further demonstrates that the probability of sanctions maximizes if the target has a poor credit rating (higher values of β) and the target places a lower value on economic transactions with the sender (lower values of x_T).

As is standard, let us begin with T's final moves. The final two moves involve T_1 borrowing some level of capital π_1 at an interest rate $\beta > 1$ while T_2 secures his capital π_2 at an interest rate $\beta = 1$. Substantively, this indicates that T_1 pays some interest on his loan since he is borrowing from international capital markets, whereas T_2 maintains the support of a black knight that loans him the necessary capital with no interest. Let us first examine how much capital both T choose to borrow. The payoff to both T should either Stand Firm is equal

to:

$$\frac{p}{1-\pi} - \beta\pi - c_T \tag{i}$$

From Condition i, we see that both T can guarantee that they stay in power if they borrow a level of capital equal to $\pi = 1 - p$. Doing so produces a payoff to T_1 for Stand Firm of:

$$\begin{aligned} &\frac{p}{1-(1-p)} - \beta(1-p) - c_T \\ &1 - \beta(1-p) - c_T \end{aligned} \tag{ii}$$

Doing so produces a payoff to T_2 for Stand Firm of:

$$\begin{aligned} &\frac{p}{1-(1-p)} - (1-p) - c_T \\ &p - c_T \end{aligned} \tag{iii}$$

Remark 1. $EU_{T_2}(StandFirm) > EU_{T_1}(StandFirm)$

Proof. Remark 1 is true if $p - c_T > 1 - \beta(1-p) - c_T$. Simplifying:

1. $p - c_T > 1 - \beta(1-p) - c_T$
2. $p > 1 - \beta + \beta p$
3. $\beta - \beta p > 1 - p$
4. $\beta(1-p) > 1 - p$
5. $\beta > 1$ (This is true since $\beta \in (1, 2)$.)

T's Borrowing Amount

Remark 2. If T_1 or T_2 play Stand Firm, both borrow $\pi = 1 - p$.

Proof. For either T to borrow some amount $\pi^* < 1-p$, it must be true that $\frac{p}{1-\pi^*} - \beta\pi^* > 1 - \beta(1-p)$. Simplifying, we see that this is only possible if $\pi^* > 1-p$. However, $\pi \leq 1-p$ by restriction. Therefore, the optimal borrowing level for both T is $\pi = 1-p$.

Given this level of borrowing, we can simplify the payoff to T_1 for playing Stand Firm in his final decision node to $1 - \beta(1-p) - c_T$, and simplify the payoff to T_2 for playing Stand Firm in his final decision node to $1 - (1-p) - c_T = p - c_T$.

We therefore have four possible outcomes at the end of the game: T_1 and T_2 Stand Firm; T_1 and T_2 Acquiesce; T_1 Stand Firm and T_2 Acquiesce; and T_1 Acquiesce and T_2 Stand Firm.

T Final Move

Lemma 1. Both T Stand Firm if $\beta < \frac{1-x_T}{1-p}$ and $p > x_T$.

Proof. T_1 plays Stand Firm if $1 - \beta(1-p) - c_T > x_T - c_T$. Simplifying in terms of β, we see that this is true if:

1. $1 - \beta(1-p) - c_T > x_T - c_T$
2. $1 - \beta(1-p) > x_T$
3. $1 - x_T > \beta(1-p)$
4. $\frac{1-x_T}{1-p} > \beta$

On the other hand, T_2 plays Stand Firm if $p - c_T > x_T - c_T \equiv p > x_T$.

Lemma 2. Both T Acquiesce if $x_T > p$.

Proof. T_2 plays Acquiesce if $x_T > p$. T_1 plays Acquiesce if $\beta > \frac{1-x_T}{1-p}$. However, if $x_T > p$, it must be true that $\frac{1-x_T}{1-p} < 1$. This implies that $\beta > \frac{1-x_T}{1-p}$ since $\beta > 1$.

Corollary. T_1 cannot Stand Firm if T_2 plays Acquiesce.

Proof. The proof follows from the proof of Lemma 2.

Lemma 3. If $\beta > \frac{1-x_T}{1-p}$ and $p > x_T$, T_1 plays Acquiesce and T_2 plays Stand Firm.

Proof. From the proofs of the above Lemma, we know T_1 plays Stand Firm only if $\beta < \frac{1-x_T}{1-p}$. Since this is not the case, T_1 must play Acquiesce instead. On the other hand, since $p > x_T$, T_2 plays Stand Firm. T_1 plays Stand Firm if:

$$\frac{1-x_T}{1-p} > \beta \tag{1}$$

T_2 Stand Firm if :

$$p > x_T \tag{2}$$

We see that if the level of economic transactions (x_T) is very valuable to T, T will always Acquiesce in its final move, and we will never observe the imposition of sanctions.

Lemma 4. S plays $\sim$ Impose if $0 > x_S - c_S$

Proof. The best possible outcome S can achieve if she plays Impose is $x_S - c_S$. On the other hand, S guarantees a payoff of 0 if she plays $\sim$ Impose. Therefore, if $0 > x_S - c_S$, S strictly prefers to play $\sim$ Impose. S therefore can only play Impose if:

$$x_S > c_S \tag{3}$$

This condition forms the basis for Hypothesis 1, which indicates that senders will only issue threats if they are resolved to reverse the target's offensive behavior. Empirically, this is more likely to occur if the sender has less affinity with the target.

Equilibria

Proposition 1. If $\sim$(3), the following strategies and beliefs constitute a Perfect Bayesian Equilibrium:

1. T_1 : {Stand Firm ; Stand Firm}
2. T_2 : {Stand Firm ; Stand Firm}

3. S: {$\sim$Threat ; $\sim$ Impose}

4. Beliefs: Pr {Ω| Stand Firm} = Ω

Proof. S plays $\sim$ Sanction if Condition 3 is not fulfilled. Both T_1 and T_2 only play Acquiesce in the first move if $x_T > 1$, which cannot be true $\therefore$ both T play Stand Firm if S plays $\sim$ Sanction. S is indifferent between the outcome where she plays $\sim$ Threat and the outcome where she plays Threat followed by $\sim$ Impose, so assume she plays $\sim$ Threat.

Proposition 2. If $\sim$ (2) and (3), the following strategies and beliefs constitute a Perfect Bayesian Equilibrium:

1. T_1 : {Acquiesce ; Acquiesce}

2. T_2 : {Acquiesce ; Acquiesce}

3. S: {Threat ; Impose}

4. Beliefs: Pr {Ω| Stand Firm} = Ω

Proof. If Condition 2 is not fulfilled, T_2 plays Acquiesce following imposition. From Lemma 2, we know that T_1 plays Acquiesce if T_2 plays Acquiesce. In both cases, S should therefore Impose since $x_S - c_S > 0$. If S plays Impose, T_1 and T_2 play Acquiesce in his first move since $x_T > x_T - c_T$. This leads to a payoff to S of $x_S > 0$. $\therefore$ S prefers to play Threat instead of $\sim$ Threat.

Proposition 3. If (1), (2), and (3), the following strategies and beliefs constitute a Perfect Bayesian Equilibrium:

1. T_1 : {Stand Firm ; Stand Firm}

2. T_2 : {Stand Firm ; Stand Firm}

3. S: {$\sim$ Threat ; $\sim$ Impose}

4. Beliefs: Pr {Ω| Stand Firm } = Ω

Proof. If Conditions 1 and 2 are fulfilled, both T play Stand Firm in their final decision node. S therefore plays Impose if $-c_S > 0$, which cannot be true. S therefore plays $\sim$ Impose. S is indifferent between the outcome where she plays $\sim$ Threat and the outcome where she plays Threat followed by $\sim$ Impose, so assume she plays $\sim$ Threat.

Proposition 4. If $\sim$(1), (2), and (3), and $\Omega^* > \Omega$, the following strategies and beliefs constitute a pooling Perfect Bayesian Equilibrium:

1. T_1 : {Stand Firm ; Acquiesce}
2. T_2 : { Stand Firm ; Stand Firm}
3. S: {$\sim$ Threat; $\sim$ Impose}
4. Beliefs: Pr {Ω| Stand Firm } = Ω^*

Proof. If $\sim$ (1) and (2), T_1 Acquiesces if S plays Impose, but T_2 plays Stand Firm. S therefore prefers to play {Threat; Impose} if she is facing T_1, but prefers to play {$\sim$ Threat; $\sim$ Impose} if she faces T_2. Represent S's belief that $T = T_1$ as Ω, and her belief that $T = T_2$ as the corresponding $(1 - \Omega)$. At her second choice node, S is indifferent between playing Impose and $\sim$ Impose if: $\Omega(x_S) + (1 - \Omega)(0) - c_S = 0$. Solving for Ω:

1. $\Omega(x_S) - c_S = 0$
2. $\Omega(x_S) = c_S$
3. $\Omega = \frac{c_S}{x_S}$

Define the critical belief $\Omega^* = \frac{c_S}{x_S}$, which is the belief where S is indifferent between playing Impose and $\sim$ Impose. S play Impose if $\Omega > \Omega^*$ and $\sim$ Impose otherwise.

In this case, $\Omega^* > \Omega$, indicating that S plays $\sim$ Impose if she observes T play Stand Firm. Both T play Stand Firm since $x_T < 1$. Since both T adopt the same strategy, the case where $\sim$ (1), (2), (3), and $\Omega^* > \Omega$ produces a pooling equilibrium where both T Stand Firm and

S plays $\sim$ Impose. S is indifferent between the outcome where she plays $\sim$ Threat and the outcome where she plays Threat followed by $\sim$ Impose, so assume she plays $\sim$Threat.

Proposition 5. If $\sim$ (1), (2), and (3), and $\Omega > \Omega^*$, the following strategies and beliefs constitute a semi-separating Perfect Bayesian Equilibrium:

1. T_1 : { q(Stand Firm), $(1-q)$(Acquiesce); Acquiesce}
2. T_2 : {Stand Firm ; Stand Firm}
3. S : { Threat ; j (Impose), $(1-j)$ ($\sim$ Impose)}
4. Beliefs: Pr $\{\Omega|$ Stand Firm $\} = \Omega^*$

In this case, since $\Omega > \Omega^*$, S plays Impose if T plays Stand Firm. In response, T_1 plays Acquiesce while T_2 plays Stand Firm. However, if the two T separate in their strategies, S updates her belief about T's type upon observing T Stand Firm:

$$\frac{\Omega(0)}{\Omega(0) + (1-\Omega)1} = 0 \tag{4}$$

S therefore now believes that she is facing T_2, and switches her strategy to $\sim$ Impose. But if she does so, T_1 should prefer to switch his strategy to Stand Firm. If T_1 switches strategies, the observation that T stands firm communicates no information to S. S therefore again uses her prior beliefs, and plays Sanction since $\Omega > \Omega^*$. This causes T_1 to again switch his strategies, causing the cycle to repeat. We therefore see that there is no pure strategy equilibrium in this case.

Let us check for the existence of a semi-separating equilibrium instead. Suppose T_1 plays Stand Firm with some probability q and plays Acquiesce with probability $(1-q)$. T_1 plays q such that S is indifferent between playing Sanction and $\sim$ Sanction: $\frac{\Omega q}{(\Omega q + (1-\Omega)1)} = \frac{c_S}{x_S}$. Solving for q:

1. $\frac{\Omega q}{(\Omega q + (1-\Omega)1)} = \frac{c_S}{x_S}$

2. $q = \frac{(1-\Omega)c_S}{\Omega(x_S - c_S)}$

S responds by playing Impose with probability j and ∼Impose with probability $(1-j)$. Define j as the probability that S plays Impose that makes T_1 indifferent between playing Acquiesce and Stand Firm in his first move:

1. $x_T = j(x_T - c_T) + (1-j)1$

2. $j = \frac{1-x_T}{1-x_T+c_T}$

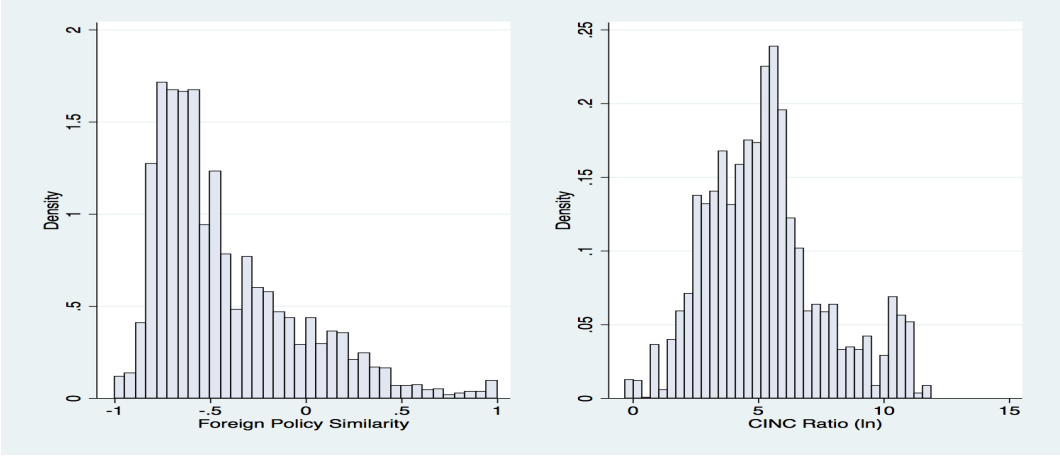
For S and T to adopt these mixed strategies, it must first be true that S's payoff for playing Threat must be greater than 0, which is her payoff for ∼ Threat. This is true given her prior belief $\Omega > \Omega^*$. We therefore see that if Condition 1 is not fulfilled ($\beta > \frac{1-x_T}{1-p}$), and Condition 2 is fulfilled ($p > x_T$), and Condition 3 is fulfilled ($x_S - c_S > 0$), sanctions occur with some positive probability.

Appendix B: Supplementary Empirical Appendix

This section includes additional details about the research design and empirical modeling choices, and presents robustness check results.

Figure S1 presents the histograms of *Foreign Policy Similarity* and *CINC Ratio-ln*.[22]

Figure S1: Histogram of *Foreign Policy Similarity* and *CINC Ratio-ln* Variables



[22]Histogram for *Credit Ratings*, and *Trade Dependence* are presented in the paper.

The main model presented in Table 4 includes temporal controls for the selection equation, following (Carter and Signorino 2010). However, their coefficient estimates are omitted from the table for brevity. Table S1 presents the full model, with temporal controls presented.

Table S1: Heckman Model: Temporal Controls Included (Carter and Signorino 2010)

	Outcome Equation: (DV: Imposition)	Selection Equation: (DV: Threat)
Credit Rating	-0.005**	
	(0.002)	
Trade Dependence	-1.152**	0.664***
	(0.414)	(0.177)
RatingxTrade Dependence	0.022**	
	(0.008)	
Foreign Policy Similarity		-0.266***
		(0.070)
Democratic Target	0.053	0.179
	(0.116)	(0.093)
CINC Ratio (ln)	0.194***	-0.172***
	(0.034)	(0.029)
Previous Imposition	-0.065	0.071
	(0.145)	(0.113)
Cold War	0.564***	-0.470***
	(0.116)	(0.104)
Multilateral	0.410*	
	(0.162)	
Time Since Last Threat		0.030
		0.031
Time Since Last Threat - Squared		-0.003
		0.003
Time Since Last Threat - Cubed		0.000
		0.000
Constant	1.254***	-1.287***
	(0.215)	(0.200)
ρ	-1	
	(1.53e-11)	
Number of Observations	3407	
Number of Censored Observations	3254	
Number of Uncensored Observations	153	

- Estimates are derived from a Heckman Model with S.Es (in paranthesis) clustered on the target state.
- Significance levels: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

As a robustness check, Table S2 presents the results with the inclusion of temporal splines, following (Beck, Katz and Tucker 1998). The results remain the same.

Table S2: Heckman Selection Model: Splines Included (Beck, Katz and Tucker 1998)

	Outcome Equation: (DV: Imposition)	Selection Equation: (DV: Threat)
Credit Rating	-0.005**	
	(0.002)	
Trade Dependence	-1.210**	0.675***
	(0.456)	(0.178)
Rating x Trade Dependence	0.024**	
	(0.010)	
Foreign Policy Similarity		-0.242***
		(0.083)
Democratic Target	0.054	0.172
	(0.120)	(0.094)
CINC Ratio (ln)	0.193***	-0.173***
	(0.036)	(0.030)
Previous Imposition	-0.057	0.071
	(0.131)	(0.113)
Cold War	0.560***	-0.475***
	(0.124)	(0.103)
Multilateral	0.407*	
	(0.186)	
Time Since Last Threat		-0.008
		(0.049)
Spline 1		-0.002
		(0.003)
Spline 2		0.002
		(0.002)
Spline 3		-0.001
		(0.001)
Constant	1.248***	-1.243***
	(0.224)	(0.207)
ρ	-1	
	(9.93e-12)	
Number of Observations	3407	
Number of Censored Observations	3254	
Number of Uncensored Observations	153	

- Standard errors are in paranthesis. Estimates are derived from a heckman selection model with standard errors clustered on the target state.
- Significance levels: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

Lastly, Table S3 presents the results without clustering standard errors on target state.

Table S3: Heckman Selection Model: No Clustering

	Outcome Equation: (DV: Imposition)	Selection Equation: (DV: Threat)
Credit Rating	-0.005**	
	(0.002)	
Trade Dependence	-1.152**	0.664***
	(0.460)	(0.216)
RatingxTrade Dependence	0.022**	
	(0.010)	
Foreign Policy Similarity		-0.266***
		(0.079)
Democratic Target	0.053	0.179*
	(0.107)	(0.088)
CINC Ratio (ln)	0.194***	-0.172***
	(0.032)	(0.028)
Previous Imposition	-0.065	0.071
	(0.134)	(0.102)
Cold War	0.564***	-0.470***
	(0.122)	(0.100)
Multilateral	0.410*	
	(0.146)	
Time Since Last Threat		0.030
		0.028
Spline 2		-0.003
		0.003
Spline 3		0.000
		0.000
Constant	1.254***	-1.287***
	(0.191)	(0.175)
ρ	-1	
	(2.40e-09)	
Number of Observations	3407	
Number of Censored Observations	3254	
Number of Uncensored Observations	153	

- Significance levels: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

Testing Target Acquiescence

We find that sanctions imposition is unlikely in cases where targets place a high value on maintaining economic transactions with the sender. These targets are likely to acquiesce to the sender's demands at the threat stage and avoid the disruption of valuable economic transactions with the sender. Since the main focus of this paper is to understand why senders impose sanctions, given the ability of some targets to offset the costs of sanctions by borrowing, we left the analysis of the target behavior to the appendix.

To test the expectation that the probability of target acquiescence increases as target's trade dependence to the sender increases, we constructed a binary dependent variable capturing whether the target acquiesces to the sender's threat, or not. Using the TIES dataset, we code the *Target Acquiescence* as 1 if the case ended with the target's complete or partial acquiescence or a negotiated settlement at the threat stage, and 0 otherwise.

Credit Ratings and *Trade dependence* are our main independent variables. In addition, we control for the target's foreign policy similarity to the U.S., whether sanctions are multilateral, whether the U.S. previously imposed sanctions on the target and relative capability. We also included dummy variables for Cold War and geographical regions to account for potentially unmeasured temporal and spatial differences among target states. Table S4 shows that the coefficient of trade dependence is positive and statistically significant, indicating that targets are more likely to acquiesce to the sender's demands at the threat stage if its trade dependence to the sender is relatively high. Negative and statistically significant coefficient estimate of *Credit Ratings* indicate that the probability of target acquiescence decreases as credit ratings increases. This is also consistent with our expectations; since our model demonstrates that targets with high credit scores are able to offset the costs of economic sanctions and more likely to resist senders' demands.

Table S4: Probit: Target Acquiescence

Credit Rating	-0.015*
	(0.007)
Trade Dependence	1.523*
	(0.755)
Foreign Policy Similarity	0.794*
	(0.375)
Multilateral	-0.333
	(0.372)
Previous Imposition	-0.066
	(0.312)
Relative Capability (ln)	-0.041
	(0.079)
Cold War	0.129
	(0.309)
Constant	-4.070***
	(0.773)
Number of Observations	144

- Robust standard errors are in paranthesis. Estimates are derived from a probit model with standard errors clustered on the target state.
- Significance levels: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$
- Regional fixed effect are omitted.