Only Here to Help? Bargaining and the Perverse Incentives of International Institutions*

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Abstract

Many international organizations reduce the costs states suffer in times of conflict. Critics argue that the expectation of aid perversely incentivizes states to initiate conflict more often. I develop a model to formalize this intuition and show that institutions may still prove helpful in two ways. First, if conflict frequently occurs without the institution, aid reduces expected costs despite possibly causing more conflict. Second, aid can have a second-order effect of reducing uncertainty about the costs of conflict; thus, aid can also counterintuitively *decrease* the probability of conflict and save on the corresponding costs. Whether aid ultimately helps or hurts depends on how the organization distributes benefits to the parties.

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1 Introduction

Consider the incentives of Syrian rebels on the eve of civil war. Some opponents of the Assad regime wanted to see democratic reforms and new policies to reduce economic inequality. War provided an alternative means to resolving the political dispute. Yet most of the military power rested in the hands of the government. The rebels correspondingly expected a costly conflict.

Nevertheless, rebels groups could also anticipate the international community's response to a potential war. The past few decades have seen a burgeoning of humanitarian organizations. Failing to reach an agreement with the government would induce those organizations to take action. Indeed, countless groups contributed after fighting began, including the United Nations High Commissioner for Refugees, the World Food Program, the World Health Organization, Doctors without Borders, and the Red Cross. War remains painful despite their efforts. Nevertheless, they have relieved some of the costs of war by providing food, shelter, and medical care.

Policymakers praise these institutions. In a speech to the United Nations, former U.S. Secretary of State John Kerry called the situation in Syria "the greatest humanitarian catastrophe since World War II" and underscored the importance of delivering aid without impediment (Walker 2016). Observers have commended these efforts more generally, with the High Commissioner alone twice winning the Nobel Peace Prize.

However, skeptics warn of unintended consequences. In particular, civil war scholars note that these costs stem from bargaining failure (Kuperman 2005; Kuperman 2008; Rauchhaus 2009; Narang 2015). Strategic actors can anticipate the corresponding cost reduction. In turn, they may take more aggressive negotiating postures that precipitate conflict. This suggests that these institutions perversely cause the exact problems they seek to solve.

Because similar institutions manipulate negotiations over arms development, trade disputes, and sanctions, researchers should know how mitigating costs affects the prevalence of conflict. In this paper, I provide answers. The results identify nuances the literature has missed. Critics correctly identify that institutions cause additional conflicts. Yet extollers will find solace as well: institutions can also counterintuitively *reduce* conflict and decrease the net costs paid.

How can all this be true? To understand the incentives, I develop a model in which

two actors bargain over a good. If they fail to reach an agreement, one party may capture it. Both parties suffer costs as a result. An international institution observes these costs and exerts effort to reduce them. The more effort exerted, the less the parties ultimately suffer.

I begin with a case in which one party does not know the other's cost of conflict. Institutional effort has asymmetric effects, so it may help to conceptualize the results using the Syrian Civil War example. Suppose Syrian rebels did not know how much the government would concede. As the institution reduces the uncertain party's (the rebels') costs, the probability of conflict increases. This occurs because the institution protects that party from the dangers of bargaining failure. Correspondingly, that party assumes more risk by increasing its demands. The institution has the perverse effect that critics predict.

In contrast, mitigating the costs of the actor not facing uncertainty (the government) has an unexpected consequence. As a second-order effect, reducing costs in this manner also decreases the opponent's (the rebels') uncertainty. When the institution reduces that actor's costs, the various types behave more similarly. This reduces the information problem, which otherwise causes conflict. Consequently, and counterintuitively, the institution *increases* the probability of settlement.

Even if the perverse effect dominates, institutions may yet prove helpful. Increasing the probability of conflict does not imply an increase in costs suffered. Imagine that conflict likely occurs in the absence of the institution—for example, suppose that Syria Civil War was likely regardless of humanitarian assistance. Adding the institution may increase the probability of conflict further. The institution causes those additional costs. However, if conflict would have begun anyway, it helps. As such, institutions can generate a net positive despite causing more conflict.

What about other sources of incomplete information? Consider uncertainty over the expected outcome of conflict. This appears frequently in the crisis bargaining literature, where actors face uncertainty over their opponent's military power. I develop a second model to address this situation. Here, I show that cost reduction increases the probability of conflict. Thus, if the Syrian government's uncertainty over rebel power created the bargaining problem, any anticipated humanitarian aid would have only exacerbated the issue.

What accounts for the difference? Mitigation has differential effects with uncertainty

over costs because it can reduce an information problem. In contrast, with outcome uncertainty, reducing costs maintains the informational structure. Yet such reductions subsidize conflict, leading to more of it. Nevertheless, the institution can reduce total costs suffered if conflict was likely in its absence.

The paper proceeds as follows. In the next section, I give a broader overview of the problem to clarify the scope of the paper and explain how my model departs from existing research. I then introduce the model with uncertainty over costs, derive its equilibrium, and discuss the empirical implications. Afterward, I compare those results to a revised model with outcome uncertainty. A brief conclusion ends the paper.

2 The Prevalence and Pitfalls of Surplus-Preserving Institutions

I call an organization a "surplus-preserving institution" if it reduces inefficient costs of conflict.[1] As the introduction previewed, a large number of surplus-preserving institutions combat the costs of war. Beyond the High Commissioner for Refugees, the United Nations also assists with landmine removal through the Mine Action Service, while the World Health Organization improves public health in war zones where traditional providers cannot meet basic needs. The World Bank helps war-torn nations rebuild and created the Post Conflict Fund to specialize in this task; in theory, promoting economic growth disincentivizes war (Collier et al 2003). The U.N. similarly engages in various forms of "postconflict reconstruction" (Doyle and Sambanis 2011). Non-governmental organizations provide comparable avenues of relief. For example, both the International Red Cross and Doctors without Borders give medical aid to civilians in times of war.

Surplus-preserving institutions mitigate other sources of costs. The dawn of the atomic age spread fears of both inadvertent nuclear war and rogue nuclear attacks. The international community has progressed here on at least four fronts. First, Interna-

[1]Note the distinction between these institutions and those that reduce the transaction costs for information gathering or coordination (Keohane 1984). Such costs do not stem from bargaining failure and do not retroactively reduce the pain. Although the timing of the institution's reduction seems inconsequential, it proves pivotal later. See Meirowitz et al (2015) for a similar argument on how information provision causes additional conflict.

tional Atomic Energy Agency safeguards make theft of nuclear material more difficult.[2] Second, the United States offers to share its permissive action link technology. These tools ensure command and control for existing nuclear arsenals, reducing the chances of an accidental launch (Caldwell 1987). Third, the Proliferation Security Initiative creates an ocean-wide network to intercept nuclear traffickers. Finally, following the September 11 attacks, the United Nations Security Council passed Resolution 1540, obligating countries to outlaw the possession and development of non-state weapons of mass destruction. The Group of 8 followed with the creation of the Global Partnership against the Spread of Weapons and Materials of Mass Destruction.

These institutions extend into issues of trade. Economic sanctions against North Korea have limited Pyongyang's ability to feed its population. The World Food Programme instead provides a portion of the country's basic caloric intake. The organization took similar actions in the 1990s when sanctions against Serbia caused the same problem (Oshunrinade 2010, 21).[3] Meanwhile, adjudication processes under the General Agreement on Tariffs and Trade and the World Trade Organization offer states a means to resolve trade disputes. Although adjudication implies inefficiency, it remains *less* inefficient than a full-scale trade war that might occur in its absence.

The various institutions I have discussed thus far address a variety of seemingly unrelated outcomes. Yet commonalities exist. Before institutions act, negotiations can ensure that the costs never materialize. States, or governments and rebel groups, routinely bargain to avoid war (Fearon 1995); proliferators and their rivals can negotiate over policies to disincentivize nuclear development (Spaniel 2015; Bas and Coe 2016); the sender and the target of sanctions can compromise on an issue that might otherwise result in sanctions (Drezner 2000); trade partners can adjust their barriers to sustain trade flows (Reinhardt 2001). If these mutual adjustments fail to resolve the problem, institutions can exert effort to minimize the damage. But they can only do so once bargaining has failed—the High Commissioner cannot house war refugees without a war, for example.

[2]Like the High Commissioner, the IAEA has won a Nobel Peace Prize for its efforts. Critics of the inspections regime—including former director of Los Alamos National Laboratory Siegfried Hecker (2006)—argue that they place too much focus on government noncompliance with nuclear agreements and do not do enough to eliminate outright theft.

[3]This reflects broader declines in public health following economic sanctions (Gibbons and Garfield 1999; Allen and Lektzian 2012).

How do the various strategic incentives interact? The qualitative and quantitative literatures, at least in regard to war, suggest an answer: not well. Broadly, researchers observe that surplus-preserving institutions decrease the costs parties pay if negotiations fail. This perversely shrinks the range of mutually acceptable settlements, which seemingly implies that more conflict occurs as a consequence.

However, complex bargaining interactions often require "accounting standards" to sort out (Powell 1999, 29-34). To develop those standards, the substantive examples suggest a model with two distinct phases. For the reasons outlined above, the first phase must feature bilateral bargaining. The second phase should feature a fully-strategic institution that limits the damage if bargaining failed beforehand.[4] This ordering prevents an institution from committing to an incredible level of assistance, in line with the qualitative literature's concern about perverse incentives. After establishing this baseline, I add asymmetric uncertainty to the model. Incomplete information allows for a more compelling setup and addresses a common cause of conflict (Schelling 1966, 99-105; Myseron and Satterthwaite 1983; Fearon 1995; Reinhardt 2001).

Developing the model in this manner highlights problems unique to surplus-preserving institutions. Previous research has explained how malfunctioning, misinformed, or poorly managed institutions can backfire (Luttwak 1999; Terry 2002; Valentino 2011; Hawkins et al 2006). In contrast, the institutions I analyze function as intended: if an inefficiency exists, any effort the institution exerts mitigates the damage. Focusing on this best-case scenario stacks the deck in favor of institutions improving outcomes. Pessimists will find greater vindication if institutions indeed backfire under these relatively rosy conditions.

A related literature argues that shifting the distributional gains of conflict primes institutions for failure (Regan 2000). In sum, scholars worry that such institutions incentivize the beneficiary to misbehave. For example, Lischer (2005) argues that some refugee camps provide sanctuary to rebel militants, allowing them to regroup and increase their chances of defeating the government. Regan (2002) finds broader empirical support for a similar mechanism, reporting that civil wars featuring interventions extend the length of conflict. Elbadawi (1999) further argues that anticipated interventions allow weak rebel groups to initiate otherwise unwinnable conflicts.

[4] A fully-strategic institution ensures that the perverse effects follow from optimal play and not a behavioral assumption built into the model.

One may wonder whether those results persist with an institution with no preference for the distributive outcome. This would again seem to stack the deck against perverse effects. Developing the model accordingly allows me to contrast my work from two related models. In Chapman and Wolford (2010), a challenger can consult a biased institution, which can hinder the challenger's mobilization efforts. It similarly contrasts with Kydd and Straus's (2013) work, in which an intervener has a moderate preference over the outcome and can enter the war to impose its ideal point. These models find that the third-party sometimes creates perverse incentives. I find that institutions can cause conflict even without altering the expected outcome.

3 Uncertainty over the Costs of Conflict

The game consists of three actors: two states and an institution.[5] Broadly, the states negotiate over control of a disputed good, while the institution exerts effort to reduce burdens should bargaining break down. Play begins with State 1 demanding $x \in [0, 1]$ of the good, which I standardize to value 1 without loss of generality. State 2 sees the demand and accepts or rejects it. Accepting ends the game with State 1 receiving x and State 2 receiving the remaining $1 - x$.

If State 2 rejects, it pursues an inefficient policy to capture the good for itself. This transfers the pie to State 2 but creates costs $c_1, c_2 > 0$ for the players. At this point, the institution exerts effort to minimize those costs. Specifically, it chooses levels $\alpha_1 \in [0, 1]$ and $\alpha_2 \in [0, 1]$ to reduce State $i's$ cost burden to $\alpha_i c_i$. Thus, State 1's overall payoff for bargaining breakdown equals $-\alpha_1 c_1$, while State 2's equals $1 - \alpha_2 c_2$. To focus on the interesting cases (i.e., situations in which State 2 has a credible threat to reject), I restrict attention to parameters in which State 2 has a positive utility for rejecting.

I impose minimal structure on the institution's payoff function to keep the results general. The institution has a tradeoff between minimizing inefficiency and exerting effort of its own. Let $g_i(\alpha_i)$ represent how much the institution internalizes State i's cost, where $\frac{dg_i}{d\alpha_i} > 0$ and $\frac{d^2 g_i}{d\alpha_i^2} \geq 0$. Substantively, this means that the larger the share of costs State i actually suffers (that is, as α_i increases) the more the institution internalizes that state's cost. It also means that the institution internalizes the extra burden of a given percent at least as much as it internalizes the next percent.

[5] For civil war cases, one might re-label a state as a rebel group.

The institution faces an effort constraint, however. Let $k_i(\alpha_i)$ represent the institution's burden from exerting some amount of effort to reduce State i's cost, where $\frac{dk_i}{d\alpha_i} < 0$ and $\frac{d^2k_i}{d\alpha_i^2} \geq 0$. Substantively, this means that the institution finds less effort (i.e., α_i close to 1) cheaper than more effort and that each additional percent becomes increasingly costly to reduce.[6] Additionally, I require that at least one of the constraints on the second derivatives of g_i and k_i holds strictly.

All told, the institution's utility equals $-g_1(\alpha_1) - g_2(\alpha_2) - k_1(\alpha_1) - k_2(\alpha_2)$. Given this utility structure, the institution may prefer reducing one side's costs by a greater percentage the other's.[7]

3.1 Complete Information Equilibrium

Going through the baseline complete information case generates some intuition for what follows. Backward induction yields the solution. The institution moves last and has complete and perfect information. It therefore faces a constrained optimization problem on its selections for α_1 and α_2. Despite the general form of the institution's utility function, a unique solution pair exists, which I call α_1^* and α_2^*. If the effort function does not cause too much of a loss, these optimal mitigation strategies fall strictly below 1. That is, the institution reduces the states' costs provided that it has a minimal capacity to do so.

From here, the states treat their costs of bargaining breakdown as $\alpha_1^* c_1$ and $\alpha_2^* c_2$ because they actually suffer those amounts if State 2 rejects.[8] Because breakdown implies inefficiency, a range of mutually satisfactory demands exists. Thus, in the

[6] For example, after having paid the fixed costs to create organizational infrastructure, institutions can more easily create the first refugee camp than the second, as international institutions pick the more hospitable and less dangerous locations for their initial efforts.

[7] In practice, this occurs when the institution internalizes one state's costs at a higher level or because the institution finds reducing one state's cost to be fundamentally easier. For an example of the latter case, the High Commissioner for Refugees can only aid a warring party that suffers a refugee problem. Thus, if a government fights a civil war against a separatist region that only displaces citizens in that area, the institution has a functional bias for the separatists. On the nuclear front, UNSCR 1540 and the Proliferation Security Initiative disproportionately address externalities the United States faces.

[8] Analogously, α_1^* and α_2^* represent the expected portion of costs in a game where both State 1 and State 2 face mutual uncertainty over the institution's preferences. This holds because the institution moves last, so no signaling dynamics exist as long as the states face equally uncertainty. The states can only maximize over what they expect to occur, which generates an analogous proof to the complete information case.

ultimatum game setup, State 1 demands the most State 2 accepts, which equals $\alpha_2^* c_2$; State 2 accepts.

Consequently, the institution's move has no effect on whether bargaining breakdown occurs with complete information. Instead, it merely alters the terms of the settlement (Grigorian 2005; Boehmer, Gartzke and Nordstrom 2004), with State 2 receiving more as the institution mitigates more of its cost.[9] In practice, bargaining breakdown does occur, which gives the institution an opportunity to operate on the path of play. Thus, the incomplete information case represents the institution's true test.

3.2 Incomplete Information Equilibrium

States may not know how costly their opponents view outside options. To incorporate this into the model, suppose State 1 faces uncertainty about State 2's cost c_2. Specifically, Nature begins the game by drawing c_2 from a continuous and strictly increasing cumulative distribution function $F(c_2)$ on the interval $[\underline{c}_2, \bar{c}_2]$, with density $f(c_2)$. The results below apply to distributions with strictly increasing hazard rates that create sufficiently responsive optimal demands.[10] State 2 observes the draw but State 1 only knows the prior.

Moving forward, suppose that even if the institution does not observe the draw, it still optimizes according to State 2's realized cost. This assumption has two justifications. First, State 1's uncertainty may stem from not knowing how much State 2 values the good. Due to the standardization of the good at 1, the model incorporates the value into the cost State 2 pays. Thus, State 1, State 2, and the institution may all have common knowledge of the actual cost of bargaining breakdown, just not how much State 2 values it relative to the good at stake. In turn, the institution can observe the inefficiency and reduce it. Second, the institution can see problems as they happen and address them. For example, imagine State 1 faced uncertainty about whether State 2 would suffer a massive humanitarian crisis after bargaining breakdown. The institution may not know this during the bargaining phase, but it can observe and address the

[9] A careful reader will note that the rest of the model essentially becomes an exercise in comparative statics on α_1^* and α_2^*, an interesting result in its own right.

[10] Formally, I assume $\frac{f(c_2)}{1-F(c_2)}$ is strictly increasing and that $I'(\alpha_2^*)\alpha_2^* > I(\alpha_2^*)$ within the interior solution, where $I(\alpha_2^*)$ defines the implicit function that maps α_2^* to State 1's optimal demand. Uniform distributions fall in this class. Later, I show that a limiting result applies to distributions without these properties.

crisis as conflict continues.

Given that, the institution still has a straightforward optimization problem: it selects α_1^* and α_2^*. Although α_2^* interacts with the source of State 1's uncertainty (c_2), depending on the other parameters, the information asymmetry can induce State 1 to make a demand that causes bargaining breakdown:

Proposition 1. *If $\alpha_1^* c_1$ is sufficiently great, the states reach an agreement with certainty. If $\alpha_1^* c_1$ is sufficiently small, State 1 offers an amount that State 2 rejects with positive probability. Inefficiency results in this case.*

The appendix contains a complete proof. Scholars familiar with bargaining models featuring uncertainty will recognize this as a classic risk-return tradeoff. The more State 1 demands, the more it keeps conditional on State 2 accepting. But greater demands simultaneously make State 2 more likely to reject, forcing State 1 to pay costs. Consequently, State 1 must balance between extracting the best deal possible and avoiding bargaining breakdown.

Intuitively, when bargaining breakdown appears relatively more painful, State 1 makes a safer demand. Thus, for $\alpha_1^* c_1$ sufficiently great, it demands $\alpha_2^* \underline{c}_2$. This induces the lowest cost type of State 2 to accept, which also ensures that all other types accept. For example, State 1 will not risk breakdown to capture a slightly larger share of territory if war will destroy the homeland. But for smaller c_1 values, State 1 gambles on a demand that State 2 might reject.

3.3 Comparative Statics and Empirical Implications

The intuition for Proposition 1 appears to vindicate scholars who argue that surplus-preserving institutions incentivize bargaining breakdown. The first comparative static provides formal validation:

Proposition 2. *As the institution reduces State 1's costs by a greater portion (i.e., as α_1^* decreases), the probability of bargaining breakdown weakly increases.*

The explanation for Proposition 1 gives the intuition. Decreasing the portion of costs that State 1 internalizes (that is, decreasing α_1^*) reduces State 1's punishment for bargaining breakdown. Insolated, State 1 runs greater risks. For example, imagine that State 1 in the absence of institutional assistance would have demanded an amount State

2 certainly would have accepted. Slight institutional help (that is, picking α_1^* close to 1) fails to change this.[11] But greater assistance convinces State 1 to increase its demand and run some risk. No bargaining breakdown occurred before. Now rejection—and the corresponding inefficiency—occurs with positive probability.

A similar problem extends to situations where State 1 would have risked rejection in the absence of the institution. Here, the assistance causes State 1 to further increase its demands. Thus, some types of State 2 that would have found State 1's original demand acceptable find the new demand unacceptable. These types add to the overall probability of bargaining breakdown. The effect compounds as α_1^* moves closer to 0.

Civil war scholars have flagged this mechanism and understand the basic intuition. If a rebel group knows that the international community will feed and shelter its civilians, war looks more attractive. The group responds by increasing its demands on the government. Doing so implies a greater risk of bargaining breakdown, but the institution has made that risk acceptable.

Even so, a cross-cutting effect exists. The institution promotes inefficiency by causing State 1 to issue more aggressive demands, leading both states to pay costs more frequently. Yet the institution also promotes efficiency by reducing the portion of costs ultimately suffered. One may think the former effect predominates, but the model qualifies that intuition:

Remark 1. *The expected costs paid are nonmonotonic in α_1^*. In particular, initial reductions to State 1's cost can increase overall inefficiency, but larger reductions can decrease inefficiency.*

Figure 1 illustrates the intuition. It looks at the overall expected costs paid ($\alpha_1^* c_1 + \alpha_2^* c_2$) as a function of c_1 for two cases. In one case, $\alpha_1^* = \frac{1}{3}$ and $\alpha_2^* = \frac{2}{3}$. To simulate an environment without the institution, $\alpha_1^* = \alpha_2^* = 1$ in the other case. Let State 2's cost be uniformly distributed on the interval $[\frac{1}{4}, \frac{3}{4}]$. In each case, State 1 demands an amount that State 2 certainly accepts if State 1 faces a sufficiently large cost. Without institutions, that critical cost level is $c_1 = \frac{1}{2}$; with institutions, it is $c_1 = \frac{1}{4}$. This smaller amount reflects Proposition 2's claim that absorbing State 1's cost increases the probability of bargaining breakdown.

[11] Consequently, the relationship in Proposition 2 is weakly increasing.

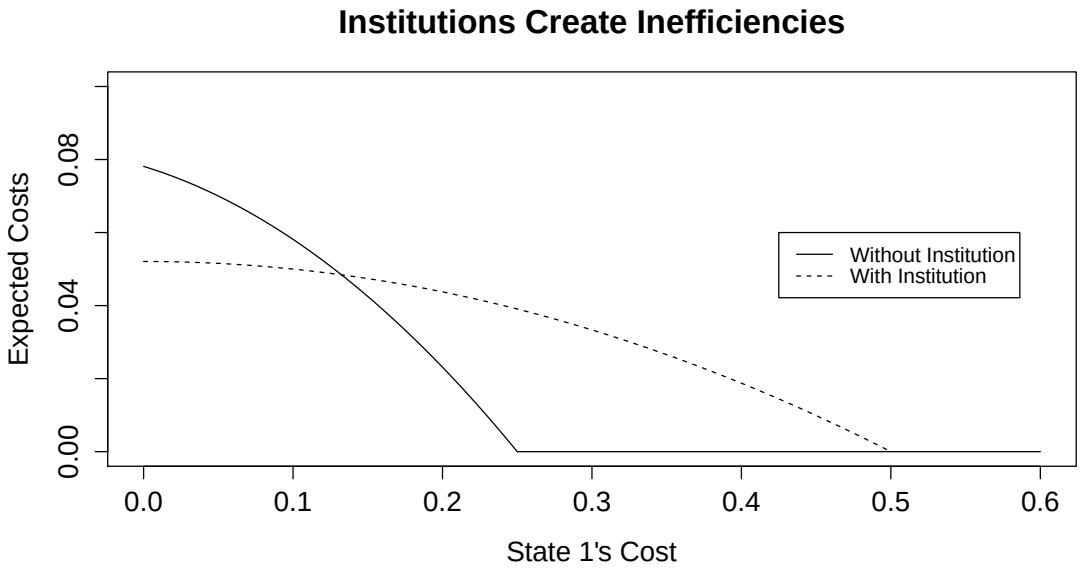

Figure 1: The expected inefficiency with and without a biased institution as a function of State 1's cost c_1.

Below those critical cost thresholds, State 1 allows for positive probability of rejection. For values of c_1 between $\frac{1}{4}$ and $\frac{1}{2}$, an efficiency gap appears because bargaining breakdown only occurs with the institution. Thus, while the institution mitigates some of the damage, it backfires. This principle continues for some c_1 values lower than $\frac{1}{4}$, as the institution causes more bargaining breakdown than it can compensate for.

Why does the institution behave in this manner if doing so hurts its wekfare? Some organizations pay little attention to the politics surrounding a conflict (Lischer 2005, 4). But the model highlights a second mechanism: institutions face a credibility problem. At any point during the game, the institution wants to minimize costs and externalities. This creates a time-consistency of preferences issue. In the institution's ideal world, it would commit to not reduce State 1's costs to eliminate the perverse incentive. However, credibility issues doom this solution—if the institution has a preference to reduce inefficiencies, it *must* exert effort in the event of bargaining breakdown.[12] Or,

[12]This distinguishes surplus-preserving institutions from cost-saving mechanisms that require disputants to agree to them *ex ante*, like the laws of war (Morrow 2014). A repeated interaction could solve the institution's problem, but this requires a high probability of conflict in any given period. Low probability events like many of the conflicts discussed here fail to qualify.

in the words of a High Commissioner for Refugees official, "even the guilty need to be fed."[13]

The credibility problem has upstream consequences. Recognizing the incredible commitment, State 1 knows the institution will offer assistance. In turn, State 1 increases its demand, knowing that the institution will mitigate some of the damage if bargaining fails.[14] It just so happens that the preference to reduces costs inadvertently creates them.[15]

Fortunately, something interesting happens as c_1 goes closer to 0. At this point, State 1 pays few costs for bargaining breakdown in the absence of the institution. It therefore demands an amount that many types reject. Introducing the institution causes State 1 to expand it demands, but only slightly—with costs small already, the institution cannot greatly impact State 1's negotiation strategy. More types now reject. Nevertheless, the portion of rejections attributable to the institution pales in comparison to the portion of rejections State 1 instigates on its own.

Meanwhile, in the absence of the institution, State 2 pays its full costs. But with the institution, State 2 only pays a fraction. Because the institution reduces the cost of the types that would have rejected anyway, the institution improves outcomes. That is, the institution promotes efficiency despite perversely causing bargaining breakdown. Figure 2 illustrates this by looking at the net difference between a world with the institution and a world without.

The existing literature that often overlooks this net-positive effect. Yet the model indicates that merely demonstrating that an institution caused bargaining breakdown does not prove that the institution backfired. Rather, the institution may have more than compensated for its deficiency by fixing problems that were likely in its absence (Western 2005). Thus, a proper review of an institution requires investigating the bargaining and implementation phases in both the actual and counterfactual world.

[13]Quoted in Rieff 2002 (54). Institutional charters commonly lack this conditionality. For example, the Mine Action Service's mission statement seeks a "world free of the threat of landmines and unexploded ordinance"; nowhere does it suggest that it would refuse calls for assistance.

[14]This contrasts with information-oriented institutions as in Chapman and Wolford (2010). These institutions alter the costs of conflict by offering support *during* the bargaining process. Such timing eliminates the credibility problem and allows a fully-strategic institution to only induce more conflict if it wants to.

[15]This connects to the broader literature on how institutions alter the terms of agreements or lead to unintended consequences (Lischer 2005; Yuen 2009; Murdie and Davis 2010; Benson et al 2014; Johns and Pelc 2014).

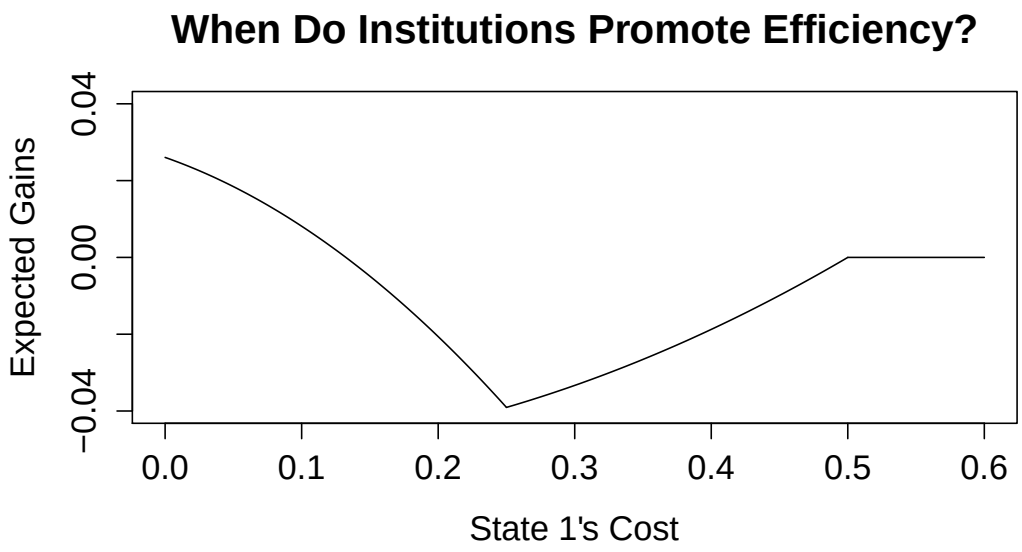

Figure 2: The difference in efficiency with and without the institution.

Figure 2 also raises more general questions about when institutions improve outcomes. Scholars recognize that reducing costs and externalities can create benefits (Oye 1992; Mitchell and Keilbach 2001). Milner (1997, 44), for example, makes the seemingly straightforward claim that "[a]s...exernalities rise, ceteris paribus, so do the gains from cooperation, and hence the incentives for it." But my model counterintuitively shows the opposite: the institution can only reduce efficiency when State 1 has great costs; the potential for great inefficiency compels State 1 to work harder to avoid it. Gains instead arise when State 1's suffers small costs of conflict, which induces State 1 to issue more reckless demands.

Switching gears, this analysis so far has only investigated how changing the institution's effort for the uninformed proposer alters efficiency dynamics. One might anticipate an identical problem as the institution mitigates more of the informed state's costs. Yet the following proposition brings great news:

Proposition 3. *As the institution reduces State 1's costs by a greater portion (i.e., as* α_2^* *decreases), the probability of bargaining breakdown weakly decreases.*

None of the perverse effects seen in Proposition 2 arise here; the more the institution

works to reduce State 2's cost, the less often bargaining breakdown occurs.[16]

The literature skeptical of international institutions has not yet identified these positive effects. Narang (2015), for example, theorizes that reducing the costs of war can only result in a higher probability of inefficient behavior. Nevertheless, Proposition 3's mechanism demonstrates the utility of formalization. Decreasing α_2^* reduces the cost that State 2 internalizes. All else equal, State 1 now finds reaching an agreement less attractive, as State 1 cannot extract as large of a surplus. The existing literature predicts that State 1 would pursue a more aggressive bargaining strategy, leading to more bargaining breakdown, more inefficiency, and counterproductive institutions.

However, all else is not equal. The proposer does not know State 2's cost in this model. Strategically, uncertainty only matters in how it affects a player's behavior. The unknown costs impact State 1 because it cannot anticipate which demands State 2 rejects. Manipulating α_2^* affects this and leads to the unexpected improvement.

To see why, consider the range of maximally acceptable demands with and without the institution. Without the institution, the lowest cost type accepts up to $\underline{c}_2$, while the highest cost type accepts up to $\bar{c}_2$. The size of this range of reservation values equals $\bar{c}_2 - \underline{c}_2$. With the institution, the lowest cost type accepts up to $\alpha_2^*\underline{c}_2$, while the highest cost type accepts up to $\alpha_2^*\bar{c}_2$. The size of this new range of reservation values equals $\alpha_2^*(\bar{c}_2 - \underline{c}_2)$.

If $\alpha_2^* < 1$, the institution *reduces* this range. This shrinks the variance of State 2's possible reservation values.[17] Put differently, the institution alleviates State 1's information problem.[18] Because the institution shrinks the difference between safer and more aggressive demands, gambling on higher demands looks less attractive. In turn, State 1 demands an amount that State 2 accepts more often.[19]

[16] In corner solutions, changing slight changes to α have no impact on the probability of breakdown.

[17] This effect can arise from a variety of alternative institutional choices. For example, one might imagine that institutions do not reduce costs by some percentage but rather mitigate damage past a critical threshold, perhaps because constructing camps looks more attractive with 100,000 refugees than with 100. This results in a similar variance-reducing second-order effect because it right-censors the distribution.

[18] Reduction of variance in State 1's beliefs about State 2's reservation value holds across bargaining protocols; indeed, calculating the variance in reservation values does not even require an explicit game form. As such, institutions reduce functional uncertainty as a general property. This demonstrates that the shrinking variance drives the differences between Propositions 2 and 3, not the fact that State 1 plays the proposer and State 2 plays the receiver in this particular model. See Reed 2003 for a similar discussion of variance and uncertainty.

[19] Considering the extreme case may prove helpful. If $\alpha_2^* = 0$, the variance collapses to 0, and State

This mechanism distinguishes itself from the informational argument common to the broader literature on international institutions. Standard liberal theory argues that institutions increase information by improving the quality of signals or by reducing the transaction costs of information acquisition (Keohane 1984; Koremenos et al 2001; Chapman and Reiter 2004; Fang 2008). Here, however, the institution provides no information; with or without it, State 1 still has the same belief given by the distribution function. But the institution nevertheless helps because it shrinks the problem that incomplete information poses.

Pressing forward, the good news continues. The institution not only reduces the probability of bargaining breakdown, it also mitigates some of the problems in the less likely scenario that the states enter conflict:

Remark 2. *As α_2^* decreases, the expected costs paid are weakly decreasing.*

Because the institution does not cause additional bargaining breakdown as α_2^* decreases, it cannot increase the inefficiencies. On the contrary,when bargaining fails, the institution meets its goals by preserving some of the pie.[20]

The differences between Propositions 2 and 3 underscore the need to better understand the correlates of uncertainty in international processes. Institutions can reduce bargaining breakdown when they make various types behave increasingly similarly. Thus, predicting whether an institution will positively or negatively affect a bargaining process requires first knowing where the uncertainty lies.

Developments in the civil war literature indicate a problem here. The previous section detailed various efforts to support refugees fleeing from rebel or insurgent areas. A separate literature argues that rebel groups face uncertainty about their governments' costs to maintain territories, especially against multiple potential challengers (Walter 2006; Walter 2009a). Under these conditions, the institution disproportionately assists the uncertain actor. The model indicates that institutions cause problems here.

Placing additional structure on the institution's utility function furthers this problem. The original setup permitted an independent optimization problem for each state's

1 faces no effective uncertainty whatsoever. It knows that 0 represents the maximal demand that *all* types of State 2 accept. State 1 faces no risk-return tradeoff here; it demand 0, which results in guaranteed acceptance. No inefficiencies occur. Note that this limiting result applies *regardless* of $F(c_2)$'s functional form.

[20]The relationship is weakly increasing because the institution has no effect if the states would strike a bargain with certainty regardless.

cost. One may alternatively conceptualize the institution's effort level as interdependently constrained. For example, constructing a refugee camp for or providing humanitarian aid to a separatist population could decrease services to the government.[21] One may then wonder how the results presented here would change under those circumstances.

In the appendix, I put some structure on this question. To summarize, suppose an institution cares more about helping a rebel group than a government. Intuitively, the institution spends more to help the rebels and less to help the government as that bias increases; greater concern for the rebels makes exerting marginal effort on them more attractive. But this extra effort must come from somewhere, and so the institution decreases its effort toward the government.

Unfortunately, this replacement effect creates a double whammy for the uncertainty structure the civil war literature emphasizes. Per Proposition 2, alleviating the pain of the uninformed party (State 1 in the model, the rebels here) increases the probability of bargaining breakdown. Per Proposition 3, alleviating the pain of the informed party (State 2 in the model, the government here) decreases the probability of bargaining breakdown. So as an institution's inclination to help the rebels increases, the institution exacerbates Proposition 2's problem while reducing the help from Proposition 3. This validates the literature's concern about unintended effects of civil war meddling.

4 Uncertainty over the Outcome of Conflict

Scholars also recognize outcome uncertainty as a major cause of conflict. This appears most prominently in research on warfare, when states do not know their opponents' military capabilities (Fearon 1995; Slantchev 2003; Powell 2004).[22] Such uncertainty extends to other contexts as well. For example, a state that implements sanctions may not know the expected resolution due to uncertainty about the opposing state's capacity to weather the sanctions or the opposing leadership's stability (Eaton and Engers 1999; Spaniel and Smith 2015). Likewise, states may not know the outcome of a trade case in front of international adjudication or whether their opponents will comply (Reinhardt

[21] These problems can result from powerful countries with disproportionate control over international institutions (Stone 2011) that use that power to provide greater aid to their friends.

[22] This may prove the more critical case—whereas costly signals can resolve uncertainty about resolve (Fearon 1997; Slantchev 2011), they fail to do so for distributional uncertainty (Arena 2013).

2001).

To analyze such a scenario, consider the following revised model. The overall structure remains identical: State 1 demands $x \in [0, 1]$, which State 2 accepts or rejects. Rejecting leads to costs $c_1, c_2 > 0$ for both players. Following rejection, an institution (with the same payoff function as before) mitigates the costs by choosing $\alpha_1, \alpha_2 \in [0, 1]$. The states only pay $\alpha_1 c_1$ and $\alpha_2 c_2$.

Unlike before, the states have common knowledge of the costs. Instead, Nature draws $p_1 \in [\underline{p}_1, \bar{p}_1]$, which represents the portion of the good State 1 expects to receive in the event of bargaining breakdown. State 2 receives $1 - p_1$. The bargaining model of war literature refers to this as State 1's probability of victory, but one may equivalently think of it as the expected outcome of the inefficient process.[23] As before, State 2 observes the draw but State 1 does not. Let $F(p_1)$ represent the strictly increasing cumulative distribution of p_1 and $f(p_1)$ be the corresponding density function. I make two additional assumptions about the distribution: it has full support on the interval $[\underline{p}_1, \bar{p}_1]$ and a strictly increasing hazard rate.[24]

This generates a key result:

Proposition 4. *With uncertainty over the distribution of the good via conflict, the probability of bargaining breakdown increases as α_1^* or α_2^* decreases.*

Put differently, institutional effectiveness can only increase the probability of conflict. The previous findings give the intuition. The probability of bargaining breakdown decreased under Proposition 3's comparative static because of a second-order effect—reducing costs shrank the proposer's uncertainty by collapsing the type distribution. Reducing costs has no analogous effect with outcome uncertainty. As such, reducing either side's cost increases the probability of bargaining breakdown; decreasing α_1^* insulates State 1 from rejection, while decreasing α_2^* makes extracting the entire (smaller) surplus with certainty look less attractive.

This result lacks the nuance from the results on cost uncertainty. Correspondingly, one may wonder whether they extend to other extensive forms with outcome uncertainty.[25] I address this question in the appendix using Bayesian mechanism design,

[23] This could include a stalemate in war or the persistence of the status quo following sanctions.

[24] Formally, $\frac{f(p_1)}{1-F(p_1)}$ is strictly increasing in p_1.

[25] See Leventoğlu and Tarar 2008 for an example of how different crisis bargaining protocol can yield different equilibrium predictions.

which shows what must hold for equilibria across a range of conflict games (Fey and Ramsay 2011). The negative finding persists under the most idyllic of circumstances: if a bargaining outcome guaranteed efficiency (because the states reach an agreement with certainty), sufficiently strong institutions (i.e., institutions that produce sufficiently small values for α_1^* or α_2^*) cause bargaining breakdown and inefficiency with positive probability.

Once again, institutions designed to mitigate the costs of civil wars seem to cause problems. Beyond uncertainty over the government's cost of war, the literature points to asymmetric information about a rebel group's capabilities as the other uncertainty-based explanation.[26] The model unambiguously shows that institutions cause bargaining breakdown in such environments.

Nevertheless, as seen earlier, additional bargaining failure does not imply greater expected inefficiencies. The following remark describes the silver lining:

Remark 3. *With uncertainty over the distribution of the good via conflict, the expected costs paid are nonmonotonic in α_1^* and α_2^*. In particular, initial reductions to either state's cost can increase overall inefficiencies, though larger reductions can eventually lead to an overall decrease.*

As before, although decreasing costs perversely causes more bargaining breakdown, powerful institutions see their savings cover the problems they cause. Unfortunately, the benefits accrue slowly here—without a second-order reduction of uncertainty, cost savings can only come as a direct result of the institution's effort.

5 Conclusion

This paper explored whether international institutions enhance efficiency by mitigating costs that actors suffer during conflict. Previous work suggests that they may backfire by perversely incentivizing bargainers to behave more recklessly in negotiations, thereby creating conflicts that would not occur in the institution's absence. I developed a formal model to scrutinize the claim. Although the model finds the anticipated effect, it also shows that the institution can enhance efficiency in two ways: (1) it can resolve

[26]The covert nature of many rebel groups masks their true capabilities (Walter 1999, 132; Fearon 2007; Walter 2009b, 248-250) and obscures the expected outcome of war.

information problems by reducing the variance of potential reservation values and (2) it may absorb so much of the expected costs that it compensates for the additional inefficiency it causes.

For policymakers, these caveats provide important nuance for the development of future institutions. Aid increases bargaining failure under high expected costs of conflict, and institutions can only overcome their own inefficiency when they help an actor with an already low cost. Yet surplus-preserving institutions tend to target the biggest crises precisely due to their saliency. The model indicates that some of this effort is misguided. Ironically, institutions prove most effective when they absorb low-level inefficiencies. Adhering to this recommendation may prove difficult, though, due to lack of political will among donor countries for off-the-radar issues.

This problem also raises questions about institutional design. Although some surplus-preserving institutions do not require substantial investment before any conflict, others do. Thus, if institutions can cause bilateral inefficiencies, why develop them in the first place? The rational design argument (Koremenos et al 2001) suggests an answer: policymakers promote institutions because the positive outweighs the negative. This may stem from the positive effects the model uncovered or because building the institution can fix a preexisting problem at the cost of causing future problems.[27] Alternatively, a pessimistic view observes that powerful states capture these institutions (Stone 2011), causing the help to go to them or their allies. Still, future work could investigate whether states can temper the drawbacks, bearing in mind the constraint of the credibility problem.

Finally, an avenue for future research would investigate similar institutions that manipulate conflict by *imposing* costs. For example, some peace missions following civil war maintain stability by militarily punishing violators (Doyle and Sambanis 2000; Fortna 2004). However, my results indicate that mitigation does not always have a pacifying effect. Threatening violators with punishment might alter the bargaining dynamics and cause the side facing uncertainty to take greater chances. Fortunately, these institutions have the benefit of manipulating ongoing negotiations. But my model suggests that finding the right incentive structures may prove difficult.

[27]This also suggests an explanation for why states build few organizations. Institutions with high startup costs would exist if the benefits exceed the costs and drawbacks. Institutions just below the threshold would come into existence if states could resolve the perverse incentives problem.

6 Appendix

This section proves the propositions from the main paper and details robustness checks and special cases it alluded to.

6.1 Proof of Proposition 1

Since the institution is fully informed and moves last, simple backward induction finds its move. Because the cost functions are strictly concave and its utility function for reducing the states' costs is weakly concave, the institution's objective function has a unique solution. Call the inputs for that solution α_1^* and α_2^*.

State 2 knows its type when it takes its move and infers that the institution will choose α_2^*. Therefore, by backward induction, a type with cost c_2' accepts if:

$$1 - x > 1 - \alpha_2^* c_2'$$
$$c_2' > \frac{x}{\alpha_2^*}$$

By analogous argument, State 2 rejects if the inequality is flipped. It is indifferent when there is equality, but the equilibrium action taken here is irrelevant because that type has measure zero.

Thus, the strategic tension is in State 1's initial offer. State 1 infers that the institution will choose α_1^* and α_2^*, and it knows how each type of State 2 will act given that they all know α_2^*. It also observes the prior distribution of types $F(c_2)$. Consequently, State 1 must find the optimal demand x that maximizes its expected utility over that distribution and the corresponding actions later in the game. The only possible optimal demands are $x \in [1-\alpha_2^*\underline{c}_2, 1-\alpha_2^*\bar{c}_2]$. This is because all other demands either induce rejection with certainty (making $x = 1 - \alpha_2^*\underline{c}_2$ a profitable deviation) or give more than the minimum amount necessary to induce all types of State 2 to accept (making a slightly larger demand a profitable deviation).

Writing out that utility as a function of x for the remaining interior values gives:

$$F\left(\frac{x}{\alpha_2^*}\right)(-\alpha_1^* c_1) + \left[1 - F\left(\frac{x}{\alpha_2^*}\right)\right](x)$$

where $F\left(\frac{x}{\alpha_2^*}\right)$ is the probability that State 1's demand induces rejection (because State

2's costs are less than $\frac{x}{\alpha_2^*}$) and $\left[1 - F\left(\frac{x}{\alpha_2^*}\right)\right]$ is the probability that State 1's demand is accepted.

Using the product and chain rules, the first order condition of this is:

$$1 - F\left(\frac{x}{\alpha_2^*}\right) - \frac{xf\left(\frac{x}{\alpha_2^*}\right) + \alpha_1^* c_1 f\left(\frac{x}{\alpha_2^*}\right)}{\alpha_2^*} = 0$$

$$\frac{\alpha_2^*}{x + \alpha_1^* c_1} = \frac{f\left(\frac{x}{\alpha_2^*}\right)}{1 - F\left(\frac{x}{\alpha_2^*}\right)} \tag{1}$$

The left-hand side is strictly decreasing in x, while the right-hand side is the distribution's hazard function and is therefore strictly increasing in x. Let x^* be the implicit solution to this function. If x^* is within the interior interval, then it is the unique solution, and State 1 demands that amount. Some portion of the types reject. If x^* does not exist because $\frac{\alpha_2^*}{\alpha_1^* c_1 + \alpha_2^* \underline{c}_2} < \frac{f(\underline{c}_2)}{1 - F(\underline{c}_2)}$ (because c_1 is too large, as Proposition 1 alludes to), then State 1 chooses $x = \alpha_2^* \underline{c}_2$. Note that $\frac{\alpha_2^*}{\alpha_1^* c_1 + \alpha_2^* \underline{c}_2}$ is decreasing in c_1. Thus, for sufficiently large c_1, State 1 selects the offer that State 2 is guaranteed to accept. This completes the proof for Proposition 1. □

6.2 Proof of Proposition 2

There are two cases to consider: the interior solution and the corner solution. In the corner solution, State 1 makes the safe demand that results in guaranteed acceptance. Slight changes to α_1^* do not alter this. However, sufficient decreases to α_1^* shift the parameters into the interior solution, which features positive probability of bargaining breakdown.

Going further into the interior case requires investigating how the implicit solution to Equation 1 changes as α_1^* decreases. This has the effect of decreasing the denominator on the left-hand side, which increases the left-hand side overall. To compensate, State 1 must increase x to maintain the equality, as this decreases the left-hand side while increasing the right-hand side.

Altering α_1^* has no direct effect on State 2's accept/reject decision. Thus, decreasing α_1^* increases the demand x, which reduces the portion of types of State 2 that accepts. Therefore, the probability of bargaining breakdown increases. □

6.3 Proof of Proposition 3

There are again two cases to consider: the interior solution and the corner solution. This time, I begin with the interior. The hazard is strictly increasing, and increasing α_2^* *decreases* the input. Thus, the right hand side of Equation 1 is strictly decreasing in α_2^*. Meanwhile, the left hand side is strictly increasing. As such, increasing α_2^* requires State 1 to increase x to maintain the equality. So the optimal demand is increasing in α_2^*.

Let $I(\alpha_2^*)$ be the implicit function that takes α_2^* as the input and outputs State 1's optimal demand. By the above, $I'(\alpha_2^*) > 0$. To see how changing α_2^* affects the probability of breakdown, note that the probability is $F\left(\frac{I(\alpha_2^*)}{\alpha_2^*}\right)$. Consider the derivative with respect to α_2^* by the chain rule:

$$f\left(\frac{I(\alpha_2^*)}{\alpha_2^*}\right)\left(\frac{I(\alpha_2^*)}{\alpha_2^*}\right)'$$

The derivative is increasing if:

$$f\left(\frac{I(\alpha_2^*)}{\alpha_2^*}\right)\left(\frac{I'(\alpha_2^*)\alpha_2^* - I(\alpha_2^*)}{(\alpha_2^*)^2}\right) > 0$$

$$I'(\alpha_2^*)\alpha_2^* > I(\alpha_2^*) \tag{2}$$

This is the condition on the distribution function for the results presented. As such, reducing α_2^* reduces the probability of bargaining breakdown for this class of distribution functions.[28]

Now consider the corner solution. The proof for Proposition 1 shows that the corner solution begins for sufficiently small α_2^*. Further reductions to α_2^* maintain the corner solution and the zero probability of breakdown.

In turn, the only remaining question is how changing α_2^* transitions from the interior to the corner. The transition occurs as α_2^* decreases. In the interior, the probability of breakdown is decreasing as α_2^* decreases. It then becomes static at 0 once in the corner solution. As such, decreasing α_2^* weakly decreases the probability of bargaining breakdown as the proposition claimed. □

[28] Rearranging Equation 2, note that the result also applies locally to any distribution when $\alpha_2^* > \frac{I(\alpha_2^*)}{I'(\alpha_2^*)}$.

6.4 Proof of Proposition 4

As in previous cases, the institution selects α_1^* and α_2^*. State 2 has complete information and accepts if its draw for p_1 meets $1 - x \geq 1 - p_1 - c_2$, or $x \leq p_1 + c_2$.

State 1 must optimize given its prior beliefs. All types of State 2 accept all x less than or equal to $\underline{p}_1 + \alpha_2^* c_2$. Consequently, the optimal demand must be at least $\underline{p}_1 + \alpha_2^* c_2$. State 1's utility function for x values between $\underline{p}_1 + \alpha_2^* c_2$ and $\bar{p}_1 + \alpha_2^* c_2$ is

$$\int_{\underline{p}_1}^{x-\alpha_2^* c_2} (p_1 - \alpha_1^* c_1) f(p_1) dp_1 + \int_{x-\alpha_2^* c_2}^{\bar{p}_1} x f(p_1) dp_1$$

where the first portion is State 1's expected value for war multiplied by the probability that the demand results in war, while the second portion is State 1's share of the settlement multiplied by the probability that State 2 accepts.

Leibniz's rule and some manipulation produces the first order condition:

$$-f(x - \alpha_2^* c_2)(\alpha_1^* c_1 + \alpha_2^* c_2) + 1 - F(x - \alpha_2^* c_2) = 0$$

$$\frac{1}{\alpha_1^* c_1 + \alpha_2^* c_2} = \frac{f(x - \alpha_2^* c_2)}{1 - F(x - \alpha_2^* c_2)}$$

The left-hand side is constant and the right-hand side is strictly increasing in x. Thus, if x^* solves the equation, it is the unique maximizer, and State 1 chooses that amount in equilibrium. If no such x value exists (because $\frac{1}{\alpha_1^* c_1 + \alpha_2^* c_2} < \frac{f(\underline{p}_1)}{1 - F(\underline{p}_1)}$), State 1 demands $\underline{p}_1 + \alpha_2^* c_2$ instead.[29]

Now to the comparative static. Decreasing α_1^* has a straightforward effect. It decreases the left-hand side's denominator and therefore increases the overall value of the left-hand side. Thus, to maintain the equality, State 1 must choose a larger x value. But the probability of acceptance $F(x - \alpha_2^* c_2)$ is decreasing in x, meaning that this increases the probability of rejection in interior cases. In the corner solution, this can either maintain the zero-probability of war demand or shift the demand into the interior, which permits positive probability of war. Both of these cases comport with Proposition 4's claim.

Decreasing α_2^* has an identical effect, though there is an additional wrinkle: α_2^* appears in the distribution functions f and F. Fortunately, this is only a superficial

[29] The first order condition rules out all demands greater than $\bar{p}_1 + \alpha_2^* c_2$, as State 1's utility for these demands are identical to demanding $\bar{p}_1 + \alpha_2^* c_2$.

problem: α_2^* only shifts where the distribution function starts and finishes, and does not distort it in any other way.[30] Thus, decreasing α_2^* keeps the value for $\frac{f(x-\alpha_2^* c_2)}{1-F(x-\alpha_2^* c_2)}$ for any given x value when pegged to the initial start value. Meanwhile, it strictly decreases the denominator of the left-hand side, leading to an overall increase to the left-hand side's value. From here, the proof is identical to the case of manipulating α_1^*. □

6.5 Extension: Rivalrous Institutional Effort

Consider the following alternative specification for the institution's utility function. Imagine that the institution has a fixed level of effort $\bar{e}$ that it must exert to alleviate the costs of State 1 and State 2. Further, suppose that the real costs State i suffers is $\frac{c_i}{1+e_i}$, where $e_i \geq 0$ and $e_1 + e_2 = \bar{e}$. Converting this functional form into the language of the original model $\alpha_i = \frac{1}{1+e_i}$.

The interesting question is how the institution's behavior changes as its bias for one state over the other changes. Let $\beta_i \geq 0$ represent the institution's bias for State i. Its overall utility function is then:

$$-\frac{\beta_1 c_1}{1+e_1} - \frac{\beta_2 c_2}{1+e_2}$$

Note that larger values of β_i make the negative effect of that state's cost appear greater to the institution, which is exactly what this parameter is designed to encapsulate.

Substituting $e_2 = \bar{e} - e_1$ and taking the first order condition yields:

$$\frac{\beta_1 c_1}{(1+e_1)^2} = \frac{\beta_2 c_2}{(1+\bar{e}-e_1)^2}$$

The claim from the paper is that increasing bias toward one state increases the effort to that state and decreases effort to the other state. This is easily observed by examining the first order condition. Increasing β_1 increases the overall value of the left hand side of the equation. But the first order condition requires both sides to maintain equality. The only freedom the institution has is to manipulate e_1. Since the right

[30] This is in contrast to when there is uncertainty over State 2's costs, in which case α_2^* compacts the distributions.

hand side is unchanging in β_1, the only way to maintain the inequality is to increase e_1, which causes a decrease in e_2. The argument works analogously for increases to β_2. □

6.6 Mechanism Design Analysis

Here, I consider a more general version of the problem with uncertainty over the distribution through conflict. Each side remains fully informed of the other's cost. However, Nature now begins by drawing t_i for each player from a commonly known prior distribution. The outcome of a rejected offer $p(t_1, t_2)$ is a function of both of these types, where p is increasing in State 1's type and decreasing in State 2's; that is, a "stronger" type of a state receives a better outcome regardless of the opponent's type.

This is sufficient for the following proposition:

Proposition 5. *With uncertainty over the distribution of gains, for sufficiently great costs of conflict, there exist efficient, voluntary, and incentive compatible mechanisms. However, for sufficiently effective institutions, all such mechanisms cease to exist.*

The proof is a straightforward corollary to Fey and Ramsay's (2011) Propositions 5 and 6. The relevant comparison is the strategic constraints in all bargaining games with the institution and without. However, because the institution merely reduces costs of both players and this role is common knowledge, the relevant comparison in practice is how the strategic constraints of all bargaining games change as a function of the cost parameters of the states.

Under the conditions of the model, these assumptions meet the requirements of Fey and Ramsay with incomplete information about the relative distribution of power. This unlocks all claims they prove about such games. Their Proposition 6 says that there exists a $\bar{c}$ such that for $c_1 + c_2 \geq \bar{c}$ a mechanism exists that has 0 probability of conflict. Because agreement is certain, the expected inefficiency equals 0. However, by their Proposition 5, if $c_1 + c_2 < \bar{c}$, all mechanisms are inefficient. Thus, an institution in this case must be the cause of that inefficiency. □

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