Sanctions and Preventive War

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Abstract

In this paper we demonstrate that through their use as tools of military containment, sanctions play an unappreciated role in international politics. We show that sanctions can be used to smooth shifts in relative power that would otherwise lead to preventive war. After presenting a model of shifting relative power and sanctions, we discuss two cases in which sanctions were imposed to destroy an adversary's military capability. We also explore the implications of this argument for the evaluation of sanctions' effectiveness. Because sanctions may be deployed as a mechanism to lock in the status quo rather than revise it, the outcome of a sanctions episode must be compared to its counterfactual rather than the status quo ante. Our argument suggests that sanctions may be effectively deployed in response to expected adverse shifts in relative power; therefore observed outcomes disadvantageous to the sanctioning state are insufficient proof that sanctions have failed.

What is the relationship between international sanctions and war? Consider the recent example of Western sanctions on Russia. In response to the Russian-sponsored rebellion in eastern Ukraine, the United States in 2014 engineered an increasingly binding set of international sanctions which curtailed a pattern of increased Russian military spending. In September, the U.S. denied Sberbank, Russia's largest bank, and Rostec, a manufacturing conglomerate, access to U.S. debt markets. Furthermore, U.S. firms were forced to void several oil and gas exploration contracts with Russian energy companies (Mohammed and Trott 2014). Yet despite its increasingly bleak economic situation, Russia did not withdraw from eastern Ukraine. While the United States seems disinclined to respond to Russian occupation of the Donbass region with military force, following the logic in Slantchev (2011) the increased placement of weaponry and troops in Eastern Europe suggests a willingness to intervene should Russia seize further territory (Schmitt and Myers 2015). A cursory evaluation might suggest that by failing to roll back Russian territorial ambitions, sanctions have failed. However, rather than engineering a change in the status quo, we find that by destroying targeted states' military power, sanctions can prevent adverse shifts in the distribution of power that could otherwise lead to armed conflict.

Many studies of sanctions behavior have focused on the role that sanctions play as a signaling device (Dorussen and Mo 2001, Lektzian and Sprecher 2007). In these studies, suffering the costs associated with either sending or bearing sanctions communicates resolve over an issue, lowering the risk of conflict by reducing the chances one party to a dispute makes an offer unacceptable to its adversary. For example, Russia might be willing to bear the costs of sanctions in order to communicate its resolve over eastern Ukraine. But sanctions have also had a direct effect on Russian military power. In the ten years preceding the Ukrainian civil war, Russia doubled its military spending. The 2014 sanctions regime put paid to this pattern. By October,

amidst decreased economic growth projections – from 6% to 0.5% – and concerns over the stability of the ruble, Russian finance minister Anton Siluanov announced that military spending would have to be cut, "reconsider[ing] the amount of resources that will be spent from the budget [on the military] in order to make it more realistic" (Kelly 2014). Sanctions not only forced a cut to Russian military spending, they also decreased Moscow's ability to pay for occupying larger slices of Ukraine: even before the invasion Russia subsidized Ukrainian industry to the tune of $5 to $10 billion per year. Despite taking indirect control of several Ukrainian cities, Russia was forced by the sanctions regime to cut these subsidies, leading a Brookings report to conclude that "[w]hat Russia could not afford is to win Ukraine" (Gaddy and Ickes 2014). Sanctions worked in this instance not by forcing a Russian surrender of Crimea or Donbass, but by preventing a Russian seizure of Kiev.

In this paper, we argue that theoretical work on sanctions has neglected the role sanctions may play in commitment problem-driven wars. These wars occur when a state is expected to experience a large and rapid period of growth in relative military power and a rival attacks to prevent the adverse shift from occurring (Fearon 1995, Powell 2006). To consider the relationship between economic sanctions and commitment problem-driven war, we analyze a model in which a declining state can temper its adversary's growth through the imposition of sanctions. We find that the relationship between sanctions imposition and the likelihood of conflict depends substantially on how destructive the sanctions are to the target's military power. When sanctions are relatively toothless, they have no effect on the probability of war. Here, states can freely sanction an adversary without significantly upsetting their relationship. However, when sanctions are moderately destructive, they can be used to offset adverse shifts in relative power that would otherwise generate a commitment problem. In these cases, a declining state imple-

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ments sanctions not to secure concessions, but rather to avoid a war it would otherwise fight given its adversary's military growth. Here, sanctions operate to smooth shifts in relative power. Finally, when sanctions are enormously destructive, states will implement them even knowing that they will cause the target to attack in response. In these cases, the benefit of sanctions in terms of destroying an adversary's military power are such that they reverse the commitment problem: states cannot promise not to deploy sanctions, and the target therefore attacks in order to prevent bearing sanctions.

Our argument has two clear implications for international relations scholarship. First, the smoothing mechanism we outline indicates that while sanctions may appear not to work, they may in fact be operating to the benefit of sending states, either by avoiding concessions a declining state would otherwise provide to its adversary or by averting costly preventive war. By preventive war, we mean a specific case of commitment problem-driven conflict in which a state attacks its adversary to prevent an expected loss in relative power (Powell 2006). Because sanctions are often employed in the face of adverse shifts in relative power, evaluating their effectiveness by comparing the *status quo ante* to outcomes after sanctions were imposed may often be inappropriate. Our argument points to the need for theoretically informed counterfactual reasoning when evaluating the efficacy of sanctions. Scholars and policymakers should ask not whether sanctions change target state behavior relative to the *status quo ante*, but rather what target state behavior would have looked like had sanctions not been imposed.[1] Counterintuitively, we show that an outcome where sanctioning states are objectively worse off after

[1] By *status quo ante*, we mean the political settlement prevailing between two states before a crisis begins.

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imposing sanctions than they were before their imposition is consistent with the rational implementation of sanctions.

Second, we demonstrate that sanctions can be tools for peace. International relations scholars are increasingly attentive to the role that states can play in underwriting peaceful political settlements (Fortna 2003, 2004). Our argument implies that sanctions may play a similar role in dynamic bargaining settings. By muting shifts in the distribution of power that could otherwise lead to war, sanctions can underwrite peace. Whether the peaceful operation of sanctions is welfare-increasing will depend greatly on the distributional effects of the specific sanctions regime, including the individuals, goods, and markets targeted. The humanitarian costs from sanctions are undoubtedly severe, but the costs of warfare to civilians are dire. Our argument cautions that under some conditions, the humanitarian costs of sanctions should be weighed against an alternative of war instead of peace.

Sanctions and Information Transmission

The question of how states might use sanctions in order to display their resolve over a disputed issue in international politics has been central to the sanctions literature. Because sanctions are costly, a theory explaining their imposition as an alternative to war might look to their signaling properties – because of their costliness, sanctions or the threat of sanctions provide a way for states to demonstrate their resolve, either through sinking costs or tying hands (Banks 1991, Fearon 1997). If sanctions serve a signaling purpose, the sanctioner might use the costliness of sanctions to demonstrate its own resolve on the issue at hand.

Identifying the effect of sanctions-induced signaling in the empirical record is likely be dif-

ficult if sanctions are imposed only when threats fail (Drezner 2003). Nooruddin (2002) finds, using a censored probit model, that after correcting for the process by which states are targeted by sanctions, several covariates previously implicated in sanctions success in reality make failure more likely. Similarly, Lacy and Niou (2004) find that strategic implementation generally leads to the imposition of sanctions in situations where they are unlikely to work: since only resilient targets will refuse to back down from the threat of sanctions, and only resolute coercers will follow through with them, we should expect sanctions to "work" only infrequently. Further, the very costliness of sanctions can undermine their ability to signal resolve due to the effect this has on their implementation: states, particularly democracies, design sanctions to be minimally costly to themselves, leaving their targets less sure about how resolved the sending state is (Lektzian and Sprecher 2007).

But these costs, in addition to sending signals over resolve, also have direct effects on the relative military power of the sender and target states. For example, the United States sought to impose a grain embargo on the Soviet Union in the early 1980s in response to the latter's invasion of Afghanistan. While the embargo decimated U.S. grain farmers and thus ostensibly demonstrated American resolve, it also had a military logic: a CIA report on the Soviet economy pointed to a "Western denial of grain and other agricultural products" as forcing a shift of investment away from Soviet military production (CIA 1982). The logic of the grain embargo sought to force Moscow to reallocate resources away from military spending. In the next section we describe in further detail how sanctions can shift relative military power between adversaries.

Sanctions, Coercion, and Power

Many scholars have argued that sanctions facilitate negotiations by imposing costs for failing to reach an agreement (for the seminal treatment of this argument, see Morgan and Schwebach (1997)). This line of argument sees sanctions as primarily a coercive tool. Through their ability in imposing costs, sanctions have been linked to leader instability (Marinov 2005) – especially in personalist authoritarian regimes (Escribà-Folch and Wright 2010) – and the collapse of democracy (Peksen and Drury 2010). In modeling sanctions as coercive, scholars have focused on sanctions' role as a detriment to consumption. But sanctions also shape states' ability to pursue their interests. In particular, sanctions can determine the value states place on going to war.

In addition to sanctions' usefulness for signaling resolve, they also have an effect on relative military power. While this direct effect of sanctions on relative military power has been neglected by scholars, shifting power has long been recognized by students of international relations to be an important factor for explaining war.[2] In this paper we explore the implications

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[2]Power transition theory was the first literature to recognize the role of shifting power for explaining international instability. See Organski (1958), Gilpin (1981) and Organski and Kugler (1980) for seminal contributions to this literature. For recent examples in the power transition literature, see Lemke (1997) and Kim and Morrow (1992). However, power transition theory focuses on major power transitions when a rising power surpasses a hegemon and therefore is mainly applicable to great power politics. Extending this logic, Powell (2006) shows that expectations of large shifts in the distribution of power, not necessarily parity, are sufficient for war. We couch our analysis in the commitment problem logic of Powell rather than power transition theory, allowing us to explain war and sanctioning behavior among minor as well as major powers.

of the direct effect of sanctions on target military power for interstate bargaining and war.

States often design sanctions to make investments in military power difficult for the target state. According to the Threat and Imposition of Sanctions (TIES) database, Morgan et al. (2006) find that roughly a quarter of all sanctions episodes have as their primary objective containing political or military behavior, regime destabilization, the denial of strategic materiel, or retaliation for alliance choices, all of which are related to the question of relative power. Furthermore, Elliott, Hufbauer and Schott (1985) code 47 out of 108 sanctions episodes since World War I as being directed towards either destabilizing, disrupting the military adventures of, or militarily impairing, a target state. Similarly, Marinov (2005) finds that sanctions are effective at destabilizing leaders in target countries. By changing the policy preferences of target states, senders are able to render shifts in relative power less threatening. While we are not arguing that sanctions are *only* imposed in response to shifting relative power, the cases in which they are appear to be particularly germane to the question of how sanctions influence the likelihood of war. The costs imposed are often substantial enough to have a large effect on the military power of the target. Approximately one in five sanctions episodes since 1945 had major or severe costs for the target state as coded by the TIES dataset. In these cases sanctions have the potential to "impose significant macroeconomic difficulties on the health of the target economy" and in the extreme have the "potential to halt the ability of the target's economy to function" (Morgan et al. 2006, p. 8).

The evidence also suggests that states often tailor sanctions to cause greater economic destruction for the target state than they do on the sending state. Over 95 percent of sanctions cases are coded as imposing a minor cost for the sending state in which there was "no evidence

that the health of the sender's economy will be impacted" (Morgan et al. 2006). This suggests that sanctions often have the effect of reducing target relative power that we discuss below. As sanctions are usually sent by a state with a larger economy than the targeted country, the marginal cost to target states is generally larger than it is for sending states even when the cases are coded as being similarly costly.

We argue that the utility of sanctions may lie in their ability to destroy in addition to their usefulness as a signal. Indeed, the destructive effects of sanctions are primarily responsible for the success of sanctions episodes (Whang, McLean and Kuberski 2013). Sanctions and military force are often used in tandem rather than strictly as substitutes (Clark and Reed 2005). If policymakers derive value from sanctions' ability to destroy, the drive to implement sanctions must encompass more than signaling alone.

The logic of commitment problems has powerful implications for the study of sanctions. In Powell's model a state has two options in the face of a rival: it can either fight a war to lock in a share of the spoils commensurate with its current power, or it can allow its adversary to become more powerful, knowing that tomorrow's agreements will secure for itself only a pittance (Powell 2006). Sanctions may provide another avenue of action because they erode the mapping of the adversary's military investments to military power. The possibility that sanctions might alleviate commitment problems upends what we should expect to observe when sanctions are implemented. Rather than securing a state more in negotiations, sanctioning should be a mechanism for locking in a particular distribution of power without resorting to war. In other words, because sanctions may be employed in response to adverse shifts in power, the impact of sanctions should be measured against the counterfactual in which sanctions were

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not imposed, rather than against the *status quo ante*.[3]

Nesting sanctions in commitment problem logic also makes explicable otherwise confounding cases. Pape (1997) argues in part that modern nation states are too institutionally-robust to fail in the face of economic tightening: even Iraq, which as he notes lost 48% of its GNP due to sanctions in the 1990s, did not concede (p. 106). But the theoretical re-evaluation provided here suggests that this may have been precisely the intention: the destruction of infrastructure, not disabuse, was the goal, and it is by this metric that sanctions' efficacy should be measured. In the next section we explore the implications of the direct effect of sanctions on military power using a game-theoretic model in two steps. First, following other commitment problem models of war, we assume that a state's adversary is expected to increase its relative power. Second, we allow the declining state to implement sanctions against its adversary.

Model

Consider an infinitely repeated game in which states *A* and *B* are bargaining over a series of pies of value one.[4] In each stage game, *A* has the opportunity to sanction *B*, which destroys some of *B*'s latent military power, denoted by p. Following, *B* offers a division of the pie $x \in [0, 1]$

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[3]The importance of counterfactuals in establishing the true causal effect of an event is well-articulated in Morgan and Winship (2007), as well as Fearon (1991). For an application of counterfactual reasoning in international relations specifically, see Bueno De Mesquita and Downs (2006).

[4]For ease of exposition we refer to State *A* as *she* and State *B* as *he*.

or fights a war, which we model as a game-ending costly lottery. If B does not fight, A has the opportunity to accept or reject B's offer. If A accepts B's offer, then they divide the good according to B's proposed division. If A rejects B's offer, then the players fight a war, and the game ends. B's offer is the amount of the pie it keeps in a bargain, such that $u_A(x) = 1 - x$ and $u_B(x) = x$. If war occurs, a portion of the present and every future pie, denoted by $d \in (0,1)$, is destroyed. This captures the assumption common in models of bargaining in war that fighting is costly. If war occurs, the victor enjoys the full value of the series of pies in the future, less the destruction of war. As long as war does not occur, the bargaining game continues infinitely, with both players discounting future play at a common rate $\delta \in (0,1)$. To be explicit, in each stage game of the model:

1. A decides whether to sanction or not.
2. B decides either to make an offer or fight a war.
   (a) If B fights a war, the game ends.
3. If B makes an offer, A either accepts B's offer or fights a war.
   (a) If A fights a war, the game ends.
   (b) If A accepts the offer, the pie is divided according to that offer.

After the initial period, B is expected to obtain some amount of growth, $\Delta \in [0, 1 - p]$, which will increase its chances of prevailing in conflict to $p + \Delta$. The upper bound on this shift, $1 - p$, ensures B's post-growth probability of winning a war does not exceed one. This construction closely follows the model in Powell (2006) on page 183: in fact, the current model is equivalent to Powell's with the exception that the declining state can implement sanctions.[5] Let γ serve

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[5]In the same paper, Powell also considers a second model exploring the effect of "first-strike advantages" in which the declining state has the option of rejecting its adversary's offer without going to war. We have analyzed a separate version of the model presented here in which A has

as an indicator for whether this shift in power has taken place in the current period, such that $\gamma = 0$ in the initial period and $\gamma = 1$ in every subsequent period.

$$\gamma = \left\{ \begin{array}{ll} 0 & \text{if } t = 0 \\ 1 & \text{if } t \geq 1 \end{array} \right.$$

While B grows stronger from the first to the second period, A also has the ability to sanction B, which destroys some of the latter's military power.[6] The effect of sanctions on B's chances of prevailing in conflict is denoted by a multiplier on p, $(1 - s)$ where $s \in (0, 1)$ is the effectiveness of sanctions.[7] In this paper we are primarily concerned with the destructiveness of sanctions as it relates to B's chances of winning a military conflict with A. Therefore, sanctions of $s = .4$ destroy forty percent of B's military power, sanctions of $s = .2$ destroy twenty percent of B's

the option to reject B's offer and revert to a status quo, paramaterized by q. The substantive results drawn below are fully robust to this alternative specification. Proofs available from the authors upon request.

[6]While sanctions clearly may reduce the absolute power of both A and B, in this paper we focus our analysis on sanctions that on balance reduce the target's absolute power more than the sender's, resulting in an overall reduction in B's relative military power. As we discuss below, we retain the assumption from the signaling literature that sanctions are costly for A to impose.

[7]Many factors may determine how much sanctions alter the target's relative military power. For example, higher levels of trade dependence, especially in goods used for military purposes, the availability of other markets, and the extent of multilateral cooperation on sanctions may all impact how much sanctions alter the distribution of power.

military power, etc. Figure 1 illustrates the influence of sanctions on B's military power. Finally, we recognize that sanctions impose costs on both sender and target outside of their effect on military power. These costs might be comprised of losses of trade or the suffering imposed on innocents hurt by sanctions. Therefore we include a cost of sanctions for A and B denoted by $\lambda_A > 0$ and $\lambda_B > 0$, respectively. Both players pay their respective cost in each round in which sanctions are imposed.

[Figure 1 here.]

Let r denote the number of times A has sanctioned B prior to the current period. It follows that B's effective relative military power, the probability he wins a war should it occur, is a function of r, γ, and A's sanctioning decision in the current round. Specifically, the probability B wins a war if it occurs is equal to $p(1-s)^r + \Delta\gamma$ if sanctions were not imposed in the current round. If sanctions were imposed in the current round, then the probability of B winning is eroded by an additional round of sanctions and is therefore given by $p(1-s)^{r+1} + \Delta\gamma$. The stage game utility of accepting offer x is given by $u_A(x) = 1 - x$ and $u_B(x) = x$ for A and B respectively. The expected utility of fighting a war for A is given by

$$EU_A(\text{war}|r,\gamma) = \begin{cases} \frac{(1-p(1-s)^{r+1}-\Delta\gamma)(1-d)}{1-\delta} - \lambda_A & \text{if } A \text{ sanctions;} \\ \frac{(1-p(1-s)^r-\Delta\gamma)(1-d)}{1-\delta} & \text{if } A \text{ doesn't sanction.} \end{cases}$$

The expected utility of fighting a war for B is given by

$$EU_B(\text{war}|r,\gamma) = \begin{cases} \frac{(p(1-s)^{r+1}+\Delta\gamma)(1-d)}{1-\delta} - \lambda_B & \text{if } A \text{ sanctions;} \\ \frac{(p(1-s)^r+\Delta\gamma)(1-d)}{1-\delta} & \text{if } A \text{ doesn't sanction.} \end{cases}$$

Substantively, the model provides a good fit for a wide range of types of sanctions. Technically, the model imposes three requirements on foreign policy instruments for them to be considered sanctions: a given foreign policy instrument must (a) hurt consumption in both the sender and target states; (b) influence the distribution of military power between the sender and target states to the sender's advantage; and (c) not be war. This definition clearly encompasses economic definitions of sanctions, as in Hufbauer et al., who define sanctions as the "deliberate, government-inspired withdrawal, or threat of withdrawal, of customary trade or financial relations" (Hufbauer et al. 2007, p. 3). While many previous authors have not explicitly considered the effect of sanctions on the relative power, we believe that sanctions often fit this requirement in practice, and illustrate several cases to this effect in the discussion section below.

Analysis

We restrict our attention to Markov Perfect Equilibria, a refinement of Subgame Perfect Nash Equilibria in which strategies are determined by the the state of the game, defined here by $\{r, \gamma\}$. In other words, game play is history independent except with respect to the number of previous times sanctions have been imposed and whether or not the shift in power has occurred. We first characterize how long A is willing to impose sanctions in equilibrium. Then we turn to the main results of the paper: we show that when sanctioning is not prohibitively costly, the size of the shift in relative power needed to cause war when sanctions are available is strictly larger than the size needed to cause war if sanctions are unavailable – this establishes the smoothing argument for the pacific effect of sanctions. Even when sanctions are not effective enough to

avert war, under some conditions states may still impose them to degrade their adversary's military capabilities. Next we show how sanctions "work" by making the sending state better off relative to the counterfactual in which they do not impose sanctions. Finally, we establish conditions under which highly effective sanctions can be a mechanism for war in their own right: here, their destructiveness incites B to attack in order to prevent them from occurring. In the analysis we focus on a *sanctions* equilibrium in which sanctions are imposed for at least two periods and a *no sanctions* equilibrium in which sanctions are not imposed at all.[8]

In order to consider the effect of sanctions on the likelihood of war and the effect of sanctions on bargaining outcomes, we must first characterize how long A is willing to impose sanctions in equilibrium. Recall that r is a state variable which denotes the number of times sanctions have been imposed in the past. We define r^* as the maximum value r may take in equilibrium for a given set of parameter values. Put another way, r^* is the number of periods A prefers to impose sanctions in equilibrium.

Proposition 1 *For any set of specific parameter values, A prefers to impose sanctions for r^* periods. In any MPE, $r^* \equiv \max\{\mathbb{N} \in [0, k]\}$, where $k \equiv \dfrac{\ln\left[\frac{\lambda_A(1-\delta)(1-s)}{p(1-d)s}\right]}{\ln[1-s]}$.*

Establishing Proposition 1 allows us to characterize the continuation values for states A and

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[8]Specifically, we focus on the comparison between the *no sanctions* equilibrium and the *sanctions* equilibrium when $r^* \geq 2$. This allows us to highlight our main results more clearly and provides a good substantive fit with the empirical record, as most instances of sanctions last longer than one year. For technical reasons the equilibrium strategies for sanctions lasting 1 period are slightly different, but the substantive implications between the *sanctions* and *no sanctions* equilibria are identical for sanctions episodes of any length.

B.[9] This allows the players in the game to anticipate the costs and benefits of the overall sanctions episode. Intuitively, note that k is decreasing in λ_A. That is, as sanctions are very costly to A, her willingness to impose long sanctioning episodes is decreased. Interestingly, k is non-monotonic in s. Having access to very destructive sanctions make A willing to impose them for longer, but only up to a point. The decreasing utility of very powerful sanctions occurs for two reasons. First, sanctions exhibit decreasing returns much faster as they become more effective, so for a constant λ_A, sanctioning episodes are shorter as sanctions have a very strong bite. Second, if sanctions are very effective, A simply does not need to impose them for very long in order to become satisfied with the bargain she receives from B.

Next, we establish that when sanctions are moderately destructive and costly they can smooth shifts in power that would have otherwise led to war. This follows from a direct comparison of the efficiency condition in the *no sanctions* equilibrium with the efficiency condition in the *sanctions* equilibrium. Here, the efficiency condition refers to the threshold on Δ, the expected shift in relative power, above which A prefers to fight a war rather than accept even the most favorable of bargains. For relative power shifts that exceed the efficiency condition on Δ, B cannot offer A enough today to compensate her for the disadvantageous bargaining position she will be in after the power shift occurs.

Recall that if relative power is expected to shift too much, too quickly, this can incentivize the declining state A to launch a preventive war. Our next result shows how sanctions may work to avoid war that would otherwise occur by smoothing these large shifts in relative power. When this is true, the effectiveness of sanctions lies in their role as a less costly alternative to

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[9]Proofs for all propositions available in the Appendix.

armed conflict. The focus in this section is on the difference between the size of shift in power

necessary for war when sanctions are and are not available. We will denote the cutpoint for

the efficiency condition in the *no sanctions* equilibrium as $\Delta_{\neg s|r^*=0}$ and the cutpoint for the

sanctions equilibrium as $\Delta_{s|r^*\geq 2}$. When shifts in relative power are greater than these cutpoints,

A attacks in order to prevent them from occurring.

In the *no sanctions* equilibrium, war occurs for all[10]

$$\Delta > \Delta_{\neg s|r^*=0} \equiv \frac{(1-\delta)(d+p(1-d))}{\delta(1-d)}. \tag{1}$$

Conversely, when sanctions are imposed – and imposed for longer than two periods – the shift

which precludes a peaceful bargain in the first round is

$$\Delta > \Delta_{s|r^*\geq 2} \equiv \frac{p(1-d)(1-s)[1-\delta(1-s)]+(1-\delta)(d-\delta\lambda_A)}{\delta(1-d)}. \tag{2}$$

A comparison of the efficiency conditions in the *no sanctions* and *sanctions* equilibria yields the

following proposition.

Proposition 2 *Under the sanctions equilibrium, peace obtains for a wider range of expected*

shifts in relative power than the no sanctions equilibrium if $\lambda_A < \lambda_p \equiv \frac{(1-d)ps((2-s)\delta-1)}{(1-\delta)\delta}$.

Proposition 2 follows from a simple comparison of the cutpoints on Δ from Equations 1 and

2. When the costs of sanctioning are low enough for the sender ($\lambda_A < \lambda_p$), larger shifts may

happen peacefully in the *sanctions* equilibrium than could occur peacefully in the *no sanctions*

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[10]See the Appendix for derivation of Equations 1 and 2.

equilibrium.

Figure 2 illustrates Proposition 2 by plotting the efficiency conditions on Δ as a function of p, the initial share of relative power held by B. At low levels of p, sanctions are not imposed: the marginal contribution to relative power is outweighed by the costs of imposition when B is too weak. When p is large enough relative to the effect of sanctions, however, A imposes sanctions in the face of shifting power. As is evident from Figure 2, when sanctions are imposed B can peacefully grow stronger than he would be able to in the absence of sanctions. For example, suppose that $p = .5$, so that absent sanctions a pre-shift B has a 50% chance of prevailing in military conflict. When this is the case, A prefers to fight a preventive war for all $\Delta > .13$. Conversely, when sanctions of effectiveness $s = .2$ are imposed, the shift necessary to cause war is $\Delta = .17$, an increase of 30%.

[Figure 2 here.]

Above we find that sanctions are often a tool for peace; however, even when s is not large enough to mute a shift in power sufficiently to avoid a war, A may still wish to impose them in order to increase the chances she wins in the military contest that ensues. Proposition 3 establishes formally when A both sanctions and fights in equilibrium.

Proposition 3 *In equilibirum, when $\lambda_A \leq \frac{ps(1-d)}{1-\delta}$ and $\Delta > \Delta_{s|r^*}$, A sanctions and fights in the first round.*

We often observe sanctions episodes before a war occurs. Proposition 3 provides an explanation for this pattern. Even when sanctions are not destructive enough to counteract an adverse power shift and A decides to fight a preventive war ($\Delta > \Delta_{s|r^*}$), A prefers to implement them if they are not too costly ($\lambda_A \leq \frac{ps(1-d)}{1-\delta}$) because they improve her chances of winning the

subsequent military conflict. To the extent that open or impending warfare against an adversary makes sanctions less costly to impose, the model generates an explanation for the coincidence of sanctions and military conflict. In the discussion section below, we also consider how the previous two propositions might inform empirical models of interstate conflict onset. To preview this discussion, the theory presented here indicates that a failure to model sanctions as a dependent variable in potential competition with war may lead to biased estimates of the effect of covariates on the likelihood of onset of the latter.

Next, we establish the influence of sanctions on bargaining outcomes. One motivation for the following section is the oft-cited puzzle that sanctions are increasingly utilized while appearing to generally be unsuccessful. States that impose sanctions are often worse off than before they imposed sanctions, leading many to conclude that sanctions are a bad policy option. In the following proposition, we establish that sanctioning states are better off than they would have been had they not imposed sanctions, highlighting the need for counterfactual reasoning when evaluating the efficacy of sanctions. Crucially, this does *not* imply that sanctioning states are better off than they were before imposing sanctions. Empirical analysis of sanctions' effectiveness that utilizes observational data to compare pre- and post-sanctioning outcomes while not taking into account the counterfactual effect of sanctions risks biasing conclusions in favor of sanctions' ineffectiveness.

Proposition 4 *Bargaining outcomes are more favorable for A in the sanctions equilibrium than bargaining outcomes in the no sanctions equilibrium. Formally,*

$$1 - x_r > 1 - x_{r^* = 0} \quad and \tag{3}$$

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$$1 - x_{r^* \geq 2} > 1 - x_{r^* = 0} \tag{4}$$

This proposition states that the equilibrium bargains for A in the first period (Equation 3) and all subsequent periods (Equation 4) are smaller in the *sanctions* equilibrium as compared to the *no sanctions* equilibrium, which increases her utility for accepting them.

Proposition 4 illustrates that comparing bargaining outcomes after sanctions are imposed to the *status quo ante* can be misleading. In fact, the theoretical model indicates that for a wide range of parameter values, sanctioning states are actually worse off after imposing sanctions than they were in the pre-sanctioning status quo, even if war would not have otherwise occurred. Figure 3 plots the utility of A, the sanctioning state, for the equilibrium bargain set across seven periods.[11] Note that while A is strictly better off when she sanctions than she would be if she did not sanction, her utility for the bargain struck after B's shift in power never quite reaches her valuation of the status quo. This proposition illustrates that imposing sanctions makes the sending state marginally better off, in addition to the welfare benefit of averting preventive war laid out in Proposition 2. Because sanctions can be employed in response to adverse shifts in power, their effectiveness must be evaluated against the counterfactual, not the *status quo ante.*

[Figure 3 here.]

Finally, we establish when the availability of sanctions causes B to attack in order to prevent them from being imposed. This reverses the commitment problem, as in any MPE A cannot commit not to impose sanctions for r^* periods.

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[11]When $\delta = .8, d = .4, p = .5, \Delta = .15, \lambda_A = .2, s = .4.$

Proposition 5 *In equilibrium, B attacks in the first round in order to prevent future sanctions if* $r^* > \bar{r} \equiv \frac{\ln[\delta - \frac{d}{\lambda_A + \lambda_B}]}{\ln \delta}$ *when A sanctions in the first round.*

Consider the case in which A has access to sanctions that will both substantially impede B's military capability and will be imposed for a lengthy period. In this scenario, sanctions are too attractive to A to not impose. Crucially, under some conditions this temptation is too great even when the imposition of sanctions will cause war. While sanctions are too valuable to A, the prospect of bearing a long, costly sanctions episode is unpalatable to B. Rather than suffer through these incredibly binding sanctions, B prefers to fight a war.

   B takes into account how long and painful a sanctioning episode will be in the future when deciding whether or not to fight in the first round. If a sanctions episode will last many years, degrading the benefits it would have received from military power and imposing high levels of costs, then B attacks in the initial period, forgoing a future power shift in order to prevent a long and costly sanctions episode. Importantly, A cannot commit not to impose these sanctions after the shift. The attractiveness of a long sanctions episode for A has "reversed" the commitment problem such that B attacks A in order to prevent A having to bargain from a weakened position in the future.

Extension: Post-Sanctions Recovery

Before turning to a discussion of empirical implications, we consider a simple extension of the model. Above, sanctions functioned as a multiplier on the probability of winning a conflict whose effects persist into future periods. In this extension we relax that assumption to consider the possibility that once sanctions are lifted, targeted states may be better able realize its eco-

nomic and military potential.[12] Consider that once r^* is reached and sanctions are lifted, B's

military power begins to rise again with a shift in power denoted by $\phi \in [0, 1 - p(1 - s)^{r^*} - \Delta]$.[13]

The possibility of a post-sanctions shift in power introduces competing incentives for A. On

the one hand, sanctions still deteriorate B's military capability; on the other, their imposition

introduces a new possibility of growth as B reaps the gains from the lifting of sanctions at some

point in the future. When the latter effect dominates, the possibility of post-sanctions growth

can actually deter sanctions' imposition. Whether or not this occurs depends on how large this

post-sanctions recovery is. First, when this shift is small, $\phi < \bar{\phi}$ and $\phi < \hat{\phi}$, the substantive re-

sults are identical to those identified in Proposition 2, though the cutpoints vary slightly.[14] In

these cases, sanctions do not incite large enough post-sanctions growth to deter their imposi-

tion or substantially alter behavior.

When the post-sanctions shift is larger, the model indicates two possibilities. When $\phi > \bar{\phi}$

and $\phi < \hat{\phi}$, the expectation of post-sanctions growth deters their imposition. Here, A prefers

to suffer the original adverse shift in power rather than sanction and introduce another chance

for its adversary to quickly grow. Finally, when $\phi > \hat{\phi}$, A prefers to sanction B for r^* periods

and *then* fight its adversary. In these cases, sanctions do not help A avoid war, but rather allow

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[12]This is similar to what Organski and Kugler (1977) call the Phoenix Factor, wherein the losers

of major conflicts undergo accelerated post-conflict growth to return to antebellum status.

[13]Note that these bounds constrain the probability that B wins a war to the unit interval.

[14]Please see appendix for definitions of cutpoints and proofs.

her to kick the can down the road. Though space restricts an in-depth analysis here, this final equilibrium plausibly illustrates the case of U.S. sanctions on Iraq throughout the 1990s. While this sanctions regime crushed conventional Iraqi military strength, it did not prevent the Hussein regime from attempting to pursue a nuclear capability. However, when the United States eventually felt compelled to fight a war, its ability to depose Hussein was substantially eased by the effect of the previous decade's sanctions.

Empirical Implications and Discussion

In this section we outline the implications that our argument holds for the empirical study of sanctions and war. We divide the discussion into three sections. First, we provide a framework for understanding *ex ante* expectations of sanctions' destructiveness, which is a key parameter shaping equilibrium behavior in the model presented above. Second, we discuss potential revisions to several empirical models of conflict suggested by our results. Finally, we present two more detailed case studies.

In the model, the destructiveness of sanctions shapes both the length of sanctions episodes and the likelihood of conflict. In order for our model to be useful for predicting sanctions imposition, scholars must evaluate key parameters of the model independent of their effect on behavior. We conceive of sanctions' destructiveness as being measured along two dimensions. First, how dependent is the targeted state on the sending state? Second, how dependent is the targeted state on imports? Cases in which the targeted state depends heavily on the sanctioned state for imports are likely to be those that conform closely to Proposition 5 above: here, sanctions are so crippling that the sanctioned state has no choice but to fight before sanctions can

Table 1: Effect of Sanctions on Likelihood of Conflict

		Dependence of target state on imports	
		Low	High
Dependence of target state on sender	Low	No effect	Decrease
	High	Decrease	Increase

take effect. Below we argue that the case of U.S. sanctions on Japan in 1941 fits this logic. Not only did Japan import more than 90% of its war material, many of these goods were obtained almost exclusively from the United States. Cases where the sanctioned state imports most of the good(s) in question but has alternative sources of supply are likely to fall in the intermediate range, where sanctions reduce the likelihood of conflict. Many cases during the Cold War fall in this range: when one superpower reduced the supply of weapons to a regime, the targeted state could turn to another. As we argue in more detail below, the case of U.S. sanctions on Iran post-1979 illustrates this mechanism: because many of Iran's weapons were outdated U.S. models, U.S.-led sanctions were painful. Still, Tehran was able to obtain weapons from elsewhere – notably one of Washington's concerns during its involvement in the Persian Gulf "Tanker Wars" was Iran's access to Chinese Silkworm missiles. Finally, cases where the sanctioned state is relatively self-sufficient and imports little from the sanctioning state are unlikely to see sanctions imposed, and thus provide little leverage on the relationship between sanctions and conflict.

The effect of sanctions on prices in a globalized market means that they can have an effect on the distribution of military power even if a targeted state has alternative means of purchase. For instance, the U.S. grain embargo on the Soviet Union induced a Soviet shift away from military spending by raising the prices the latter had to pay for grain, rather than by quashing its availability entirely. While Europe's refusal to cooperate in the United States' embargo is cited

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as evidence of sanctions' weakness, the unavailability of American grain reduced supply sufficiently to raise prices such that the Soviets had less money to devote to military expenditures, a result that conforms to the original logic for imposing sanctions.

Our theoretical argument offers revisions to two empirical research agendas. First, our theory suggests that work on the onset of international conflict should both take into account how potentially destructive sanctions are and model the choices of sanctions and war as potentially competing. The availability of sanctions can help pin down predictions over conflict onset. Consider the cases of U.S. use (and non-use) of military force in Nicaragua and the Dominican Republic. The U.S. decision not to directly invade Nicaragua in the mid-1980s – or as Alexander Haig euphemistically put it, not to "do other things as well" – was driven not only by the emergence of the Contras, but by the ability of a naval blockade to stop the flow of Soviet weapons into the country (Grow 2008, p. 129). Indeed, Leogrande (1996) finds that economic sanctions were more devastating to the Sandanista regime than was the Contra war. This case contrasts with the U.S. invasion that restored conservative rule in the Dominican Republic in 1965. Lyndon Johnson initially attempted an indirect show of force to bolster anti-communist forces. When this failed, the lack of foreign support for Juan Bosch's troops meant that sanctions would have provided limited purchase on destroying the military support of anti-conservative forces (Grow 2008, chapter 6). An omission of sanctions from the decision of the U.S. to intervene risks concluding that foreign-supported rebellions are *less* likely to face direct military intervention. More generally, in failing to account for the correlation between sanctions' destructiveness and a number of other variables thought to influence conflict initiation – for example, economic interdependence – scholars risk recovering biased estimates of the effect of these other variables.

Second, work on the relationship between the length of sanctions episodes and sanctions ef-

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fectiveness should take into account the selection effect identified above. For example, Dashti-Gibson, Davis and Radcliff (1997) find that longer sanctions episodes are less effective at destabilizing targeted leaders. Likewise, the logic of trade diversion suggests that longer sanctions episodes may ultimately find failure as targeted states have time to identify alternative sources of supply: Lektzian and Souva (2001) argue that the length of sanctions episodes has no effect on the amount of time it takes for sanctioning dyads to return to pre-sanctions trade levels. The theoretical model presented above indicates that the types of sanctions episodes that are actually observed are a strategically-determined subset of potential sanctions episodes. As we demonstrated in Proposition 5, very lengthy, destructive sanctions may be accompanied by war. To the extent that conflict shapes global trading patterns, this logic suggests that controlling for the effect of sanctions on war may help better identify the relationship between the length of sanctions episodes and success. This finding has implications for studies seeking to *explain* the length of sanctions episodes, as well (Bolks and Al-Sowayel 2000, McGillivray and Stam 2004). These studies should include not only an *ex ante* measure of the expected costs of sanctioning; they should also account for the possibility that the observed set of sanctions are a censored – and potentially less destructive – subset of all potential sanctions cases.

Finally, we offer brief sketches of two historical sanctions episodes – U.S. sanctions on Iran in the 1980s and U.S. sanctions against Japan in 1941 – to illustrate the principles of our theory at work. In both cases the imposition of sanctions contains a clear military logic distinct from signaling. These cases should not be construed as offering dispositive proof of the theory; rather we focus on illustrating the plausibility and dynamics of the theoretical narrative presented above.

Iranian Arms: Sanctions and Smoothing Shifts in Relative Power

The case of U.S. sanctions on Iran during the Iran-Iraq War represents an instance where sanctions operated to avoid war: destructive enough to materially affect Iranian power, but not so painful that Iran preferred fighting the U.S. directly in response. The argument presented in this article suggests that had the United States not had access to sanctions which would materially affect Iran's ability to wage war, it would have been more likely to engage in military hostilities to curtail Iranian promotion of radical Islam. There was good reason to suspect Iran might be successful on this front, at least with respect to Iraq: from the beginning of the Iran-Iraq War in 1980, Iran's military expenditures surged from nearly $3.5 million to a peak of just over $20 million in 1984. Similarly, Iranian men under arms more than doubled from 300,000 in in 1980 to 650,000 in 1988.

In the context of this Iranian growth in power, U.S. sanctions – in place since the hostage crisis of 1979 – were not tightened against Iranian military efforts until Washington perceived a direct threat to Iraqi survival. After Iran repulsed the opening Iraqi salvo and made gains into Iraq proper, U.S. policy shifted dramatically. One of the keystones of this shift was Operation Staunch, a diplomatic effort to deny Iran U.S. weapons components which it had previously acquired from third parties (Rajaee 1993, p. 106). The denial of these components shackled Iranian military efforts because of the erstwhile ties between the U.S. and Iran during the Shah's regime: according to Akbar Torkan, former Iranian Minister of Defense, Iran's top priority became the procuring of spare parts for out-of-date Western tanks, submarines, missiles, and aircraft (Cordesman 1994, chapter 3). In the 1980s, Operation Staunch played a key role in denying Iran these materials. The overall effect of sanctions on Iranian military effort is worth quoting

at length:

> U.S. sanctions have made an important contribution to U.S. security by *depriving*
> *Iran of the resources it could otherwise have used for a military buildup.* Iran's eco-
> nomic woes – which have been exacerbated by U.S. sanctions – have forced Tehran
> to cut military procurement…by more than half…. With an extra \$1 billion to \$2
> billion a year, Iran would have been able to add many more weapons, complicat-
> ing U.S. defense planning in the region (Clawson et al. 1998, pp. 100-101, emphasis
> ours).

What goods Iran was able to procure were of alarmingly poor quality: Jeeps from India that immediately broke down, personnel carriers from China which proved "useless," and missiles from North Korea which had defective guidance systems. By the end of the war in 1988, Iran was down to 50 combat aircraft from a total of 400 at the beginning of the war. Likewise their stock of helicopters had shrunk from 500 to a dozen. Operation Staunch was crucial to preventing Iran from replenishing these military stockpiles: as late as 1987 a Chilean sale of sixteen F-5s to Tehran was scuttled on account of American pressure (Bulloch and Morris 1989, p. 192, 195-196).

In addition to preventing Iran from replenishing its destroyed stockpiles, the sanctions regime also forced Tehran to cancel large orders of additional military material. From 1989-1996, Iran contracted agreements to purchase 1,500 tanks, but was only able to pay for 184; similarly, the government purchased approximately one quarter of the number of aircraft originally planned for, and acquisition of artillery pieces was cut by between half and a third (Clawson et al. 1998, p. 94-95). Although sanctions did not prevent Iran from attempting to become stronger vis-a-

vis the United States and its ally Iraq, they did seriously curtail Tehran's ability to do so. The economic dislocations induced by sanctions forced Tehran to throw more resources after lesser results.

From the viewpoint of a 21st century U.S. policymaker considering the costs of more than thirty years of sanctions on Iran, the fact that Tehran remains belligerent likely implicates the fecklessness of sanctions. In fact in a November 2014 op-ed, Tzvi Kahn argues that the more than 20 years of sanctions have utterly failed to change Tehran's behavior (Kahn 2014). However, consider that prospectively, from the viewpoint of a U.S. policymaker in 1980, Iran's failure to export Islamic revolution abroad would likely augur for a rosier evaluation. Therefore, while a cursory evaluation of the overall effect of these sanctions might conclude that they were ineffective given that the war continued for nearly six years after their instantiation, this confuses effect with cause. Sanctions were imposed against Iran precisely because Iran's prospects of victory in its war against Iraq appeared to be improving. The fact that sanctions underwrote a bloody stalemate – and prevented an Iranian victory – should be counted as evidence in their favor.

Whether or not the United States would have fought a war with Iran in the absence of sanctions is impossible to know with certainty. But there is reason to believe that war would have been far more likely without the availability of sanctions. The U.S. interest in the Iran-Iraq war was to ensure that the Persian Gulf was not dominated by a single military power. As Secretary of State George Schultz wrote in his memoirs, Operation Staunch was "a limited form of balance-of-power policy," with U.S. support for Iraq "increas[ing] in rough proportion to Iran's military successes" (Schultz 1993, p. 237). While the administration clearly did not covet a war, Shultz was clear that the administration was accepting a risk of conflict with its later decision to

reflag Kuwaiti oil tankers to protect them from Iranian predation, but that this risk was acceptable given that it was "critical" that one power "not come to dominate the Gulf and therefore the Arabian Peninsula" (Schultz 1993, p. 926). When read in the context of the actual use of force not a decade later (this time against Iraq) to prevent the exact same fear from being realized, these quotes suggest that the possibility of war absent sanctions was a real one. Finally, the reflagging operation eventually did come to direct blows, in the largest naval engagement since the end of World War II. The contention of our theory is that the United States would have been willing to extend this confrontation had Iranian military power not already been significantly damaged by the sanctions of the preceding five years.

Japanese Isolation and World War II

The final insight from the model – that very effective sanctions can reverse the commitment problem and act as a cause of war in their own right – is exemplified by the sanctions imposed on Japan by the United States shortly before World War II. The oil embargo of August 1941 should be viewed as the culmination of a process that had gradually constricted Japan's commercial sphere to virtually nothing. The National Defense Act of 1940 gave the Roosevelt administration the ability to restrict the export of any materials vital to national defense; that same year, Roosevelt declared a ban on Japanese acquisition of aviation gasoline, certain types of steel and iron, copper, brass, bronze, zinc, and nickel. Since the United States supplied Japan with upwards of 80% of some of these materials, the ban dramatically restricted Japan's ability to engage in the production of new military capabilities (Record 2010).

The requirements of Japanese imperial expansion meant that Tokyo was pinched between

needing to ramp up imports from the U.S. at the very time Washington was restricting its ability to do so. For example, while the U.S. supplied 75% of Japan's scrap metal requirements in 1939 (up from 16% in 1931), total iron and steel exports across the Pacific fell from just over two million tons in 1939 to less than five hundred just two years later (Worth 1995, p. 102-103). The Japanese economy was heavily reliant on imports generally, regardless of source: in 1941 Japan imported 90% of its petroleum, nearly 100% of its cotton, wool, and rubber, and close to 90% of the metal required for its steel industry (Worth 1995, p. 108). All this meant that the much-bemoaned oil embargo was but one manifestation of the freeze of Japanese financial assets by the United States in July 1941. Executive Order 8832 froze all assets in which a Japanese national held a 25% or greater stake. Licenses – which were not forthcoming – were required for the transfer of any Japanese funds, foreign exchange transactions, and the sale of gold or silver (Miller 2007, p. 192). This had the immediate effect of restricting Japanese trade to the yen area, consisting primarily of Japan itself and recently-conquered territories. The consequences of this restriction are obvious from the numbers presented earlier: Japan's wartime economy was cut off from nearly all of the raw materials it required for expansion, with few options for immediate substitution.

Crucially, policymakers and military officials within the United States expected the escalation of sanctions to lead to war. In fact, Roosevelt was so certain that a complete embargo would lead to a Japanese invasion of the Dutch East Indies that he initially envisioned the freeze as being only partially enforced so as to allow Japan some breathing room. The creation of the Foreign Funds Control Committee (FFCC) – run by Assistant Secretary of State Dean Acheson, General Counsel Edward H. Foley, and Assistant Attorney General Francis Shea – effectively took control of the policy out of his hands. Although Roosevelt's intention in doing so is somewhat

obscured, the delegation of policy control to these three men led to the financial freeze being implemented without exception (Miller 2007, p. 200-204). The implications of this move from the view of top U.S. admiralty were unsparing and unequivocal. Chief of Naval Operations Admiral Harold Stark argued that "unless we were ready to accept a war risk, we should not take measures which would cut oil down to the Japanese below that needed for what might be called their normal peacetime needs for their industry and their ships." Similarly, Admiral Raymond K. Turner, Chief of War Plans Division of the navy indicated that an embargo "would probably result in a fairly early attack by Japan on Malaya and the Netherlands East Indies, and possibly would involve the United States in an early war in the Pacific" (Worth 1995, p. 194-196). The Japanese attacks on Pearl Harbor and Malaya followed Executive Order 8832 by less than five months.

Conclusion

What is the relationship between sanctions and war? Sanctions destroy resources that targets of sanctions might otherwise use to secure favorable international bargains. Consequently, we have argued that sanctions can be used to offset shifts in military power that would otherwise cause commitment problem-driven wars. This argument indicates that sanctions can be used as a tool for peace. Moreover, sanctions can be utilized as instruments to avoid what are likely to be the longest and most destructive wars – those driven by commitment problems.

Returning to the example from the introduction, the argument we have presented here suggests that sanctions may be a successful policy instrument against a belligerent Russia. However, if sanctions are measured by their ability to roll back Russian gains in Eastern Europe, they

may unfairly be judged to have failed. Instead, policymakers should note first that sanctions have likely prevented at a minimum further Russian escalation in Ukraine, and at a maximum Western military mobilization in response to this escalation. However, while U.S. and European policymakers may do well to impose sanctions on Russia, they should be careful not to design them too stringently. When sanctions bind too tightly, they may cause, rather than help avoid, conflict. In fact, the global oil shock to oil prices that helped to collapse the ruble in late 2014 may augur for a weakening of sanctions lest the cumulative effect of both sanctions and devalued natural resource exports point the way forward for further Russian belligerence.

To conclude, we offer three suggestions for future empirical research. First, many other mechanisms of international influence may operate similarly by shifting relative military power. For example, states may undertake arms programs of their own in response to expectations of an adversary's arming. If this is the case, understanding the relationship between arms races and the likelihood of war is similarly complicated by the fact that they are often occur in response to expected shifts in the distribution of power. For example, a state's ability to engage in an arms race could work to avoid war – if it is facing a growing adversary – or to cause it, if it is too unconstrained in its military buildup.

Second, the model highlights the problematic nature of previous efforts to determine whether sanctions are an effective tool of foreign policy. If sanctions are assumed to be instruments of status quo revision, they may well appear to be unsuccessful most of the time. However, if sanctions are instead deployed as mechanisms to maintain rather than overturn the status quo – as we argue here – they may achieve their goals more often than previously thought. The link between sanctions and war also cautions against using peace as a yardstick for measuring sanctions' efficacy. While moderately destructive sanctions can lower the probability of war, highly

destructive sanctions may be instituted by states fully expecting them to lead to war. Sanctions' efficacy in these cases cannot be judged against the peaceful status quo, because their implementation does not seek the avoidance of war. Instead, they are imposed to prevent a gradual deterioration of the previous bargain. Scholars should take seriously the role of counterfactuals when evaluating whether sanctions achieved their goal.

Finally, future empirical research should ascertain how often sanctions are utilized in response to expected shifts in relative power. A preliminary examination of the evidence suggests that the scope of the argument presented above is broad. According to two widely-cited data collections on sanctions imposition, between a quarter and half of sanctions episodes are explicitly designed to militarily contain targeted states (Hufbauer et al. 2007, Morgan et al. 2006). Moreover, one in five sanctions episodes have either major or severe costs for target states. Finally, nearly all (95%) sanctions cases are coded as imposing more costs on target rather than sending states. Determining precisely how often sanctions comport with the account we provided in this article will be challenging: if sanctions in fact are targeted to destroy the military capabilities of a state that is expected to grow stronger, sanctions may in fact be associated with an *increase* in target military capabilities. Careful empirical work is needed to establish reasonable counterfactuals absent sanctions. Future research in this pattern will contribute to the increasing push among scholars of international sanctions to understand the many causal logics of sanctions' imposition (Marinov 2005, Whang, McLean and Kuberski 2013).

Supporting Information

Proposition 1

For any set of specific parameter values, A prefers to impose sanctions for r^* periods. In any MPE,
$r^* \equiv \max\{\mathbb{N} \in [0, k]\}$, *where* $k \equiv \dfrac{\ln\left[\frac{\lambda_A (1-\delta)(1-s)}{p(1-d)s}\right]}{\ln[1-s]}$.

Proof To prove Proposition 1 we first establish the offer x which B makes in equilibrium when

the state variable $r = r^*$ after the shift in power has taken place ($\gamma = 1$). This offer, denoted by

x_{r^*} is the offer which makes A indifferent between accepting and fighting, conditional on not

sanctioning in the future. Such an offer allows B to capture the bargaining surplus and avoid

the cost of war, without giving anything extra to A.

Lemma 0.1 $x_{r^*} \equiv 1 - [1 - p(1-s)^{r^*} - \Delta](1-d)$ *denotes the equilibrium offer x by B when the state*

variable $r = r^*$ in any MPE.

Proof

$$EU_A(\text{accept}|x, r = r^*, \gamma = 1) \geq EU_A(\text{fight}|r = r^*, \gamma = 1)$$

$$\frac{1 - x_{r^*}}{1 - \delta} \geq \frac{(1 - p(1-s)^{r^*} - \Delta)(1-d)}{1 - \delta}$$

$$x_{r^*} \equiv 1 - (1 - p(1-s)^{r^*} - \Delta)(1-d)$$

Therefore the largest offer x that A will accept when $r = r^*$ is given by:

$$x_{r^*} \equiv 1 - [1 - p(1-s)^{r^*} - \Delta](1-d).$$

Lemma 0.2 *In any MPE, the equilibrium offer when state variable $r = r^* - 1$ is given by x_{r^*}*

Proof

$$EU_A(\text{accept}|x, r = r^* - 1, \gamma = 1) \geq EU_A(\text{fight}|r = r^* - 1, \gamma = 1)$$

$$1 - x_{r^* - 1} - \lambda_A + \frac{\delta(1 - x_{r^*})}{1 - \delta} \geq \frac{(1 - p(1 - s)^{(r^* - 1) + 1} - \Delta)(1 - d)}{1 - \delta} - \lambda_A$$

$$x_{r^* - 1} \leq 1 - (1 - p(1 - s)^{r^*} - \Delta)(1 - d) = x_{r^*}$$

Therefore the largest offer x that A will accept when $r = r^* - 1$ is given by x_{r^*}.

When $\gamma = 1$, for $k = r^*$ it must be the case that

$$EU_A(\text{sanction}|r = k - 1) \geq EU_A(\neg\text{sanction}|r = k - 1).$$

From above, $x_{r^* - 1} = x_{r^*}$ therefore the above inequality is equivalent to:

$$\frac{1 - x_{r^* = k}}{1 - \delta} - \lambda_A \geq \frac{1 - x_{r^* = k - 1}}{1 - \delta}.$$

Substituting x_{r^*} from above,

$$\frac{1 - (1 - (1 - p(1 - s)^k - \Delta)(1 - d))}{1 - \delta} - \lambda_A \geq \frac{1 - (1 - (1 - p(1 - s)^{k-1} - \Delta)(1 - d))}{1 - \delta}$$

$$k \equiv \frac{\ln\left[\frac{\lambda_A(1 - \delta)(1 - s)}{p(1 - d)s}\right]}{\ln[1 - s]}.$$

Therefore, r^* is the largest natural number which is less than k; if $k < 0$ then $r^* = 0$.

Equilibrium play posits that A will sanction if $r < r^*$. To see why A would not one-shot deviate from this strategy by not sanctioning in a given round when $\gamma = 1$, recall that the offer

at r when $\gamma = 1$ is strictly decreasing in r. By not sanctioning in a given round, A simply pushes her strategy back a period, as play is only conditioned on the state of the game. Because $\delta \in [0,1]$, A never has an incentive to do so, therefore A will not deviate from the posited strategy of sanctioning when $\gamma = 1, r < r^*$. Additionally, this strategy is based only on state variables r and γ and therefore satisfies the requirements for Markov Perfection.

Proposition 2

Under the sanctions equilibrium, peace obtains for a wider range of shifts in relative power than the no sanctions equilibrium if $\lambda_A < \lambda_p \equiv \frac{(1-d)ps((2-s)\delta-1)}{(1-\delta)\delta}$.

Proof Let $i = r^* - r$, or the number of rounds between a given round r and the final round of sanctions r^*. Then for A the minimal offer acceptable i periods before r^* when $\gamma = 1$, for $i \in \{2, 3, .., r^*\}$ is given by

$$x_{r^*-i} = \frac{p(1-s)^{r^*-i+1}[1-\delta(1-s)](1-d)}{1-\delta} + d + \Delta - d\Delta - \delta\lambda_A.$$

Noting that $r^* - i = r$, we can rewrite the minimal offer A is willing to accept indexed by the state variable r for $r < r^* - 1$ as

$$x_r = \frac{p(1-s)^{r+1}[1-\delta(1-s)](1-d)}{1-\delta} + d + \Delta - d\Delta - \delta\lambda_A$$

for $r \in \{0, 1, ..., r^* - 2\}$ when $\gamma = 1$.

The expected utility for A if she sanctions and war does not occur in the first round is the value of the offer in the first round plus the offers x_r, less costs of sanctioning for $r^* - 2$ periods

plus the offer at x_{r*-1}, less the costs of sanctioning, followed by offers of x_{r^*} in every period after that, all appropriately discounted by discount factor δ.[15]

$$EU_A(\text{sanction}|x_s,\, \gamma = 0,\, r = 0) = 1 - x_s - \lambda_A + \sum_{i=1}^{r^*-2} \delta^i(1 - x_i - \lambda_A) + \delta^{r^*-1}(1 - x_{r^*-1} - \lambda_A) + \frac{\delta^{r^*}(1 - x_{r^*})}{1 - \delta}$$

If A chooses to fight and sanction in the first round, her expected utility is

$$EU_A(\text{sanction, fight}|\gamma = 0, r = 0) = \frac{(1 - p(1 - s))(1 - d)}{1 - \delta} - \lambda_A$$

Therefore, when A does sanction in the first round, she accepts any offer x which is less than x_s, where

$$x_{s|r^* \geq 2} \equiv \frac{(1 - \delta)(d - \delta\lambda_A) + (1 - d)[p(1 - s)(1 - (1 - s)\delta) - \delta\Delta]}{1 - \delta}.$$

An offer that A prefers to war exists when $x_s \geq 0$. Therefore such an offer exists when $r^* \geq 2$ and

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[15]In order to focus on behavior in anticipation of a power shift, assume that $x_r \in [0, 1]$ for all $r \in \{0, 1, \ldots r^*\}$. This ensures that after the shift, an efficient offer exists. This is likely to be the case in all but a few extreme parameter values. While relaxing this assumption will change the continuation values and thus the specific thresholds found on equilibrium behavior before the power shift slightly, our major substantive results remain.

We have explored alternative versions of the model presented here in which shifts in power occur probabilistically and war occurs in future periods, including after sanctions episodes have ended. The substantive results are very similar, and so we focus on this much simpler presentation where sanctions and war behavior is substantially determined by the shift occurring in the first round.

A sanctions at $\gamma = 0$ if

$$\Delta < \frac{(1-d)p(1-s)(1-(1-s)\delta) + (1-\delta)(d - \delta\lambda_A)}{\delta(1-d)} \equiv \Delta_{s|r^*\geq 2}.$$

If A does not sanction in the first round, then she sanctions for r^* periods when $\gamma = 1$, as given by the threshold k above. Therefore the utility of not sanctioning in the first round given r^* is

$$EU_A(\neg\text{sanction}|x_{\neg s}, \gamma = 0, r = 0) = 1 - x_{\neg s} + \sum_{i=0}^{r^*-2} \delta^{i+1}(1 - x_i - \lambda_A) + \delta^{r^*}(1 - x_{r^*-1} - \lambda_A) + \frac{\delta^{r^*+1}(1 - x_{r^*})}{1-\delta}.$$

If A chooses to fight when not sanctioning in the first round, her expected utility is

$$EU_A(\neg\text{sanction}, \text{fight}|\gamma = 0, r = 0) = \frac{(1-p)(1-d)}{1-\delta}.$$

Therefore when A does not sanction in the first round, she accepts any offer x which is less than $x_{\neg s}$ where

$$x_{\neg s|r^*=0} = d + p(1-d) - \frac{(1-d)\delta\Delta}{1-\delta}$$

if $r^* = 0$ and

$$x_{\neg s|r^*\geq 1} \equiv \frac{(1-\delta)(d - \delta\lambda_A) + (1-d)[p(1-(1-s)\delta) - \delta\Delta]}{1-\delta}$$

if $r^* \geq 1$. A prefers to sanction when $\gamma = 0$ if

$$\lambda_A \leq \frac{ps(1-d)}{1-\delta}.$$

An offer that A prefers to war exists when $x_{\neg s} > 0$; therefore, such an offer exists if

$$\Delta < \frac{(1-\delta)(d + p(1-d))}{\delta(1-d)} \equiv \Delta_{\neg s|r^*=0}$$

when $r^* = 0$.

The threshold on Δ is lower in the case with no sanctions than a case with sanctions of at least two periods when the costs of sanctions are not too high. Formally, sanctions have a pacifying effect when $\lambda < \lambda_p$ where

$$\Delta_{\neg s|r^*=0} < \Delta_{s|r^*\geq 2} \leftrightarrow$$

$$\lambda_A < \frac{(1-d)ps((2-s)\delta - 1)}{(1-\delta)\delta} \equiv \lambda_p.$$

Proposition 3

In equilibrium, when $\lambda_A \leq \frac{ps(1-d)}{1-\delta}$ and $\Delta > \Delta_{s|r^*}$, A sanctions and fights in the first round.

Proof In the initial round in an equilibrium where A sanctions, war happens when $\Delta > \Delta_{s|r^*}$. This follows directly from our derivation of $\Delta_{s|r^*}$ above.

Proposition 4

Bargaining outcomes are more favorable for A in the sanctions equilibrium than bargaining outcomes in the no sanctions equilibrium. Formally,

$$1 - x_r > 1 - x_{r^*=0}, \ \forall r$$

and

$$1 - x_{r^* \geq 2} > 1 - x_{r^* = 0}$$

Proof Both of these inequalities follow from the derivation of x_r and x_r^* in the proof of Propositions 1 and 2.

Proposition 5

In equilibrium, B attacks in the first round in order to prevent future sanctions if $r^* > \bar{r} \equiv \dfrac{\ln[\delta - \frac{d}{\lambda_A + \lambda_B}]}{\ln \delta}$ when A sanctions in the first round.

Proof B is willing to make offer x_s when A sanctions in the first round rather than fight when

$$EU_B(x_s | \gamma = 0, r^*, \text{sanction}) \geq EU_B(\text{fight} | \gamma = 0, \text{sanction})$$

$$x_s - \lambda_B + \sum_{i=1}^{r^*-2} \delta^i (x_i - \lambda_B) + \delta^{r^*-1}(x_{r^*} - \lambda_B) + \frac{\delta^{r^*} x_{r^*}}{1 - \delta} \geq \frac{p(1-s)(1-d)}{1 - \delta} - \lambda_B.$$

This always holds when $r^* \leq 1$, therefore B is always willing to offer x_s when $r^* \leq 1$. When $r^* \geq 2$, B is willing to offer x_s when $r^* \leq \bar{r}$ where

$$\bar{r} \equiv \frac{\ln[\delta - \frac{d}{\lambda_A + \lambda_B}]}{\ln \delta}.$$

Post-Sanctions Growth

Proposition 1 (Post-Sanctions Growth)

For any set of specific parameter values, A prefers to impose sanctions for r^* periods. In any MPE,
$r^* \equiv \max\{\mathbb{N} \in [0, k]\}$, *where* $k \equiv \dfrac{\ln\left[\frac{[\lambda_A(1-\delta)-\phi(1-d)](1-s)}{p(1-d)s}\right]}{\ln[1-s]}$.

Proof To prove Proposition 1 we first establish the offer x which B makes in equilibrium when

the state variable $r = r^*$ after the shift in power has taken place ($\gamma = 1$). This offer, denoted by

x_{r^*} is the offer which makes A indifferent between accepting and fighting, conditional on not

sanctioning in the future. Such an offer allows B to capture the bargaining surplus and avoid

the cost of war, without making unnecessary concessions to A.

Lemma 0.3 *(Post-Sanctions Growth)* $x_{r^*} \equiv 1 - [1 - p(1-s)^{r^*} - \Delta - \phi](1-d)$ *denotes the equilibrium*

offer x by B when the state variable $r = r^*$ in any MPE.

Proof

$$EU_A(\text{accept}|x, r = r^*, \gamma = 1) \geq EU_A(\text{fight}|r = r^*, \gamma = 1)$$

$$\frac{1 - x_{r^*}}{1 - \delta} \geq \frac{(1 - p(1-s)^{r^*} - \Delta - \phi)(1-d)}{1 - \delta}$$

$$x_{r^*} \equiv 1 - (1 - p(1-s)^{r^*} - \Delta - \phi)(1-d)$$

Therefore the largest offer x that A will accept when $r = r^*$ is given by:

$$x_{r^*} \equiv 1 - [1 - p(1-s)^{r^*} - \Delta - \phi](1-d).$$

Lemma 0.4 *(Post-Sanctions Growth) In any MPE, the equilibrium offer when state variable $r = r^* - 1$ is given by x_{r^*-1}, where $x_{r^*-1} = [p(1-s)^{r^*} + \Delta](1-d) - \frac{\delta\phi(1-d)}{1-\delta}$.*

Proof

$$EU_A(\text{accept}|x, r = r^* - 1, \gamma = 1) \geq EU_A(\text{fight}|r = r^* - 1, \gamma = 1)$$

$$1 - x_{r^*-1} - \lambda_A + \frac{\delta(1-x_{r^*})}{1-\delta} \geq \frac{(1-p(1-s)^{(r^*-1)+1} - \Delta)(1-d)}{1-\delta} - \lambda_A$$

$$x_{r^*-1} \leq [p(1-s)^{r^*} + \Delta](1-d) - \frac{\delta\phi(1-d)}{1-\delta}$$

When $\gamma = 1$, for $k = r^*$ it must be the case that

$$EU_A(\text{sanction}|r = k - 1) \geq EU_A(\neg\text{sanction}|r = k - 1).$$

From above, $x_{r^*-1} = x_{r^*}$ therefore the above inequality is equivalent to:

$$1 - x_{(r^*=k)-1} - \lambda_A + \delta\frac{1 - x_{r^*=k}}{1-\delta} \geq \frac{1 - x_{(r^*=k-1)}}{1-\delta}.$$

Substituting from above,

$$k \equiv \frac{\ln\left[\frac{[\lambda_A(1-\delta)-\phi(1-d)](1-s)}{p(1-d)s}\right]}{\ln[1-s]}.$$

Therefore, r^* is the largest natural number which is less than k; if $k < 0$ then $r^* = 0$.

Equilibrium play posits that A will sanction if $r < r^*$. To see why A would not one-shot deviate from this strategy by not sanctioning in a given round when $\gamma = 1$, recall that the offer at r when $\gamma = 1$ is strictly decreasing in r. By not sanctioning in a given round, A simply pushes her strategy back a period, as play is only conditioned on the state of the game. Because $\delta \in$

[0, 1], *A* never has an incentive to do so, therefore *A* will not deviate from the posited strategy of sanctioning when $\gamma = 1, r < r^*$. Additionally, this strategy is based only on state variables r and γ and therefore satisfies the requirements for Markov Perfection.

While the length of sanctioning behavior is derived in the same manner as the original model, one additional wrinkle introduced by the Phoenix Effect is the possibility that *A* will prefer to fight a preventive war at the end of the sanctioning episode to prevent *B*'s post-sanctions growth. We consider this possibility next.

Post-Sanctions Growth and Delaying War

Note that if $x_{r^*} < 0$, *A* prefers to fight at the last period of sanctions rather than suffer the post-sanctions power shift. As with the shift in power that occurs at $t = 0$, if *A* expects to grow too weak following the end of sanctions, she prefers preventive war. This is true if $\phi > \frac{(1-\delta)[p(1-s)^{r^*} + \Delta]}{\delta} \equiv \hat{\phi}$.

Consider then the case where $\phi > \hat{\phi}$. When this is the case, no possible offer exists that *A* prefers to war in the $r^* - 1$ state. Therefore, *A* fights in the $r^* - 1$ round. The utility of fighting at $r^* - 1$ is equivalent to the utility of the $x_{r^* - 1}$ offer in the main model without the Phoenix Effect presented above because fighting censors this post-sanctions growth. Therefore the first-period efficiency conditions on Δ derived for that model are equivalent in this case and Proposition 2 regarding the initial efficiency conditions hold.

Post-Sanctions Growth and Deterring Sanctions

Finally, in the case where A does not fight at the end of the sanctions episode to prevent B's post-sanctions power shift (when $\phi < \hat{\phi}$), she chooses at $t = 0$ whether to play the *sanctions* equilibrium or the *no sanctions* equilibrium.

As in the main model, let $i = r^* - r$, or the number of rounds between a given round r and the final round of sanctions r^*. Then for A the minimal offer acceptable i periods before r^* when $\gamma = 1$, for $i \in \{2, 3, .., r^*\}$ is given by

$$x_{r^*-i} = \frac{p(1-s)^{r^*-i+1}[1-\delta(1-s)](1-d)}{1-\delta} + d + \Delta - d\Delta - \delta\lambda_A.$$

Noting that $r^* - i = r$, we can rewrite the minimal offer A is willing to accept indexed by the state variable r for $r < r^* - 1$ as

$$x_r = \frac{p(1-s)^{r+1}[1-\delta(1-s)](1-d)}{1-\delta} + d + \Delta - d\Delta - \delta\lambda_A$$

for $r \in \{0, 1, ..., r^* - 2\}$ when $\gamma = 1$. It is on first glance counterintuitive that ϕ does not appear in A's reservation value for $r < r^* - 2$. The reason for this is that while B can compensate A for the former's gain in power, A's threat to fight in order to underwrite this compensation is incredible until the period directly before the shift. As shown above, then, ϕ is factored directly into the equilibrium offer in the period immediately preceding the shift in power such that $x_{r^*-1} = [p(1-s)^{r^*} + \Delta](1-d) - \frac{\delta\phi(1-d)}{1-\delta}$.

The expected utility for A if she sanctions and war does not occur in the first round is the value of the offer in the first round plus the offers x_r, less costs of sanctioning for $r^* - 2$ periods

plus the offer at x_{r^*-1}, less the costs of sanctioning, followed by offers of x_{r^*} in every period after that, all appropriately discounted by discount factor δ.

$$EU_A(\text{sanction}|x_s, \gamma = 0, r = 0) = 1 - x_s - \lambda_A + \sum_{i=1}^{r^*-2} \delta^i(1 - x_i - \lambda_A) + \delta^{r^*-1}(1 - x_{r^*-1} - \lambda_A) + \frac{\delta^{r^*}(1 - x_{r^*})}{1 - \delta}$$

If A chooses to fight and sanction in the first round, her expected utility is

$$EU_A(\text{sanction, fight}|\gamma = 0, r = 0) = \frac{(1 - p(1 - s))(1 - d)}{1 - \delta} - \lambda_A$$

Therefore, when A does sanction in the first round, she accepts any offer x which is less than x_s, where

$$x_{s|r^* \geq 2} \equiv \frac{(1 - \delta)(d - \delta\lambda_A) + (1 - d)[p(1 - s)(1 - (1 - s)\delta) - \delta\Delta]}{1 - \delta}.$$

Note that for the reason described earlier, this offer is identical to the $x_{s|r^* \geq 2}$ derived in the original model. Therefore the initial period efficiency condition on Δ is also equivalent.

At the beginning of the game, A therefore chooses between playing a *sanctions* equilibrium or a *no sanctions* equilibrium. Comparing the expected utility of these equilibriia, we characterise cutpoint $\bar{\phi}$:

$$EU_A(\text{Sanctions}) \geq EU_A(\neg\text{Sanctions})$$

$$1 - x_s - \lambda_A + \sum_{i=1}^{r^*-2} \delta^i(1 - x_i - \lambda_A) + \delta^{r^*-1}(1 - x_{r^*-1} - \lambda_A) + \frac{\delta^{r^*}(1 - x_{r^*})}{1 - \delta} \geq (1 - p)(1 - d) + \delta\frac{(1 - p - \Delta)(1 - d)}{1 - \delta}$$

$$\phi \leq \frac{\delta^{r^*}[1 - 2(d - \Delta + d\Delta)] + \lambda_A - \delta[\lambda_A + \Delta(1 - d)] - p(1 - d)[s + 2(1 - s)^{r^*}\delta^{r^*}]}{2(1 - d)\delta^{r^*}} \equiv \bar{\phi}.$$

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Figure 1: Effect of sanctions on *B*'s latent military power ($p = .8$ and $s = .2$)

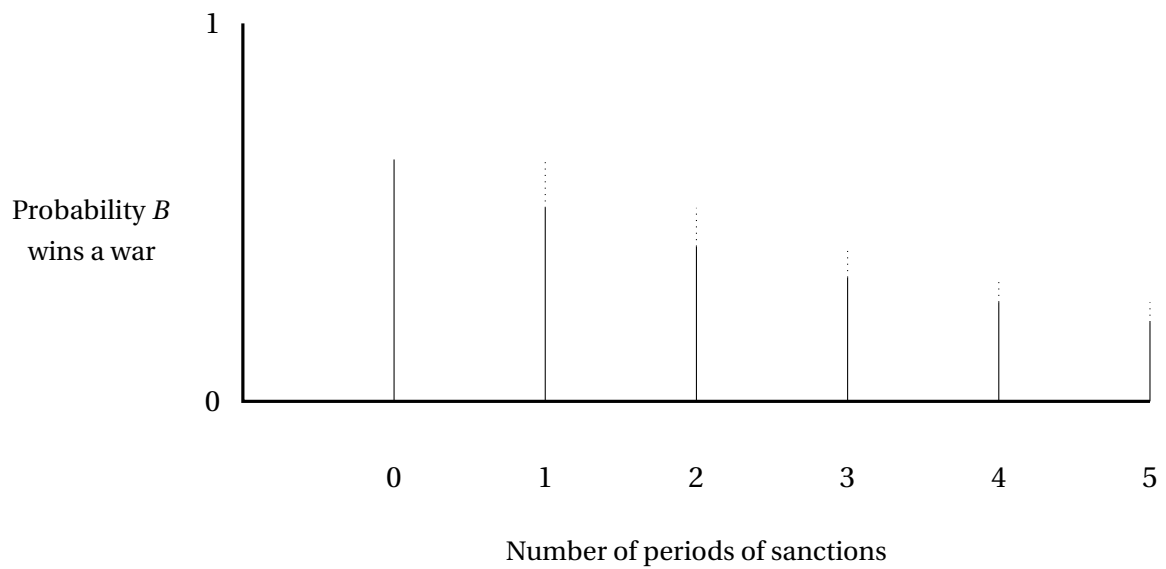Figure 2: Size of Shift Necessary for War

Size of Power Shift
(Δ)

$s = .2$

No Sanctions
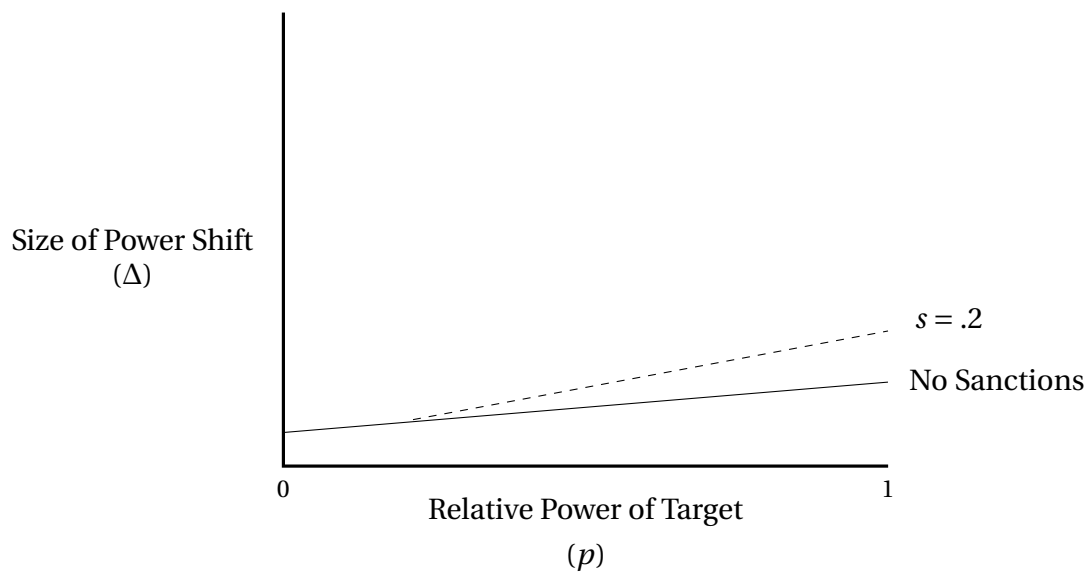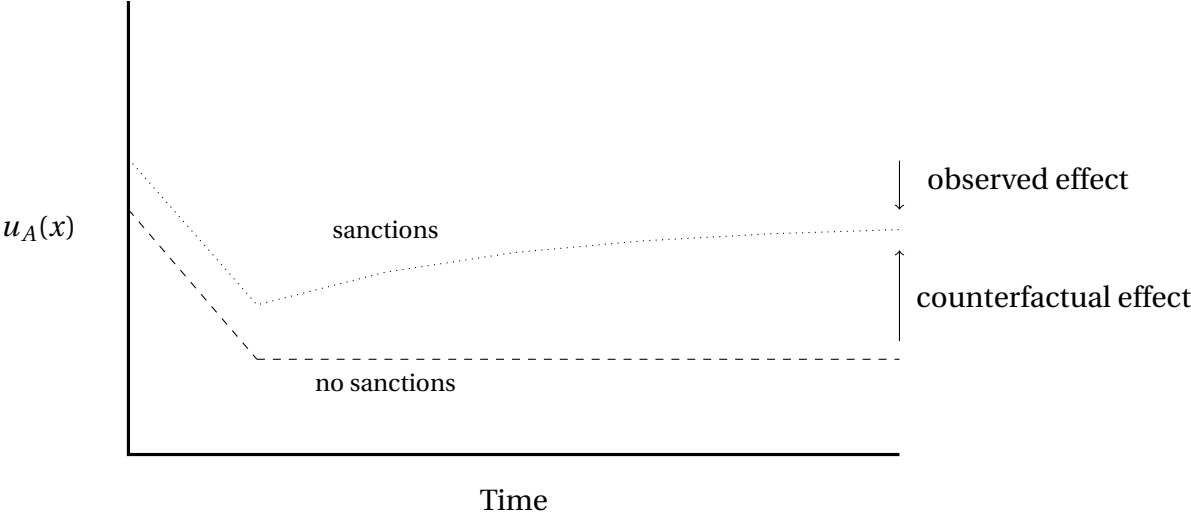
0

1

Relative Power of Target

(p)

Figure 3: Utility for A of bargaining with and without sanctions

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