When Does Hawk Engagement Work? Conflict and Cooperation Under Uncertainty

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Abstract

Engaging leaders with a greater resolve to fight in negotiations sometimes leads to increased cooperation, but when and why is relatively unclear. This paper develops a new theory to explain why bargaining with these hawkish leaders under uncertainty can increase the likelihood of peace. We create a formal model that shows that as a leader becomes more hawkish – and the expected payoffs for fighting increase – uncertainty over the costs of fighting becomes irrelevant. With information problems mitigated, proposers make safer offers. We illustrate the strategic logic with a short case on constructive engagement policy surrounding South Africa. We derive implications for understanding variation in other contemporary hawk engagement policies towards East Germany and North Korea. This finding advances scholarly understanding about how crisis bargaining works under uncertainty.

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1 Introduction

Crisis bargaining theories argue that negotiating with leaders who expect higher payoffs to fighting – commonly known as hawks – is more likely to lead to conflict relative to negotiating with leaders whom expect lower payoffs to fighting, otherwise known as doves.[1] However, outside states sometimes choose to engage hawks in negotiations despite these risks. From West Germany's *Ostpolitik* to South Korea's Sunshine Policy, bargaining with hawks sometimes leads to more peace and cooperation. Under what conditions does engaging hawks increase the probability of peace and why?

Existing explanations suggest peace can emerge if hawks initiate negotiations. Domestic political advantages help hawks navigate crisis bargaining situations more effectively than doves, increasing the probability of a peaceful agreement (Cowen and Sutter 1998; Schultz 2005; Mattes and Weeks forthcoming).[2] However, it is unclear whether – and to what extent – domestic political stories can explain why hawks sometimes *attract* peace. Under some conditions, these domestic political factors may be irrelevant in shaping an outside state's offer. In other cases, domestic political advantages may only have a negligible effect (Kreps et al. 2018).

We introduce a new theory that overcomes these gaps. We argue that increasing the leader's value of the issue at stake – and making him more hawkish – increases the likelihood of peace by incentivizing outside actors to make less aggressive offers. We develop a model that outlines under what conditions these incentives arise and draw comparative statics on how much the leader values fighting to demonstrate how it affects the likelihood of peace and conflict.

The intuition follows from a simple screening logic. Suppose a proposing state has uncertainty over its opponent's material costs of fighting – the number their soldiers who will perish, the number of buildings they will lose, or the quantity of trade value sacrificed. Imagine that the opponent in question is a *dove*, defined as valuing the issues at stake a lower level than a *hawk* would. In this situation, the proposer has strong incentives to offer a stingy amount. Why? The extra amount the proposer could keep by risking war against a low cost type to extract every last bit out of a high cost type is large. Proposing a safe offer therefore has a higher peace premium, which leads to more aggressive bargaining strategies and therefore war.

[1]In the remainder of this paper, we refer to hawks as those with higher expected payoffs to fighting and doves as those with lower expected payoffs to fighting consistent with the literature (Colaresi 2004; Schultz 2005; Wolford 2007).

[2]This is sometimes remembered by the sentiment that "only Nixon can go to China."

In contrast, suppose the opponent leader was a hawk. As an extreme example, the costs for war are irrelevant for a hawk with a near-infinite value for the good at stake. Casualties, lost capital, and sacrificed trade mean nothing. This is true whether that hawk's true material costs of war are large or small. Consequently, the peace premium the proposer has to pay to induce all types to accept is small. It therefore makes those safe offers more often, leading to less war.

Putting these pieces together, our goal for this paper is to introduce a model that demonstrates countervailing effects between hawkishness and uncertainty. Greater levels of resolve make a state more belligerent, but it can also mitigate an information problem. We derive the conditions when the latter effect dominates to demonstrate under what conditions engaging hawks increases the probability of peace. To illustrate the logic, we briefly trace the model's main intuitions through a short case on the negotiations surrounding the policy of constructive engagement towards South Africa during the Namibian War for Independence. We also briefly examine additional implications of the model with reference to more contemporary cases of hawk engagement towards East Germany and North Korea.

This paper results in three new contribution to scholarly understanding about how hawks and doves affect crisis bargaining. First, it identifies a new set of conditions whereby hawks are advantaged in crisis bargaining even if they do not initiate negotiations. Second, it reveals how different sources of uncertainty affect crisis bargaining. Although scholars often treat uncertainty as a monolithic mechanism for war, we demonstrate that a failure to trace the effects of different types of uncertainty can mask how and why uncertainty affects the probability of conflict. Finally, it strengthens the theoretical foundations for why engaging with hawks might increase the probability of peace. Understanding when and why these efforts work is important to navigating future rapprochement opportunities with hawkish leaders around the world.

2 Existing Explanations

Bargaining with hawks is generally perilous. Crisis bargaining theories argue that uncertainty increases the likelihood of war when leaders have incentives to misrepresent their payoffs from fighting.[3] Negotiating with hawks therefore seems to carry a higher risk of bargaining failure relative to negotiating with doves because the range of mutu-

[3] See, for example, Fearon (1995), Gartzke (1999), Powell (1999), and Ramsey (2017).

ally acceptable settlements is much smaller.

Despite these risks, bargaining with hawks sometimes pays off, leading to new modes of cooperation between states. Scholars often recall that "only Nixon can go to China" because Richard Nixon's hawkish, anti-communist reputation within the US enabled him to make credible overtures to the People's Republic of China to pursue rapprochement. This Nixon-to-China story has spurred a robust set of research on the conditions under which bargaining with hawks improves the prospects of cooperation.

Scholars argue that peace can emerge when hawks initiate cooperation because they benefit from domestic political advantages in crisis bargaining. Hawks may be better able to credibly signal their commitment to peace than doves. Pursuing policies contrary to type – such as a right-wing politician pursuing extreme left-wing policies and vice versa – can command bipartisan support (Cukierman and Tommasi 1998). In contrast, pursuing policies consistent with type can be seen as ideological shirking by catering only to an extreme population (Cowen and Sutter 1998). If a hawk has more support for cooperation than a dove, then he can better signal his commitment to cooperation.

Hawks may also initiate cooperation to moderate their preferences and avoid being seen as an extremist to domestic audiences (Nincic 1988; Schultz 2005). Doves do not initiate cooperation because they fear domestic audience costs for being perceived as too pacifist (Colaresi 2004). By initiating cooperation, hawks can better appeal to the median voter and align their preferences with the populace. This can enable them to command public support for their rule. Mattes and Weeks (forthcoming) find experimental evidence that publics reward hawks for pursuing cooperation, consistent with this mechanism.

There are two main limits to this research. First, this research primarily describes why hawks initiate cooperation, but this is not always the case. Sometimes outside state choose to engage hawks instead. Most models in the crisis bargaining literature that formally examine this cooperation problem typically treat hawkish leaders as the proposers, rather than receivers.[4] Domestic political advantages may be irrelevant in shaping an outside state's offer. It might be hard for an outside state to assess whether a hawk has incentives to moderate or whether the public is also hawkish. This, in turn, raises questions about whether a hawk's willingness to cooperate is credible or not.

Second, there is mixed evidence over whether these domestic political advantages

[4]See, for example, Colaresi (2004), Schultz (2005), and Clare (2014).

exist. Empirically, Kreps et al. (2018) find evidence that hawks are not as advantaged in their ability to secure cooperation as previously assumed. Through an analysis of U.S. arms control negotiations, they find that even a dove can secure cooperation if he is willing to pay a higher cost. Others find that certain politicians who go against type risk public backlash and other audience costs for turning away from their prior commitments or statements over an issue (Tomz 2007; Trager and Vavreck 2011). Finally, some scholars note that many negotiations occur behind closed doors, which obscure the extent to which public audiences can bolster a leader's position in crisis bargaining (Yarhi-Milo 2013; Carson and Yarhi-Milo 2017). If domestic political advantages are absent, then it is unclear why hawk engagement sometimes works. Scholars need a new theory to understand under what conditions hawk engagement increases the probability of peace and why.

We address these limits by developing an alternative explanation for why bargaining with hawks may increase the likelihood of peace. The closest set of findings to ours comes from the appeasement literature (Powell 1996; Rock 2000; Treisman 2004). These models suggest the prospect of repeated interactions and future distribution of power can lead states to make safer offers towards revisionist leaders than they otherwise would have. We suggest a simpler explanation may be afoot. Crisis bargaining under uncertainty can increase the prospects for peace without having to incorporate these future considerations. Further, while many revisionist leaders have hawkish preferences, it would be a misnomer to treat all hawks as revisionist leaders. We seek to identify a broader set of conditions under which bargaining with more resolved leaders is effective.

3 Uncertainty over Material Costs

In this section, we analyze a specific source of uncertainty in crisis bargaining models, which we call material costs.[5] This source of costs will be important to the model developed later because it has a unique effect on the types of offers under consideration. Material costs capture the various political, economic, or military costs of war. They can be either the costs incurred as a direct result of fighting or opportunity costs associated with lost trade as an indirect consequence of fighting.

Uncertainty over the costs of conflict is not new (Morrow 1989; Fearon 1995; Powell 1999). However, most studies treat uncertainty as a monolithic problem when, in

[5] This is similar to the distinction in Morrow (1994) between peacetime costs and wartime costs.

fact, it is much more nuanced. Existing discussions of war costs parameters in crisis bargaining lump together both material costs and a state's resolve. Models commonly do this through a simple standardization of the good to value 1. This is advisable for most research questions because it reduces notational clutter. Nevertheless, conducting comparative statics on one of those concepts requires disaggregating the two. Otherwise, the comparative static does not isolate the effect of changing a single parameter, but rather the two in conjunction. As such, we write the costs of war as $\frac{c}{V}$, where $c > 0$ represents the material costs and $V > 0$ represents the actor's resolve. This conceptualization is similar to previous research that models uncertainty over resolve as the state's "value for the issue at stake relative to the costs of conflict" (Fearon 1995, 394).[6] Yet we show that disaggregating these two parameters leads to new and unexplored effects in crisis bargaining.

To elaborate, suppose that a state values the good at stake worth V rather than 1. Then letting p be its probability of victory, its utility for war equals $Vp - c$. Because expected utilities are identical across positive affine transformations, we can rewrite this as $p - \frac{c}{V}$ without loss of generality. Given that $c > 0$ and $V > 0$, a researcher wishing to reduce notation could just call this c and eliminate a variable. But if we wanted to know how changing V altered the probability of war while holding the material costs constant, a lone c parameter is insufficient.

While leaders can alleviate uncertainty over some costs through monitoring, signaling, or imposing new costs, it is difficult to overcome other sources of uncertainty (Fearon 1997). We identify uncertainty over material costs as one such case.[7] This source of uncertainty is important because it arises in interstate and intrastate conflict more often than scholars have previously recognized. We provide a few illustrations of why one state may have private information about these material costs to demonstrate its commonality.

First, a state may have private information about its ability to mitigate the physical costs of fighting. If conflicts disrupts trade, then a state may have private information about its ability to replace lost trade gains or its sensitivity to these lost gains (Gartzke and Lupu 2012; Spaniel and Smith 2015). The domestic political consequences of fighting may also be better known to a leader from within the country than to an

[6]This is also the source of uncertainty in Morrow (1988), Schultz (2005), and Snyder and Borghard (2011).

[7]This also helps differentiate our model from the source of uncertainty present in Powell (1996) and Tresiman (2004).

outside observer as well (Goemans 2000).

Second, a state may have private information about its ability to adapt to the physical costs of fighting. For example, a state knows whether it will receive military aid or external assistance to fight a rival or rebel group (Gleditsch et al. 2011). Conversely, a rebel group may also have private information about its access to external sponsors or a sanctuary that enable it to avoid detection (Bapat 2007; Salehyan 2009).

A state may also have private information about its ability to create and introduce new technological innovations or other types of weaponry that affect conflict dynamics. For example, the U.S. was forced to rapidly innovate its tank production plating during World War II and again during the Iraq War to protect soldiers from improvised explosive devices and guerrilla attacks. Beyond weaponry, a state may also have private information about its battlefield medicine prowess or ability to care for and rehabilitate injured soldiers (Fazal 2014).

As a second-order cause of this information problem, different probabilities of victory translate to different costs of war. States may not know their opponents' underlying military resources or their ability to use them. Not knowing this information has consequences to the uncertain party beyond the probability of victory. An opponent with a poorly-trained tank regiment is not only less likely to win – it is also unlikely to inflict many casualties. We return to this source of uncertainty over material costs in an extension.

Taking stock, we do not disagree with the conventional finding that uncertainty over resolve shapes the likelihood of conflict. However, we think it is also important to clearly specify the sources of uncertainty given how much variation exists in the literature. We diverge from existing literature by disaggregating between the value of the issue, V, and the costs of the conflict c. This allows us to draw comparative statics on how changing the hawkishness of a leader changes the likelihood of cooperation under varying conditions of uncertainty.

4 The Model

Consider the following model in the crisis bargaining framework. Two leaders, A and B, are in a dispute over some good, which A values at $V_A > 0$ and B values at $V_B > 0$. Nature begins the game by drawing B's cost of war as either c'_B with probability $q \in (0, 1)$ and c_B with probability $1 - q$, with $c'_B > c_B > 0$; in the appendix, we show our results extend to environments with continuous type distributions.[8] B observes this value, but A only has the prior belief. Play begins with A offering $x \in [0,1]$ to B, where x represents a percentage of the good at stake. If B accepts, it receives x as its share and A receives the remaining $1-x$. Thus, A's payoff is $(1-x)V_A$ and B's payoff is xV_B.

If B rejects, the states fight a war. To demonstrate the central logic of our mechanism, we begin by assuming that the probability of victory is *not* a function of B's type; we later explain how our results extend to that case. Instead, B wins with probability $p_B \in [0,1]$ and A wins with probability $1-p_B$. Fighting costs A the value $c_A > 0$, while B pays the quantity drawn earlier. Thus, A overall earns $(1-p_B)V_A - c_A$, the high cost of type B receives $p_B V_B - c_B'$, and the low cost type receives $p_B V_B - c_B$.

Normally, we would standardize V_A and V_B to 1 and proceed from there. However, this standardization is a barrier to inference in our model for two reasons. First, standardizing implicitly moves a state's valuation to its cost parameter, but this model captures uncertainty over the material costs. If we made the standardization, taking a comparative static on the value would conflate a change of that value and a change in the source of uncertainty. The appeasement and salient stakes literatures only compare low to high value environments, and so we want to isolate just that effect. Second, if values increase for both parties simultaneously, the overall consequences may depend on the relative initial starting points and *not* the material costs. Investigating this also requires divorcing values from material costs.

4.1 Optimal Demands in High-Value Cases

Because this is a sequential game of incomplete information, we search for its perfect Bayesian equilibrium. We begin our analysis by focusing on cases where both types of B has positive values for war. These parameters lead to an "interior solution," which sees the equilibrium offer change as a function of the parameters. Interior solutions differ from "corner solutions," for which the optimal offer remains static. Most models have theoretically analogous results between these two types of solutions and thus only focus on interior cases. This is not the case here, and so we take each in turn.

Broadly, A faces a risk-return tradeoff. The high cost type earns xV_B by accepting and $p_B V_B - c_B'$ by rejecting. Thus, it rejects any value less than $p_B - \frac{c_B'}{V_B}$ and accepts

[8]Specifically, we show analogous results for a uniform distribution and then give technical conditions for the class of distributions the main counterintuitive result holds for.

otherwise.[9] Analogously, the low type rejects any value less than $p_B - \frac{c_B}{V_B}$ and accepts otherwise.

In turn, A has two options. First, it can propose at least $p_B - \frac{c_B}{V_B}$. This is enough to appease the low cost type; because the high cost type pays more to fight a war, it is also enough to appease the high cost type. Consequently, such offers guarantee the peace and mean that A will not have to worry about paying its cost of war. Second, it can propose less than $p_B - \frac{c_B}{V_B}$ but still greater than $p_B - \frac{c'_B}{V_B}$. This buys the high cost type's compliance but leads to war against the high cost type. The smaller offer means that A obtains a greater share of the peaceful distribution whenever B is actually the high cost type. Smaller offers also risk war against the low cost type. Hence the risk-return tradeoff.

Intuitively, which offer A prefers to make depends on the relative likelihood of the two types. The following proposition summarizes the equilibrium:

Proposition 1. *A's offer strategy is a function of its prior belief. If the probability B has high costs is sufficiently high (i.e.,* $q > \frac{\frac{c_A}{V_A} + \frac{c_B}{V_B}}{\frac{c_A}{V_A} + \frac{c'_B}{V_B}}$*), A offers an amount only the high cost type accepts (i.e.,* $x = p_B - \frac{c'_B}{V_B}$*). If the probability B has high costs is sufficiently low (i.e.,* $q < \frac{\frac{c_A}{V_A} + \frac{c_B}{V_B}}{\frac{c_A}{V_A} + \frac{c'_B}{V_B}}$*), A offers an amount both types accept (i.e.,* $x = p_B - \frac{c'_B}{V_B}$*).*

In essence, if B is likely the high cost type, A gambles by making a stingy offer. It knows full well that this will sometimes result in war, but it is risk worth taking. Meanwhile, if A is more pessimistic about B's type, it plays things safe, offers an amount targeted for the high type, and ensures a settlement.

Our research question asks how the likelihood of war changes as the value of the stakes increases. There are two ways to think about shifting values. First, one party's valuation may change independently of another's. For example, suppose the states were bargaining over a strip of territory. At one point in time, B's leader believed that the land was an integral part of the state's identity and thus found it extremely valuable. Following an election, a new leader came to power that cared very little about the issue. Here, B's valuation changed while A's remained static. Second, both parties valuations may increase simultaneously. This could arise if a conflict shifts from being about a mundane policy dispute to a border clash, or if prospectors discover natural resources

[9] For ease of exposition, we assume that B accepts when indifferent. This is in fact a necessary condition of equilibrium here.

in a disputed territory. We cover both of these cases, beginning with changes to B's valuation in isolation:

Proposition 2. *As the B's value of the good increases (i.e., as V_B increases), the set of parameters for which war occurs decreases.*

Put differently, increasing B's value of the stakes makes the environment *less* conducive to conflict. More formally, increasing V_B can switch the expected probability of war from 0 to $1 - q$.[10] This result should be striking. It says that making B more inclined to fight over the good actually makes it less likely to fight in practice.

What accounts for the counterintuitive relationship? Increasing V_B has two effects, one direct and one indirect. The direct effect is a relative decrease in the costliness of war. All else equal, this ought to reduce the probability of conflict. But it also affects high cost and low types differently. This indirectly exacerbates A's information problem and accounts for the increase in the probability of war.

Figure 1 illustrates the intuition. The left side shows the minimum value of x both the high cost and low cost types must receive to accept for a case with a low value of V_B. The difference between those values partially determines A's propensity to run risks in bargaining. If the difference is large, offering the larger amount necessary to appease both types vastly overpays the high cost type. Thus, offering the smaller amount looks tempting. Although doing so triggers war with the low cost type, as long as the probability of the low type is small, that risk is worth capturing a better share of a settlement.

Now consider the right side of Figure 1. Here, B has a larger value for V_B. Both types now have greater minimum demands, as each finds war more attractive than before. But notice that the gap between the minimum demands has narrowed; the high and low cost types now behave more similarly. This makes offering the risky amount look less attractive, as A does not have to overpay the high cost type as much. In turn, A's optimal demand may switch to the safe amount. The game goes from having war occur with positive probability to guaranteed peace.

If this intuition is not clear, the extreme case may prove helpful. Imagine that V_B increased to infinity. How does this change each type's reservation value? To calculate reservation values, each type divides its cost by V_B. As V_B trends toward infinity, both

[10]The discontinuous increase in the probability of war is due to the discrete type space. In the continuous type space model in the appendix, the probability of war increases continuously.

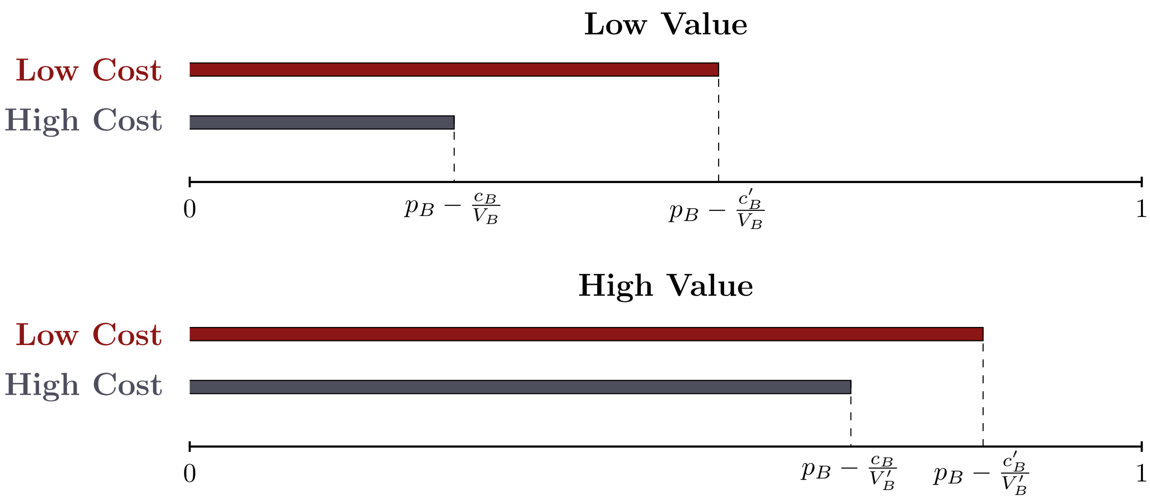

Figure 1: The minimum portion of the good a low cost type and a high cost need to accept an offer for two cases: when the value of the good is low (V_B) and when the value of the good is high ($V'_B > V_B$). Increasing the value increases each type's minimum acceptable offer. In this case, the difference between the low cost and high cost types is greater in the low value case. This incentivizes the proposer to make more aggressive offers, which in turn leads to war more frequently.

of those fractions go to 0. In turn, both must receive at least p_B to accept – that is, they behave identically. A can therefore reach a settlement.

The extreme case also helps further explain the mechanism. Since Fearon's seminal work, international relations scholars have viewed asymmetric information as an explanation for war, but not all information problems are created equal. In the standard setup, uncertainty only complicates the bargaining process when it causes distinct types to behave differently. Leader A does not care about B's cost of war *per se*, but not knowing whether B will accept or reject an offer is a major issue. As Figure 1 illustrates, increasing B's value has a second order effect of minimizing A's information problem. This explains why the probability of war goes down despite B having greater incentive to fight.

To further underscore the fact that increasing the value of the prize does not generally decrease the probability of war, consider the next proposition:

Proposition 3. *As the A's value of the good increases (i.e., as V_A increases), the set of parameters for which war occurs increases.*

This is the intuitive relationship between the value of the prize and the probability of war. There is no uncertainty over A's preferences for war and peace. In turn, increasing V_A has no second-order effects on the game's information structure. Instead, it desensitizes A to the physical costs of conflict. This encourages A to take more risks than it had previously. In turn, it is more likely to pursue the offer strategy that results in war against the low cost type.

Taking Propositions 2 and 3 together, it appears that increasing both states' values simultaneously has an indeterminant effect; higher values of V_B incentivize A to pursue safer offers but higher values of V_A incentivize A to take greater risks. Fortunately, the next proposition gives a clean empirical prediction on when either effect will dominate.

Proposition 4. *Suppose each value increase by some quantity (i.e., V_A and V_B each increase by $\epsilon > 0$). If $V_A > V_B$, the the set of parameters for which war occurs decreases; if $V_B > V_A$, the set of parameters for which war occurs increases.*

Why do the baseline valuations matter? Adding value to the good at stake has a diminishing marginal effect on how a state internalizes the physical costs of war. To illustrate, recall that the low cost type settles if $x \geq p_B - \frac{c_B}{V_B}$. If V_B shifts from 1 to 2, the impact of the cost gets cut in half. But shifting V_B from 2 to 3 only cuts the cost by a third. In fact, as V_B goes to infinity, the cut in the cost goes to 0 for each unit added.

With that in mind, suppose V_B is large and V_A is small. Adding a fixed amount to both states' value of the good does two things. First, it mitigates A's information problem about B's reservation values. Second, it decreases A's effective cost of war. Here, the latter effect dominates. High values of V_B mean that A's information problem is not too severe, so adding more to it only marginally relieves the information problem. In contrast, A's low initial valuation V_A means that it is more sensitive to the additional value. Incentivized to take risk, A's offer leads to war more often. The incentives are flipped when V_A is large and V_B is small.

4.2 Optimal Demands in Low-Value Cases

We now investigate the corner solution – that is, situations where at least one type of B accepts all possible offers. Formally, the condition for this requires $0 \geq p_B - \frac{c'_B}{V_B}$, or $V_B \geq \frac{c_B}{p_B}$. Initially, one might expect that these situations behave identically. The following proposition states otherwise:

Proposition 5. *Suppose at least one type of B prefers accepting 0 to war. The set of parameters for which war occurs weakly increases as the values V_A or V_B increase.*

The nuance found in Propositions 2, 3, and 4 are gone. Any changes to the values – V_A in isolation, V_B in isolation, or both together – makes the situation more conducive to conflict.

Why does the relationship only go one way? The logic further underscores the second-order uncertainty mechanic discussed previously. When V_B is very small, both types of B accept all offers. War is impossible under these circumstances. Adding more value to V_B eventually pushes the low cost type to reject some offers. In fact, additional increases to V_B continue pushing the low type's reservation value further beyond 0. This makes the low type behave increasingly different from the high type. Adding value to V_B now *exacerbates* the information problem, not solves it. Eventually, though, enough of an increase to V_B means that both types reject offers of 0. That shifts the parameters into the the previous cases, at which point further changes to V_B in isolation decrease the probability of war.

Meanwhile, A has identical incentives as before. Because increasing V_A has no impact on the informational structure, it only makes war look more attractive. In turn, any addition to V_A creates conditions more conducive to war.

4.3 Uncertainty over the Probability of Victory

To isolate the underlying mechanism, we began with a model where the probability of victory is constant across types. The previous section noted that a state may be unsure of its opponent's cost for war as a consequence of not knowing its chances of victory. We therefore now investigate how second-order information problems unfold under these conditions.

Doing so requires a slight tweak to the model. Nature still draws B as a high cost type with probability q and a low cost type with probability $1 - q$. But now B prevails with probability p'_B if it is a low and p_B if is a high type, where $p'_B > p_B$. While B observes the draw, A still only has the prior belief.[11] For interior solutions, this change adds a new caveat to Proposition 2's counterintuitive result:

Proposition 6. *Suppose the difference in potential probabilities of victory is sufficiently*

[11]For parsimony, we keep A's cost of war static at c_A. Including this does not alter our theoretical conclusions.

small (i.e., $p'_B - p_B < \left(\frac{c_A}{V_A}\right)\left(\frac{c'_B}{c_B} - 1\right)$). As the B's value of the good increases (i.e., as V_B increases), the set of parameters for which war occurs decreases.

Why does the difference in possible probabilities of victory need to be sufficiently small compared to the differences in costs? Now increasing V_B has two competing effects. In standard models with uncertainty over the probability of victory – but no corresponding uncertainty about the costs of war – only the sum costs of war matter.[12] Any decrease to either shrinks the inefficiency from conflict. With less surplus to steal through negotiated resolutions, proposers have less incentive to make safe offers, and wars occur more often. As mentioned before, increasing V_B effectively decreases B's cost of war. Therefore, all else equal, larger values of V_B cause A to fight more often.

But all else is not equal. While increasing V_B makes A more inclined to go aggressive due to uncertainty over the probability of victory, it also decreases the effective differences in the low cost and high cost types' disutility from war. Thus, damaging the first information problem repairs the other, and vice versa. As such, which effect dominates depends on which is the bigger issue in the first place. If slight differences in the probability of victory result in great differences in B's potential costs for war, then increasing V_B reduces the probability of war. In other words, if large differences in the probability of victory only imply minor differences in B's potential costs, then increasing V_B increases the probability of war.

This result shows an interesting intersection between independent and interdependent types. Crisis bargaining games with independent types mean that one player's type only affects that player's payoff; with interdependent types, one player's type affects both its own payoff and its opponent's. Fey and Ramsay (2011) show that these cases have unique implications for the prospects of war and peace. In our extension, interdependent uncertainty (over power) creates independent uncertainty (over costs). Proposition 6 Illuminates how both kinds of uncertainty impact the bargaining process but that the greater problem dominates the implications.

Although we do not go into detail on this, analogous versions of Propositions 3, 4, and 5 exist for this extension. Adding to A's value incentivizes war, as the functional decrease in A's cost makes it more likely to pursue the risky offer in light of both information problems. In contrast, increasing both values simultaneously can again result in less conflict if V_A is small compared to V_B and the the possible probabilities of

[12]That is, A's costs and B's costs appear interchangeably, so that a case where $c_A = .1$ and $c_B = .1$ is identical to a case where $c_A = .05$ and $c_B = .15$ is identical to a case where $c_A = .15$ and $c_B = .05$, and so forth.

victory are sufficiently identical. Finally, in corner solutions, adding value can move a type away from having a reservation value of 0, which results in an upswing in conflict.

Together, these findings show a series of alternate conditions under which hawks may be advantaged at cooperation. If a leader is highly resolved over an issue, opponents have less incentive to make less aggressive offers, which in turn leads to war less frequently.

5 Case Illustration: Constructive Engagement with South Africa

We illustrate the model's strategic logic through the case of constructive engagement policy towards South Africa in the 1970s and 1980s. The model sets three key scope conditions for hawk engagement to increase the probability of peace. First, one state must have uncertainty over the other's cost of war. Second, to avoid the corner solution, the informed party must have a positive value for fighting regardless of whether it has high or low costs. Finally, to fully exploit the comparative static, we need to juxtapose a situation where the informed party had high resolve (hawk) to one where they had low resolve (dove). Holding all else equal throughout, our model predicts that peace is more likely in the hawkish case.

As evidence, we trace negotiation efforts to convince South Africa to end its long-standing occupation of Namibia. Party speeches, meeting transcripts, and memoirs provide insight into how South Africa and outside parties approached the issue. We show first that conflict intensified when South African Prime Minister Balthazar Johannes Vorster rejected demands to withdraw from Namibia in 1978. We then turn to show how – ten years later – the same issue peacefully resolved itself, in part, due to U.S. Assistant Secretary of State for African Affairs, Chester Crocker's constructive engagement policy. Cuban President Fidel Castro (leader A, the uninformed party) offered a key concession to South African President Pieter Willem (P.W.) Botha (leader B, the informed party), which laid the basis for Namibian independence. Because of the difficulty of keeping everything else constant, we choose to use a within case comparison, investigating how perspectives on the issue changed over time.

The main point of contention in both situations was under what conditions South Africa would change its position on Namibia. Since 1960, an indigenous, ethno-nationalist insurgency demanding Namibian independence known as the Southwest African People's Organization (SWAPO) had fought against South African rule. In 1966, the United Nations General Assembly announced it would no longer recognize South Africa's mandate over the territory, placing additional pressure on South Africa to resolve the issue.

As the insurgent conflict persisted, outside parties began to express an interest in resolving the issue. Namibia became another battlefield in the larger Cold War. In 1975, Cuba sent military forces to Angola as an opportunity to push communist movements, including SWAPO, towards victory (Falk 1987; Steenkamp 1989, 163). This was seen as critical to establish a Soviet and Cuban stronghold in in Southern Africa. In 1976, the United States launched a new diplomatic initiative, spearheaded by Henry Kissinger, to work with South Africa and Western European powers. The aim was to negotiate a resolution to the conflict and prevent Soviet and Cuban influence from growing any larger (FRUS 1977-1980 Vol XVI, No. 264).

5.1 Vorster's Failed Negotiations

We juxtapose the situation where the informed party, South Africa's leader, had low resolve in 1977-1978 to one where he had high resolve in 1987-1988, to demonstrate the model's logic. In the late 1970s, South Africa and outside parties saw a window of opportunity to potentially end debate over Namibia. Vorster saw himself as a "moderate and reasonable ruler" whose work negotiating a peaceful end to the Rhodesian Bush War set himself up to resolve the SWAPO insurgency as well (Thomas 1995, 152). Vorster also appeared open to SWAPO's demands for Namibian independence after nearly 15 years of civil conflict (Jaster 1988, 60).

The South African administration, under Vorster's leadership, had already organized the Turnhalle Conference to develop plans for a new constitution and Namibian government (Seiler 1982). Vorster also had begun work with U.S. Secretary of State Henry Kissinger on a Seven Point Plan to grant Namibia independence by the end of 1978 (Miller 2016, 246-247). In terms of our model, Vorster's value of the prize was relatively low.

U.S. President Jimmy Carter was also eager to settle the issue. A National Security Council Policy Review conducted shortly after Carter's inauguration suggested South Africa was open to negotiations. Work with Kissinger had led South Africa to already agree to a date for Namibian independence, terms for a peace conference with SWAPO, and acceptance of "whatever conclusions" came to pass (FRUS 1977-1980 Vol XVI, No. 264). Based on this information, the Carter Administration decided "we should not be too abusive to South Africa and that maybe there should be some means of accommodation" (FRUS 1977-1980, Vol XVI, Doc. 267). Carter signed a presidential directive one week later formally authorizing the State Department and other officials to engage Vorster in negotiations on the topic (FRUS 1977-1980, Vol XVI, Doc. 268).

A team of U.S. delegates and representatives from other Western countries worked with South Africa soon after to outline possible terms for South African withdrawal. In order to keep South Africa talking, Carter was reluctant to link the Namibia issue to other policy issues like apartheid and Cuba's support for SWAPO. However, negotiations became characterized by "false signals and the creation of unreal expectations" between parties as the US publicly chastised South African apartheid and privately assured South Africa it would not affect negotiations (Crocker 1981).

At the same time, another potential complication arose when the U.S. learned from the Russians that South Africa was pursuing a nuclear weapons program (FRUS 1977-1980 Vol XVI, No. 288). An Inter-Agency Review on South Africa's program soon expressed concern that the program could affect ongoing negotiations on Namibia, but was hard to assess "because of real current uncertainties regarding the state of South Africas test readiness" (FRUS 1977-1980, Vol XVI, Doc. 293). The U.S. proceeded though, bent on delivering a set of proposals amenable to South Africa and SWAPO leader Sam Nujoma (FRUS 1977-1980, Vol XVI, Doc. 83-84).

After a year of negotiations, the U.S. finally sent a new set of proposals to South Africa in April 1978. Upon receipt, the South African delegation announced it was near "impossible for the South African Government to accept it" (FRUS 1977-1980, Vol XVI, Doc. 85). In their opinion, the proposals did not address their concern that "in the event of South African troop withdrawal, [Namibia] could be confronted with invasion by Cuban" (FRUS 1977-1980, Vol XVI, Doc. 85). Two weeks later, Vorster ordered a massive counterinsurgency offensive against SWAPO known as Operation Reindeer and peace talks fell apart (Steenkamp 1989, 71). In terms of the model, this stingy offer backfired and Carter's attempts to engage Vorster failed. The Namibia issue remained unresolved.

5.2 Botha's Successful Negotiations

By the late 1980s, events were changing. Vorster's replacement, P.W. Botha, had doubled down on the Namibia issue. Botha believed Namibian independence posed both direct and indirect threats to South African rule. First, SWAPO's success could indirectly galvanize the African National Congress's latent insurgency to intensify its attacks and further undermine the apartheid regime. It was possible - Botha privately told Crocker - that "South Africa could not survive if it allowed a red flag in Windhoek" (Crocker 1992, 41). Second, Botha privately told his advisors "SWAPO must not be allowed to win" or else "South Africa would be totally encircled by Russian-inspired powers" (Scholtz 2010, 74).

Concurrently, the U.S. and other outside states were trying to decide how to make progress on the Namibia issue. In 1981, US Assistant Secretary of State for African Affairs Chester Crocker proposed a new policy of 'constructive engagement' to tackle the issue. Although similar engagement efforts had failed against Vorster, Crocker thought this strategy was the only way to convince Botha to withdraw. An opportunity to put this policy into action arose in 1987 when a new opportunity for negotiations arose. Counter-intuitively, peace prospects grew when Botha launched a new campaign along the Namibia-Angola border to push for a South African military victory.

Botha's new operation – known as the Cuito Cuanavale campaign – saw the introduction of several new technologies, including the G5 and G6 howitzers to deter Cuban and Angolan forces along the border and undermine SWAPO's sanctuary strongholds (George 2005, 210). Cuban forces in the area were forced to respond.

However, the new military technologies created uncertainty over South Africa's cost of war. It raised questions over whether Cuba was willing to take on the fight. The issue worsened when the Cuban commander in charge of forces in the area, General Arnaldo Ochoa Sanchez, "sent little information" to Fidel Castro in Havana (Castro 1989). Ochoa "did not like to write reports during his missions," which severely hampeered Castro's efforts to plan a strategic response to the issue (Castro 1989). Privately, Castro wrote Ochoa that he did "not understand what is being done in Cuito" (Castro 1989).

At the same time, South Africa continued introducing new battlefield technologies. Soviet Deputy Foreign Minister Anatolii Adamishin reportedly told Cuban Ambassador Jose Risquet that Cuba's tepid response made the South African military leaders "feel every day more comfortable in Angola, where they are able to try out new weapons and inflict severe blows" (Gledijeses 2006, 40). This issue captures the key source of uncertainty in our model: a state may have private information about its ability to create and introduce new technological innovations on the battlefield.

Unsure of real-time developments and with limited information about South African's costs of fighting, Castro faced a dilemma over how to proceed. He feared South Africa's continued battlefield successes would undermine both the prospects of leftist movements in the region and harm Castro's international prestige. Castro believed that if he were the second-mover, he would not be able to dictate the terms of an agreement.

By late January 1988, Castro was willing to "move first" (Crocker 1992, 373).[13] On January 29, Castro formally agreed to offer a complete, withdrawal of Cuban forces from Angola. Consistent with Proposition 2, South Africa's hardened resolve coupled with Cuban uncertainty over South Africa's material costs led Castro to offer a new concession, absent in previous negotiations. Crocker pounced and began using it to convince Botha to re-enter negotiations (Steenkamp 1989, 156; George 2005, 220-221). It was the concession necessary to move negotiations forward. Botha agreed to re-enter talks to grant Namibia independence. Approximately one year after the Cuito campaign started, Botha signed the larger Tripartite Accord, officially ending South Africa's occupation (Crocker 1992).

5.3 Assessing Alternate Explanations

The case here provides compelling evidence for the key implications of the model. When facing a hawk with uncertainty over the material costs of fighting - Cuba offered a key concession, which laid the groundwork for new modes of cooperation (Proposition 2). When facing a dove, outside parties gambled on an offer that superceded what Vorster was open to (Proposition 3). It illustrates why hawks, like Botha, may sometimes secure favorable peace outcomes over doves, like Voster, despite having an increased payoff from fighting.

This behavior is particularly compelling given that alternate explanations fall short. First, Botha's success against Cuba may have come about because fighting revealed information to Cuba, which made finding a bargaining settlement easier to obtain. However, miscommunication between Castro and his military commander in Angola hampered the flow of such information. It undermined Castro's efforts to update his range of offers commensurate with developments on the battlefield. Further, if fighting revealed information, then it is even more puzzling why Vorster and outside parties could not reach an agreement ten years earlier. The SWAPO insurgency had fought against the South African government for over fifteen years by the time the Carter Administration begin serious negotiations with Vorster to reach a deal. Previous fighting should have revealed information to make it clear to both parties what the range of acceptable settlements was and made a peace settlement even more obtainable.

[13]See Crocker 1992, p. 354-358 for more analysis about why Castro changed his mind at this time.

A second competing explanation is that Cuba's decision to initiate negotiations emerged because Cuba faced higher costs to fighting. However, Cuba benefited from immense Soviet assistance during the Namibian War of Independence. The Soviet Union provided an estimated $2 billion in military equipment in 1984-1985 to Cuba (Falk 1987). Cuba also received an additional $4-5 billion in economic aid during the 1980s as well (Gleijses 2006, 31). Many of the casualties in the Cuito Cuanavale campaign also affected Angolan, not Cuban forces (Velthuzien 2010). In contrast, a new set of sanctions and arms embargoes against South Africa in 1986 made it increasingly costly to keep fighting. These sanctions cost South Africa up to $160 million in lost trade and $2 billion in additional costs to circumvent an oil embargo (Manby 1992). Relative costs of fighting could not explain this outcome.

6 Empirical Implications for Hawk Engagement

The model holds several important implications on when engaging hawks can improve prospects for cooperation. We go through these implications in turn, illustrating through reference to cooperative endeavors with East Germany and North Korea.

First, our model suggests that engaging with hawks in authoritarian states can work. A key condition for the Nixon-to-China story to hold is a domestic political environment whereby publics or elites can hold leaders accountable. This is essential to make a hawk's willingness to cooperate credible. The institutional design of nondemocratic or personalist regimes can undermine these accountability mechanisms, making hawkish claims to cooperate "cheap talk."

Our model presents an alternative explanation for how cooperation can arise even if these domestic political advantages are absent. Since a proposer's offer is independent of a hawk's regime type, whether a hawk leads an authoritarian or democratic government is less important.

As evidence, consider the success of *Ostpolitik*. West German leader Willy Brandt began *Ostpolitik* in 1969 to ease tensions with East Germany and pursue a possible rapprochement. At the time, it was widely panned as unlikely to succeed (Fink and Schaefer 2009). East Germany did not recognize West Germany and it was unclear to many politicians whether the Soviet Union would allow its satellite state to grow closer with the West. The rise of hawkish East German Chancellor Eric Honecker in 1971 further reinforced beliefs these negotiations were too risky to work. Our model suggests these risks may have actually contributed to Brandt's bargaining success. West Germany's willingness to overturn its existing policy of nonrecognition and offer new trade opportunities changed relations for the better. The two parties agreed to cooperate as part of the Basic Treaty of 1972, setting the foundation for reunification 20 years later (Merkl 1974).

Second, our theory implies that bargaining with hawks is less risky when these information problems are present, increasing the probability safer offers are made. Tense bargaining environments with hawks may be more conducive to cooperation than envisioned. As a result, this model may help explain variation in South Korea's attempts to constructively engage with North Korea.

Indeed, the success of *Ostpolitik* in West Germany motivated South Korea to adopt a similar policy, which it called *Nordpolitik*. However, these efforts were initially unsuccessful and Kim Il-Sung rebuffed these offers. This changed in August 1998 when North Korea conducted a Taepo-dong missile test across the Sea of Japan. Many viewed the act as highly provocative, undermining the 1994 Agreed Framework to de-escalate nuclear tensions in the region. Although the test ultimately failed, it did not "allay concerns among Japanese, South Koreans, and Americans about unexpected technological leaps in the DPRK ballistic missile program" (Cha 2002, 51). This missile test created uncertainty over North Korea's technological capabilities.

In response, South Korean President Kim Dae Jung decided on a new approach. Instead of authorizing new sanctions to punish North Korea or mobilizing military forces along the DMZ, South Korea did the opposite. It pledged to not interfere in North Korea's affairs and offered economic carrots to improve the relationship. These efforts became known as the Sunshine Policy, so-called because it thawed relations. In June 2000, the two Korean leaders met in Pyongyang for the first inter-Korea summit since the Korean War and pledged to bilateral trade, family visits, and overall increase interactions with each other.

These two cases might suggest that promoting negotiations with hawkish leaders can be more peace-promoting than if leaders cared less about the issue at stake. However, our model implies that crisis bargaining with hawks can backfire unless this information problem is present. Outside states risk overreaching and demanding too much from hawks when there is little uncertainty.

Finally, the model helps resolve a lingering puzzle in the 'salient stakes' literature, which measures how increasing the stakes of an issue affects the probability of conflict between two countries (Rider et al. 2011; Rider 2013).[14] After operationalizing these stakes through factors like shared borders, an enduring rivalry, or mutual access to commodity deposits, scholars have found that increasing the value of these good "seems paradoxically to make war between rivals less likely" (Lemke and Reed 2001, 466). Further, Hensel and Mitchell (2005) find additional evidence that increasing the cultural, ethnic, or historical significance of a territory for a particular side is counter-intuitively correlated with a higher likelihood of reaching an agreement.

Some scholars discount these findings as spurious because there is no clear intuition to decipher these results. We suggest instead these findings present an opportunity to develop new theory instead.[15] Our model helps explain these findings. Factors that change both state's valuation of a territory – like the discovery of oil or historical significance – increase the value of both V_A and V_B. In turn, this affects the type of crisis bargaining dynamics that may emerge.

Collectively, these implications bolster our ability to identify when these engagement offers are more likely to lead to peace or tensions. It holds important implications for future engagement with hawks and rapprochement with other resolved authoritarian leaders.

7 Conclusion

Despite historical evidence suggesting engagement with hawks sometimes works, there has been little theory to examine why and under what conditions this might be true. We suggest that the most prevalent explanation for hawkish bargaining is ill-suited to answer this question because it cannot explain why outside states sometimes choose to engage with hawks. We present an alternative explanation for why this pattern of cooperation can emerge in international politics. The results here suggest that states can navigate crisis bargaining more effectively due to countervailing effects between hawkishness and uncertainty.

For policymakers, it identifies new conditions under which bargaining with hawks can improve prospects for peace and cooperation. This is important to not only understanding recent variation in US rapprochement efforts towards Cuba, Iran, and Russia,

[14] Similarly, the territorial conflict literature suggests territorial disputes are more likely to escalate into war than disputes over policies or regimes because the stakes or value are more prevalent for both parties (Goertz and Diehl 1992; Diehl 1992; Gibler 2007; Schultz and Goemans 2016).

[15] See Sartori (2003) for a longer critique about these findings.

but opportunities for future engagement.

For scholars, these findings advance general understanding about crisis bargaining dynamics. For example, it could lead to more general optimism for conflict resolution efforts in civil wars. The resource curse argues that the discovery of new commodities should increase the likelihood of conflict by increasing the value of the good to be bargained over (Fearon and Laitin 2003; Collier and Hoeffler 2004). In turn, this makes parties more recalcitrant to change their positions and creates a commitment problem between parties (Fearon 2004). Our findings suggest the resource curse may not always breed new conflict.[16] The discovery of natural resources can incentivize parties to stop fighting as evidenced by a peace agreement between Sudan and the SLA following the discovery of a new oil deposit in Darfur (Reuters 2005).

Our explanation resolves a long-standing theoretical gap in crisis bargaining by identifying conditions under which engaging with hawks can be effective. By introducing a key, but previously unexplored, source of uncertainty, we identify how and why peace can emerge in counterintuitive situations.

[16] This does not, of course, address the more famous commitment problem underlying civil war resolution.

8 Appendix: Proofs of Main Propositions

8.1 Proof of Proposition 1

Straightforward backward induction implies that the high type is willing to accept if $x \geq p_B - \frac{c'_B}{V_B}$, while the low type is willing to accept if $x \geq p_B - \frac{c_B}{V_B}$. For this proof, we assume that each type accepts with probability 1 when indifferent, though this is a necessary property of equilibrium for the standard reasons with ultimatum games.

Now consider A's offer. Offering strictly greater than $p_B - \frac{c_B}{V_B}$ cannot be optimal; both types accept with certainty, but A could profitably deviate to a slightly smaller amount (that is still greater than $p_B - \frac{c_B}{V_B}$), still induce both types, and keep more of the remainder.

Offering strictly between $p_B - \frac{c'_B}{V_B}$ and $p_B - \frac{c_B}{V_B}$ also cannot be optimal. Such an offer induces the high cost type to accept and the low cost type to reject. But consider a deviation to a slightly smaller amount that is still greater than $p_B - \frac{c'_B}{V_B}$. The high cost type still accepts, and the low cost type still rejects. A's payoff is unchanging against the low cost type. However, it now keeps strictly more against the high type. Because the high type exists with positive probability, this is a profitable deviation.

Finally, offering strictly less than $p_B - \frac{c'_B}{V_B}$ cannot be optimal either. Both types reject, netting a payoff of $1 - p_B - \frac{c_A}{V_A}$ for A. Consider an offer of p_B instead. Both types accept. A therefore yields $1 - p_B$, which is strictly greater than $1 - p_B - \frac{c_A}{V_A}$.

This leaves two possible equilibrium offers: $p_B - \frac{c'_B}{V_B}$ and $p_B - \frac{c_B}{V_B}$. Offering the former induces the high type to accept (which occurs with probability q) and the low type to reject (which occurs with probability $1 - q$). Offering the latter induces both types to accept. Thus, offering the riskier former offer is superior if:

$$q\left(1 - p_B + \frac{c'_B}{V_B}\right) + (1-q)\left(1 - p_B - \frac{c_A}{V_A}\right) > 1 - p_B + \frac{c_B}{V_B}$$

$$q > \frac{\frac{c_A}{V_A} + \frac{c_B}{V_B}}{\frac{c_A}{V_A} + \frac{c'_B}{V_B}}$$

This is the cutpoint from Proposition 1. Analogous logic shows that A offers $p_B - \frac{c_B}{V_B}$ if q is less than that cutpoint. □

8.2 Proof of Proposition 2

Proposition 2 is a comparative static on how changing V_B manipulates the circumstances that lead A to make the aggressive offer. Recall from above that the condition for the aggressive offer is $q > \frac{\frac{c_A}{V_A}+\frac{c_B}{V_B}}{\frac{c_A}{V_A}+\frac{c'_B}{V_B}}$. Taking the derivative of the right hand side with respect to V_B yields:

$$\frac{c_A V_A(c'_B - c_B)}{(c'_B V_A + c_A V_B)^2}$$

If the right hand side is increasing, then the values of q for which A makes the aggressive offer decrease. We can show this by demonstrating that the derivative is positive:

$$\frac{c_A V_A(c'_B - c_B)}{(c'_B V_A + c_A V_B)^2} > 0$$

$$c'_B > c_B$$

This is true. □

8.3 Proof of Proposition 3

Proposition 3 is a comparative static on how changing V_B manipulates the circumstances that lead A to make the aggressive offer. As with the proof of Proposition 2, the condition for the aggressive offer is $q > \frac{\frac{c_A}{V_A}+\frac{c_B}{V_B}}{\frac{c_A}{V_A}+\frac{c'_B}{V_B}}$. Taking the derivative of the right hand side with respect to V_A yields:

$$-\frac{c_A V_B(c'_B - c_B)}{(c'_B V_A + c_A V_B)^2}$$

If the right hand side is decreasing, then the values of q for which A makes the aggressive offer increase. We can show this by demonstrating that the derivative is negative:

$$-\frac{c_A V_B(c'_B - c_B)}{(c'_B V_A + c_A V_B)^2} < 0$$

$$c'_B > c_B$$

This remains true. □

8.4 Proof of Proposition 4

Proposition 4 is a comparative static on how changing both V_A and V_B simultaneously manipulates the circumstances that lead A to make the aggressive offer. That condition remains $q > \frac{\frac{c_A}{V_A}+\frac{c_B}{V_B}}{\frac{c_A}{V_A}+\frac{c'_B}{V_B}}$. However, we cannot simply take a derivative here because the comparative static analyzes how the cutpoint changes as two different elements increase. Thus, we instead compare the case where the values equal V_A and V_B to a case where the values equal $V_A + \epsilon$ and $V_B + \epsilon$, where $\epsilon > 0$. The right hand side of the cutpoint shrinks with the addition if:

$$\frac{\frac{c_A}{V_A}+\frac{c_B}{V_B}}{\frac{c_A}{V_A}+\frac{c'_B}{V_B}} > \frac{\frac{c_A}{V_A+\epsilon}+\frac{c_B}{V_B+\epsilon}}{\frac{c_A}{V_A+\epsilon}+\frac{c'_B}{V_B+\epsilon}}$$

$$V_B > V_A$$

Thus, the values of q for which A makes the aggressive offer expand if $V_B > V_A$. Analogously, the values of q for which A makes the aggressive offer contract if $V_A > V_B$. □

8.5 Proof of Proposition 5

There are two cases to consider: (1) both types have negative values for war and (2) the high cost type has a negative value but the low cost type does not. We also need to analyze how changing V_B can transition the parameters from one case to the other. We proceed by analyzing the first case and go from there.

Both types having a negative value for war implies that $V_B < \frac{c_B}{p_B}$. In this case, A's offer is always accepted regardless of the value selected. A's payoff is therefore $1 - x$. This maximizes at $x = 0$ and thus A selects that amount. Changing V_A or V_B locally does not affect this logic. Therefore, the parameters for war remain empty as those quantities increase.

Increasing V_B to sufficiently high levels eventually shifts the parameters to a case where the high type accepts all offers but the low type rejects some. Formally, this condition is $V_B \in \left(\frac{c_B}{V_B}, \frac{c'_B}{V_B}\right)$. The same risk-return dynamic from Proposition 1 governs the process here, except now the minimum offer necessary to buy off the high cost type is 0. In turn, A can offer $p_B - \frac{c_B}{V_B}$ and induce both types to accept or offer 0 and only induce the high cost type to accept. A prefers the latter if:

$$q(1) + (1-q)\left(1 - p_B - \frac{c_A}{V_A}\right) > 1 - p_B + \frac{c_B}{V_B}$$

$$q > \frac{\frac{c_A}{V_A} + \frac{c_B}{V_B}}{\frac{c_A}{V_A} + p_B}$$

Taking the derivative of the right hand side with respect to V_B yields:

$$-\frac{c_B V_A}{V_B^2(c_A + p_B V_A)}$$

This is negative. Therefore, increasing V_B increases the values of q for which A makes the aggressive offer. Note, however, that further increases to V_B shifts the parameter space into the interior solution of Proposition 1, at which point further increases to V_B make the environment less conducive to war.[17]

Now consider the derivative of the right hand side with respect to V_A:

$$\frac{c_A(c_B - p_B V_B)}{V_B(c_A + p_B V_A)^2}$$

This is negative because $c_B - p_B V_B < 0$ can be reconfigured to $V_B > \frac{c_B}{p_B}$, which is given by the parameter space. Thus, increasing V_A also increases the values of q for which A makes the aggressive offer.

9 Appendix: Continuous Type Robustness Check

We now show that the counterintuitive result on B's valuation is not confined to discrete type distributions. To begin, we replicate Propositions 2, 3, and 4 using a uniform distribution. Afterward, we describe the class of distributions for which the result applies.

9.1 Uniform Distribution

Suppose the game form remains identical to the main model with one change: Nature now draws B's cost from the uniform distribution on the interval $[\underline{c}_B, \overline{c}_B]$, where $\overline{c}_B <$

[17] The cutpoint is continuous at the transitions from corner solution to corner solution and corner solution to interior solution, so there are no lingering ways a change to V_B could affect the feasibility of war.

$\frac{V_B}{p_B}$.[18] B's optimal strategy remains unchanged; it still accepts if $x \geq p_B - \frac{c_B}{V_B}$. Rewriting this in terms of c_B yields $c_B \geq V_B(p_B - c_B)$.

A's optimal offer strategy requires additional work. For a given offer x, the probability B rejects the offer is the probability that $c_B < V_B(p_B - c_B)$.[19] Working through the uniform distribution, this probability is $\frac{V_B(p_B - x) - \underline{c}_B}{\overline{c}_B - \underline{c}_B}$ for any interior solution.[20] In turn, A's utility for an offer x is:

$$\left(\frac{V_B(p_B - x) - \underline{c}_B}{\overline{c}_B - \underline{c}_B}\right)\left(1 - p_B - \frac{c_A}{V_A}\right) + \left(1 - \frac{V_B(p_B - x) - \underline{c}_B}{\overline{c}_B - \underline{c}_B}\right)(1 - x)$$

The first order condition of this is:

$$\frac{2p_B V_B + \frac{c_A V_B}{V_A} - \overline{c}_B - 2V_B x}{\overline{c}_B - \underline{c}_B} = 0$$

$$x^* \equiv p_B + \frac{c_A}{2V_A} - \frac{\overline{c}_B}{2V_B}$$

This is a maximum because the second derivative is $-\frac{2V_B}{\overline{c}_B - \underline{c}_B}$. Note that A only has to give $p_B - \frac{\underline{c}_B}{V_B}$ to appease all types. Thus, in Case 1 A offers x^* if $\frac{c_A}{V_A} < \frac{\overline{c}_B - 2\underline{c}_B}{V_B}$. In Case 2, A offers $p_B - \frac{\underline{c}_B}{V_B}$ if $\frac{c_A}{V_A} > \frac{\overline{c}_B - 2\underline{c}_B}{V_B}$.

Consider the solution of Case 1. We can calculate the probability of peace by feeding x^* into the cumulative distribution function:

$$1 - \frac{V_B(p_B - x^*) - \underline{c}_B}{\overline{c}_B - \underline{c}_B}$$

$$\frac{\overline{c}_B + \frac{c_A V_B}{V_A}}{2(\overline{c}_B - \underline{c}_B)}$$

For Proposition 2, we take the derivative of this with respect to V_B:

$$\frac{c_A}{2V_A(\overline{c} - \underline{c}_B)}$$

[18]This condition implies that all types of B have a positive value for war. This is not a necessary condition for the result, but it does substantially reduce the workload.

[19]Because any given type has measure zero, B's action when indifferent is irrelevant in continuous type models.

[20]A will never offer more than what is necessary to induce all types to accept. Nor will it offer an amount that no type will accept. Put differently, the solution to the interior will be the equilibrium offer.

This is positive. Thus, consistent with Proposition 2, the equilibrium probability B accepts A's offer is increasing in V_B.

For Proposition 3, we take the derivative of the probability with respect to V_A:

$$-\frac{c_A V_B}{2V_A^2(\overline{c}_B - \underline{c}_B)}$$

This is negative. Thus, consistent with Proposition 3, the equilibrium probability B accepts A's offer is decreasing in V_A.

For Proposition 4, we cannot take a derivative because it investigates a change to V_A and V_B simultaneously. Instead, we analyze how the probability changes when we add $\epsilon > 0$ to both values. The probability of acceptance increases when we add value for both parties if:

$$\frac{\overline{c}_B + \frac{c_A V_B}{V_A}}{2(\overline{c}_B - \underline{c}_B)} < \frac{\overline{c}_B + \frac{c_A(V_B+\epsilon)}{V_A+\epsilon}}{2(\overline{c}_B - \underline{c}_B)}$$

$$V_A > V_B$$

Analogously, the probability of acceptance decreases if $V_B > V_A$. These are consistent with the claims of Proposition 4.

Now consider Case 2, which required $\frac{c_A}{V_A} > \frac{\overline{c}_B - 2\underline{c}_B}{V_B}$. The probability of war is 0 here, and local changes to V_A and V_B do not change that. Thus, the only question that remains is whether larger changes can shift the parameters to Case 1, which yields a positive probability of war. Enlarging V_B only reinforces the inequality, so adding value for B keeps the probability of war at 0. As V_A goes to infinity, the inequality will eventually no longer hold as long as $\overline{c}_B - 2\underline{c}_B$ is strictly positive. Thus, increasing V_A can decrease the probability of war. Adding to V_A and V_B simultaneously can switch the case depending on the other values. However, for the effect to persist into positive probability of war, it must still be that $V_B > V_A$.

9.2 General Conditions for the Result

We now investigate the class of distribution functions for which an analogous version of Proposition 2 holds. To do this, suppose now that c_B has a cumulative distribution function $F(c_B)$ with density $f(c_B)$, with a weakly increasing hazard rate.[21] We assume

[21]Formally, a hazard function is $\frac{f(c_B)}{1-F(c_B)}$. Intuitively, it gives the probability of drawing a particular value given that the value drawn is at least as large as that particular value. Many common distribution

that the distribution is continuous and strictly increasing on the interval $[\underline{c}_B, \overline{c}_B]$ and equal to 0 everywhere else. As before, we also assume that $\overline{c}_B < \frac{V_B}{p_B}$.

All types of B still reject if $x < p_B - \frac{c_B}{V_B}$, or $c_B < V_B(p_B - x)$. Thus, the probability of a rejected offer is $F(V_B(p_B - x))$. This builds the following utility function for A:

$$F(V_B(p_B - x))\left(1 - P_B - \frac{c_A}{V_A}\right) + (1 - F(V_B(p_B - x)))(1 - x)$$

The first order condition of this is:

$$V_B f(V_B(p_B - x))\left(p_B + \frac{c_A}{V_A}\right) - 1 + F(V(p_B - x)) - V_B f(p_B - x)x = 0$$

$$\frac{f(V_B(p_B - x))}{1 - F(V_B(p_B - x))} = \frac{1}{V_B(p_B + \frac{c_A}{V_A} - x)}$$

As x increases, the input into the hazard rate on the left hand side decreases. Because the hazard rate is weakly increasing, an increase to x therefore weakly decreases the left hand side. Meanwhile, the right hand side is strictly increasing. Thus, if there is a solution, it is unique. These are the interior solutions of the game.[22]

Let $I(V_B)$ be the implicit function that maps V_B an interior solution x. Because the implicit solution equation is continuous, this function is also continuous. Note that increasing V_B increases the input of the hazard and thus increases the value of the left hand side. Meanwhile, it decreases the right hand side. Thus, to maintain the balance, x must increase in V_B.

Now we show the conditions under which the probability of acceptance is increasing in V_B. Recall that the probability of acceptance is $1 - F(V_B(p_B - I(V_B)))$. Taking the derivative of this with respect to V_B yields:

$$-f(V_B(p_B - I(V_B))) \bullet \frac{\partial}{\partial V_B}(V_B(p_B - I(V_B)))$$

The derivative is positive if:

$$-f(V_B(p_B - I(V_B))) \bullet \frac{\partial}{\partial V_B}(V_B(p_B - I(V_B))) > 0$$

functions have this property, including the uniform distribution.

[22] It is possible that substituting $x = p_B - \frac{\overline{c}_B}{V_B}$ already means the right hand side is already larger than the left hand side. In this case, A offers $p_B - \frac{\overline{c}_B}{V_B}$, the minimum amount to ensure compliance.

$$I'(V_B) > \frac{p_B - I(V_B)}{V_B}$$

This is the technical condition for probability distributions that generate Proposition 2's result.

10 References

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