The Uncertainty Tradeoff: Does Interdependence Decrease War?

William Spaniel* Iris Malone†

July 9, 2018

Abstract

Conventional wisdom about economic interdependence and international conflict predicts increasing opportunity costs make war less likely, but some wars occur after trade flows grow. Why? We develop a model that shows a nonmonotonic relationship exists between the costs and probability of war when there is uncertainty about resolve. Under these conditions, increasing the costs of an uninformed party's opponent has a second-order effect of exacerbating informational asymmetries about that opponent's willingness to maintain peace. We derive precise conditions under which war can occur more frequently and empirically showcase the model's implications through a case study of Sino-Indian relations from 1949 to 2007. This finding challenges how scholars traditionally believe economic interdependence affects the probability of war; it demonstrates instruments like trade do not solely mediate the probability of war through opportunity costs.

*Department of Political Science, Posvar Hall, University of Pittsburgh, Pittsburgh, PA 15260. (williamspaniel@gmail.com, http://williamspaniel.com).

†Department of Political Science, 100 Encina Hall West, Stanford University, Stanford, CA 94305. (irismalone@stanford.edu, web.stanford.edu/~imalone)

1 Introduction

What is the relationship between economic interdependence and war? Most political scientists argue that commerce, trade ties, and other economic transactions decrease the probability of conflict.[1] As potential gains from interdependence increase, opportunity costs also rise. The range of mutually preferable settlements expands and the probability of war correspondingly drops (Fearon 1995; Oneal and Russett 2001; Polachek and Xiang 2010). In sum, the "opportunity cost" mechanism underscores one of the most popular theories of economic interdependence and conflict.

However, not all scholars believe interdependence is a panacea for war.[2] The historical record is replete with empirical inconsistencies in the trade-conflict relationship. At times, conflicts arise despite increased economic interdependence between parties. These gaps have raised doubts about whether "opportunity costs do reduce conflict" (Polachek and Xiang 2010, 140) or whether "opportunity costs…generally cannot deter disputes" (Gartzke, Li, and Boehmer 2001, 392). The debate raises new questions about under what conditions the inverse trade-conflict relationship holds and why.

In this paper, we develop a model that reconciles this puzzle by showing both proponents and skeptics of the opportunity cost mechanism are right. How can this be true? Instruments like trade mediate the probability of war through different mechanisms including, but not limited to, increasing opportunity costs. Opportunity costs indeed decrease the probability of conflict. However, trade also has a second-order effect of exacerbating uncertainty about a country's resolve, which is among the most popular mechanisms that explain war.[3] In equilibrium, the latter effect can dominate—that is, increasing interdependence can increase the probability of war *despite* raising opportunity costs.

The intuition falls back on screening models where a proposer is uncertain about its opponent's willingness to fight. Broadly, the uninformed state can pursue two strategies under these conditions. First, it can offer a generous amount that resolved types would be willing to accept. This has the benefit of avoiding the costs of war. Alternatively, it can propose a stingy settlement and screen the opponent's willingness to fight, causing unresolved types to accept while forcing resolved types to reject. The latter has the benefit of giving

[1]See Hirschman (1977), Polachek (1980), Copeland (1996), and Simmons (2005) on trade, Gartzke, Li, and Boehmer (2001), Polachek, Seiglie, and Xiang (2007) on capital flows, and Arena and Pechenkina (2015) on foreign aid.

[2]See Waltz (1979), Copeland (1996), Barbieri (1999), and Gartzke (2007, 170).

[3]See, for example, Morrow (1989), Fearon (1995), Gartzke (1999), Wolford (2007), Slantchev (2011), and Kertzer (2016).

the proposer a large share of the settlement when the opponent accepts, but also forces it to pay the costs of war if its screening offer backfires.

When the difference between the costs of war for resolved and unresolved types is small, the proposing state has less incentive to screen. Why? Screening still forces the proposer to risk war, but the prospective gains from such a settlement are minimal. However, as the costs of conflict grow, a state is more likely to issue more aggressive demands because of a divergence in relative valuations among resolved and unresolved types. In other words, as the difference in relative costs between resolved and unresolved types increases, stingy offer strategies become more attractive; the prospective gains are worth the risking the increased potential costs of fighting. Thus, increasing interdependence can have a countervailing effect of *raising* the risk of war even though the opportunity cost is common knowledge.

Our model verifies this counterintuitive relationship.[4] It also generates comparative statics on when the uncertainty effect dominates the opportunity cost effect. To preview, uncertainty arises as trade flows increase because a state cannot observe how its opponent weighs the benefits of trade relative to the costs of fighting. The probability of war increases when the state facing this uncertainty internalizes a larger portion of the military costs than the benefits of trade relative to their opponent's internalization. The conditional effect advanced here resolves the tension between economic interdependence theory and its most serious empirical challenges.

This paper proceeds as follows. The next section delves further into the conventional wisdom on economic interdependence and explains how previous studies missed the link between trade and uncertainty over resolve. We then introduce the model and generate comparative statics on the probability of conflict. Finally, we explore Sino-Indian relations from 1949 to 2007 to trace the mechanism's propositions and operationalize its key parameters. The case study focuses on three different decision points in Sino-Indian relations where trade affected the probability of conflict contrary to what conventional wisdom would predict. In particular, we suggest a major trade agreement between China and India in the 1950s exacerbated Indian uncertainty about Chinese resolve, which contributed to the 1962 Sino-Indian War. The overall takeaway is to introduce a new pathway to war in the economic interdependence literature; instruments like trade do not solely affect the probability of war through opportunity costs.

[4] We are unaware of any published models in the bargaining model of war literature where increasing costs increases the probability of conflict for standard sources of uncertainty. In the appendix, we show that increasing costs monotonically increases the likelihood of war across a number of textbook examples. See Slantchev (2011, 225-231) for an exception involving an escalation game.

2 Challenges to Conventional Wisdom on Economic Interdependence

Economic interdependence theories argue that higher levels of bilateral transactions—like trade, capital flows, or foreign direct investment—increase the opportunity costs for war.[5] As states become increasingly invested and reliant on economic commerce with each another, both become less willing to risk those gains during coercive bargaining episodes. Accordingly, peace becomes more likely (Keohane and Nye 1977; Polachek 1980; Oneal and Russett 2001). This finding seems robust given empirical evidence that many measures of interdependence find an inverse relationship with the probability of conflict (Gartzke, Li, and Boehmer 2001; Gartzke and Li 2003; Gartzke 2007).

However, there are some important challenges to the prevailing wisdom that interdependence decreases the probability of war. First, there are many historical disparities where crises escalated despite growing opportunity costs. For example, policymakers in the 19th and early 20th Centuries heralded trade as an antidote to Europe's legacy of imperialist wars (Blainey 1988, 18-34). Nevertheless, World War I began at a time the core countries had never been more economically integrated (Copeland 1996).[6] These aberrations highlight a gap in existing theories about how trade affects the likelihood of war; it suggests an alternate mechanism may be at play in these cases.

Some political methodologists also challenge the empirical evidence proffered in support of the opportunity cost mechanism. The inverse trade-conflict results stem from statistical models that assume a linear relationship between trade and conflict. However, empirical studies do not justify this relationship. Modeling specifications can substantially shift the direction and challenge underlying theoretical predictions when we thoroughly re-examine the linearity assumptions grounding the data generating process (Xiang et al. 2007). To wit, Beck and Baum (2000) allow for a non-parametric setup and show a perplexing non-monotonic relationship between growing trade flows and militarized conflict. There is no theory, to date, to explain these findings.

Together, these issues highlight an important weakness in current economic interdepen-

[5]Economic interdependence takes many different forms in the international relations literature. In the remainder of the paper, we focus our discussion on trade flows due to their prominence, but note the results generalize.

[6]Gartzke and Lupu (2012) argue this is a misinterpretation of the economic interdependence argument because it was incentives to misrepresent resolve among economically integrated countries, and not the opportunity costs of conflict, which contributed to the July Crisis. We build on this interpretation to demonstrate how information problems emerge from economic integration.

dence theories about war. Despite empirical evidence that increasing economic interdependence does not always lower the risk of war, a theoretical gap remains in understanding why. One reason this gap exists is the literature's reliance on opportunity costs as the sole mechanism by which interdependence affects the probability of conflict. We advance a new argument in this paper, which differs from previous research in two ways. First, we disaggregate the relative benefits from trade compared to the overall bilateral trade flows between parties. Consistent with previous literature, we argue that as overall bilateral trade increases, both states benefit from new trade gains. However, we depart by suggesting states do not necessarily benefit from increased trade to the same extent. These relative gains capture the conditions under which one party values these transactions more, which can then affect their willingness to gamble on war.

Second, we analyze how opportunity costs change the probability of conflict when there is uncertainty over resolve. The model we develop below is closest to Polachek and Xiang's (2010), which analyzes the effect of increasing trade on the probability of conflict under cases of incomplete information. Polachek and Xiang (2010) argue that opportunity costs decrease the probability of conflict when there is uncertainty over military costs. We should be careful not to generalize these results across all other mechanisms.[7] Indeed, we should not even generalize this result across the discussion of cost uncertainty. In the next section, we change the information problem to uncertainty about the opponent's value of the good at stake, which scholars often refer to as a state's *resolve*. This impacts a state's cost of fighting, as states must compare the military costs of engagement to their values of the prize. This change produces the counterintuitive result that the probability of war increases as trade flows increase.

Noting the discrepancy between uncertainty over resolve and uncertainty over military costs is not a minor caveat in the bargaining model of war literature. Powell (2004) and Fey and Ramsay (2011) show that uncertainty over costs behaves differently from uncertainty over the probability of victory.[8] We go further by showing that the source of uncertainty over costs should be further broken up into uncertainty over *military* costs and uncertainty

[7]In the appendix, we take comparative statics on cost for other mechanisms. We find that the probability of war monotonically decreases in costs when there are preventive war incentives, commitment problems, and uncertainty over the probability of victory. Nonmonotonic effects emerge when there is uncertainty over resolve and endogenous armaments, which can endogenously create uncertainty over the probability of victory. The reason for the nonmonotonicity is the same as what we present in our main model, which we choose to showcase because of its relative simplicity.

[8]Furthermore, non-traditional sources of uncertainty (e.g., the size of the pie, an opponent's level of moderation, or an opponent's ideal point) also behave differently from the traditional sources (Dal Bó and Powell 2009; Spaniel and Bils 2017).

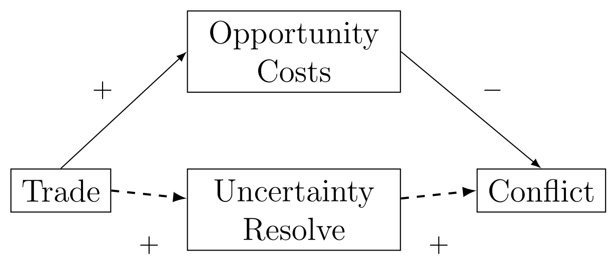

Figure 1: The causal pathways governing the trade-conflict relationship. The solid black line represents conventional wisdom that trade decreases the probability of conflict through increased opportunity costs. The dashed line represents our new mechanism by which trade may increase the probability of war. We show that when the effect of opportunity costs on the probability of conflict is less than the effect of uncertainty over resolve, increased economic interdependence will counterintuitively raise the risk of war.

over resolve. Failing to note the differences can result in imprecise theoretical claims, which in turn leads to misleading empirical implications.

These differences lead to the discovery that although opportunity costs decrease the probability of conflict, it is not the only mechanism governing the trade-conflict relationship. A second pathway exists whereby new trade exacerbates uncertainty about the relative valuations of trade (Figure 1). We develop a model to formalize these intuitions and identify the conditions under which economic interdependence increases the probability of war, despite increasing opportunity costs.

3 Modeling Bargaining, Resolve, and the Changing Costs of War

In this section, we develop a model in which increasing the costs of conflict creates uncertainty about the opponent's value of the good relative to original costs. Consider a game consisting of two states, A and B, bargaining over an object they both desire. If they reach a settlement, then peace and efficiency prevail. If bargaining breaks down, a costly lottery generates an inefficient outcome.

The timing is as follows. Nature begins the game by drawing B's value of the good V from the support $[\underline{V}, \overline{V}]$, where $\underline{V} > 0$. The analytical results below use the distribution $\frac{1}{V^2}$; in the appendix, we give technical conditions for the class of distribution for which the main result applies.[9] Following Fearon (1995, 394) and Frieden, Lake, and Schultz (2013, 95), we say that a type with a higher V draw is more "resolved" than a lower type.[10] A more resolved type values the prize more and—as we will demonstrate below—is more likely to fight to capture it. This information is private to B; A only knows the prior distribution. Everything else is common knowledge.

We standardize A's value of the good to be worth 1. Following the draw, A makes a take-it-or-leave-it offer $x \in [0, 1]$, where x represents the percentage of the good going to B. B sees the offer and accepts or rejects.

Payoffs are as follows. If B accepts, it earns the offered portion x multiplied by its drawn value of the good, or Vx; A receives the remainder, or $1 - x$.[11] If B rejects, the states fight a war. Nature selects B as the winner with probability p_B and A as the winner with complementary probability. The winner captures the entire good.

Fighting is inefficient for two reasons, and we must distinguish between them to draw the proper inferences about the effect of trade on war. The first pair of costs, $c_A, c_B > 0$, reflect the standard military costs of war. Both these values are common knowledge. One might imagine this as the baseline price of fighting in the absence of any bilateral trade. Note for later that the ratio $\frac{c_A}{c_B}$ reflects the proportion of non-trade pain A suffers via war compared to the non-trade pain B suffers.

The second pair of costs incorporate the lost value of trade if conflict disrupts these flows. These represent the additional costs incurred by fighting on top of the military costs. An initial temptation may be to simply include two additional trade-related costs, $\tau_A, \tau_B > 0$, that capture the overall trade flows lost from conflict.[12] However, this is too simplistic because it ignores the relative gains from trade across states. As suggested earlier, bilateral trade gains for state A are not independent from bilateral trade gains for state B. Increasing A's value of trade also increases B's value of trade because the mutual benefits rise for both parties. Thus, the ratio $\frac{\tau_A}{\tau_B}$ captures which defines the proportion of benefits from trade state A receives divided by the proportion of benefits of from trade state B receives.

To put the overall trade flow in context, we require an additional parameter beyond the ratios to connect the parties' gains together. By taking a comparative static on that flow,

[9] We illustrate the model with this distribution because the uniform distribution causes issues with concavity—specifically, A always proposes an offer that is accepted with probability 1. As a result, there are no comparative statics to draw.

[10] Frieden, Lake, and Schultz (2013, 95) define resolve as "how much the state values the object of dispute relative to [the costs of war]" and claim that this is one of the two major sources of uncertainty in crisis bargaining.

[11] This is implicitly multiplied by A's value of the good, which is standardized to 1.

[12] See Polachek and Xiang (2010).

we can identify the conditions where the incentives for war outweigh the incentives for peace and the probability of conflict rises.

Therefore, let a new parameter, $\alpha \geq 0$, represent the size of that flow. When $\alpha = 0$, only the military costs matter. As α grows arbitrarily large—and this is key for the comparative static we develop later—the military costs become unimportant. Therefore, all told, state A earns $1 - p_B - c_A - \alpha\tau_A$ if it fights. Meanwhile, for any type V, B earns $Vp_B - c_B - \alpha\tau_B$.

Games with positive affine expected utility transformations are identical. Thus, we can scale B's payoffs by $\frac{1}{V}$. Doing so generates a more familiar-looking war payoff of $p_B - \frac{c_B+\tau_B}{V}$. Note that higher values of V give a type a lower total price of war. This observation explains why most models simply represent uncertainty over resolve with a single parameter c (Fearon 1995, 387). Although that formalization is fine for most research questions, it obscures how each true component of a state's cost (military costs of war, lost trade, and value of the prize) affects the probability of conflict. We therefore need to disaggregate the components to draw the correct inference. The transformation clarifies that A can observe B's benefits from trade, but *cannot* observe how it weighs those costs relative to the potential gains from fighting.[13] This asymmetric information problem affects A's screening incentives and willingness to gamble on war.

3.1 Manipulating the Risk-Return Tradeoff

Because this is a sequential game of incomplete information, we solve for its perfect Bayesian equilibria. The appendix covers the details. In short, A faces a classic risk-return tradeoff. The less it offers B, the higher A's payoff is conditional on B accepting. However, offering less also makes B more likely to reject, and in turn A pays its costs of war more often. A's optimal demand must therefore balance its desire to take more from a peaceful settlement and its aversion to war.

How increasing trade flows affects the probability of war depends on which type of solution the game falls under. For example, if A's costs of war are sufficiently high, then it makes an offer that all opposing types accept. Meanwhile, increasing B's costs of war to large enough levels means that more and more types are willing to accept an offer of 0. Together, these two situations can result in "corner solutions" because the optimal offer may be locally invariant in the game's input parameters. This contrasts with "interior solutions," in which A's offer is a non-trivial function of the parameters.

[13] This contrasts our model from Morrow's (1999) discussion.

For many models, corner solutions generate similar theoretical results to interior solutions, and thus researchers focus only on the interior. Our model is not like that; empirical implications differ when the game has these more extreme parameters. We therefore highlight two scope conditions critical to our theory:

Condition 1 (Risky Offers)**.** *Let A's total disutility for war be sufficiently small. That is,* $c_A + \alpha\tau_A < (c_B + \alpha\tau_B)\left(\frac{1}{\underline{V}} - \frac{2}{\overline{V}}\right)$.

Condition 2 (Positive War Utility)**.** *Let all types of B has a positive expected utility for war. That is,* $p_B - \frac{c_B+\alpha\tau_B}{\underline{V}} > 0$.

According to standard crisis bargaining theory, if the additional costs of war are positive for both states (i.e., $\tau_A > 0$ and $\tau_B > 0$), increasing the relative valuation of those new costs (i.e., increasing α) should lead to a decrease in the probability of conflict. In other words, greater costs should incentivize state A to propose safer offers so it can avoid paying the costs of war and simultaneously capture B's costs in the settlement. Yet our first result says that this is not always the case:

Proposition 1. *Suppose Conditions 1 and 2 hold and the ratio of A's military cost of war to B's military cost of war is greater than the ratio of A's trade benefits to B's trade benefits (i.e.,* $\frac{c_A}{c_B} > \frac{\tau_A}{\tau_B}$*). Then the probability of war is strictly increasing in the trade flow* α.

What accounts for the unexpected result? As previewed earlier, increasing trade flows exacerbates A's information problem. A's uncertainty only matters in so far as it prevents A from anticipating how B will play the game. Figure 2 illustrates the issue. Recall that a given type of B earns $Vp_B - c_B - \alpha\tau_B$ if it fights. Thus, with x representing the portion of the good B keeps if it accepts, a given type is indifferent between accepting and rejecting if:

$$Vx = Vp_B - c_B - \alpha\tau_B$$
$$x = p_B - \frac{c_B + \alpha\tau_B}{V}$$

The left side of Figure 2 shows this values for a more resolved and a less resolved type without any gains from trade. The right side demonstrates how those values change as trade increases the total price of war. Note that both values decline but that the unresolved type's war payoff decreases at a faster rate. In turn, the difference in the types' reservation values grows.

Consider how this affects A's incentives to screen the types by making a risky offer that only the more resolved type would accept. The total trade benefit of $\alpha\tau_B$ *interacts* with

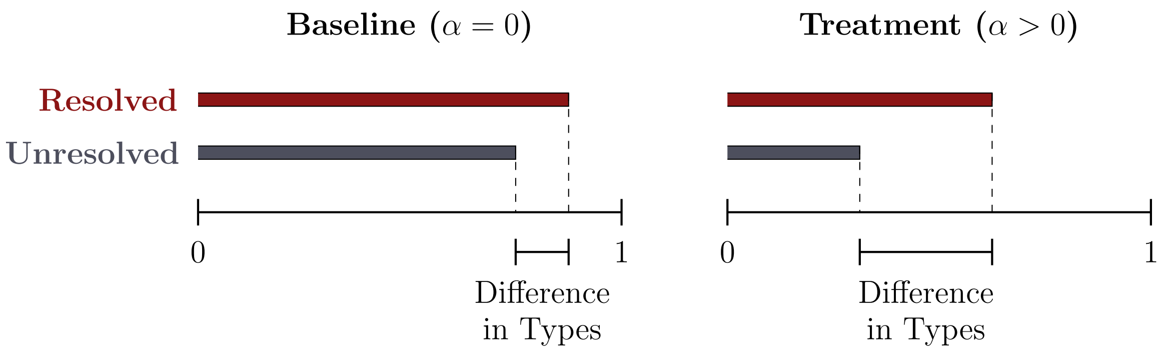

Figure 2: The functional difference in two types of B with and without trade benefits. Bars represent a type's payoff for war. Because the difference is greater in the treatment case ($\alpha > 0$), A has greater incentive to risk war by offering smaller amounts.

A's source of uncertainty. When $\alpha = 0$, A cannot capture much more by inducing only the unresolved type to accept. However, as α grows, so too does the disparity. All else equal, this makes screening offers look more attractive to A.

However, all else is not equal. Increasing trade flows also causes A more pain if B rejects the offer. In turn, it reduces A's desire to run risks. This helps make sense of Proposition 1's condition on the ratio of military costs to trade costs. When $\frac{c_A}{c_B} > \frac{\tau_A}{\tau_B}$ (as the proposition requires), the relative impact of lost trade is less for A than B vis-à-vis the impact of military costs. As such, A's incentive to screen the more diffuse types of B trumps A's concern to avoid the extra costs. It therefore proposes a riskier offer, and war occurs more frequently.

The interactive relationship between B's total trade benefit differentiates our results from previous models on the trade-conflict relationship. Consider how trade flows change reservation values when A knows B's valuation of the good but is uncertain of its military cost. For example, suppose that B's military cost is either c_B or $c'_B > c_B$. Then B's possible reservation values are $p_B - \frac{c_B + \alpha\tau_B}{V}$ or $p_B - \frac{c'_B + \alpha\tau_B}{V}$. Increasing the trade benefit decreases each of these values by the same rate.[14] It therefore does not have a second-order effect on the game's information structure.[15] In turn, additional trade only has the pacifying effect that standard interdependence theory anticipates.

Of course, when the inequality runs the other way, A's desire to avoid war exceeds its willingness to screen types. As the next proposition summarizes, trade reduces conflict:

[14] That is, the derivative of $\left(p_B - \frac{c_B + \alpha\tau_B}{V}\right) - \left(p_B - \frac{c'_B + \alpha\tau_B}{V}\right)$ with respect to α is 0.

[15] This is true only for the interior solution. In the corner solution, it can *reduce* A's information problem and further promote peace. A similar effect occurs in our model, and we explain the intuition below.

Proposition 2. *Suppose Conditions 1 and 2 hold and the ratio of A's military cost of war to B's military cost of war is greater than the ratio of A's trade benefits to B's trade benefits (i.e., $\frac{c_A}{c_B} < \frac{\tau_A}{\tau_B}$). Then the probability of war is strictly decreasing in the scale of trade flow α.*

The ratios $\frac{c_A}{c_B}$ and $\frac{\tau_A}{\tau_B}$ determine the relationship between the flow of trade and the probability of conflict. Given the empirical importance of the ratio, it is fortunate that they have a straightforward substantive interpretation as discussed earlier. If the proportional benefits from trade for A are greater than proportional military damage for A, then Proposition 2 applies, and the probability of war decreases. If the opposite holds, then Proposition 1 applies, and the probability of war increases.[16]

This interpretation of the cutpoint gives empirical scholars an easy way to check the expectation of any given case. All it requires is simple examinations of how costly the act of fighting would be to each party in the event of a war and how much each party benefits from trade. We implement such a comparison in the case study of Sino-Indian relations below when we provide an example of how to operationalize these variables.

3.2 When Additional Costs Incentivize Peace

Propositions 1 and 2 explain local effects. Increasing α can transition the parameters outside of Conditions 1 and 2. For example, consider Condition 2's requirement that $p_B - \frac{c_B + \alpha\tau_B}{\underline{V}} > 0$. Large values of α assuredly cause it to fail, as at least some type of B will have a negative expected utility for war. One may then wonder whether Proposition 1's counterintuitive finding extends into these corner solutions. The following proposition summarizes our findings:

Proposition 3. *If the scale of trade flow α is sufficiently large, further increases weakly decrease the probability of war.*

Proposition 3 is welcome news for traditional economic interdependence theory. It effectively states that additional trade causing war is a short-term effect—eventually, trade pacifies. Put differently, if trade is the problem, *more* trade is the solution.

However, reaching peace-inducing trade quantities may not be easy. Consider the reason why sufficiently large trade flows assuredly reduce war regardless of the ratio between military costs and trade benefits. At some point as trade flows increase, some types of B begin

[16]Furthermore, the rate at which war increases or decreases works analogously. For example, if $\frac{c_A}{c_B}$ is much larger than $\frac{\tau_A}{\tau_B}$, the probability of war increases faster as the total trade flow increases than if $\frac{c_A}{c_B}$ is slightly larger than $\frac{\tau_A}{\tau_B}$.

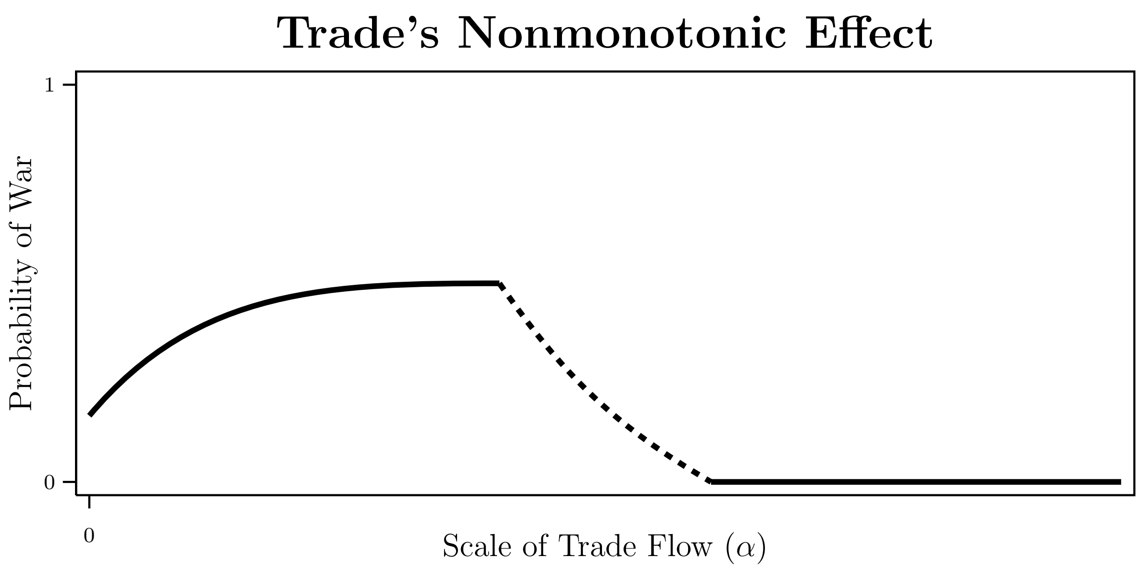

Figure 3: The probability of war as a function of the scale of trade flow. Initial increases to trade result in more frequent war. Eventually, trade begins having a pacifying effect until peace is the certain outcome.

accepting offers of 0. Increasing trade further causes more of those types to behave identically. Eventually, A's optimal offer becomes 0, inducing all of those types to accept. Further increases to α make yet more types accept an offer of 0. Because A maintains that same offer (because it cannot extract any more even if it wanted to), peace results more often.

In the extreme, massive trade ties cause all types of B to accept all offers. In turn, A optimally offers 0 and extracts the entire good peacefully. This is why Proposition 3 states that the effect is weakly decreasing.

Figure 3 illustrates trade's effect over the entire range of possible flows when $\frac{c_A}{c_B} > \frac{\tau_A}{\tau_B}$. The increasing line covers Proposition 1: additional trade flows causes more war. The trend eventually reverses in the decreasing dashed line. A begins offering 0: all types with negative war payoffs accept and all types with positive payoffs reject. Sufficiently large trade flows cause all types to have negative war payoffs. At this point, the flat solid line shows that the probability of war stabilizes at 0.

Before moving on, there are a few points worth reinforcing. For the positive effects to kick in, trade costs must push states into the corner solution—i.e., war becomes so costly that at least one type prefers accepting nothing to fighting. This onerous requirement generates two implications. First, it means that the counterintuitive results from Proposition 1 are not insignificant. Second, it helps explain World War I as a noted exception to the inverse trade-conflict pattern. Although trade had never been greater, Gowa and Hicks (2015) find that countries covered most of the losses through new trade channels or domestic reallocations. Further, this shows that the problems of asymmetric information and uncertainty about resolve Gartzke and Lupu (2012, 143) proffer actually arise as a consequence of changing economic integration between Eastern European states.

Although more trade may fix the issue, flows may have to be expansive before the net effect is positive. Figure 3 shows the issue. If two states have no trade relations whatsoever, their probability of war is low. Increasing the flow increases the probability of war until the transition point. But note that in the immediate proximity to the right of the transition point, the probability of war is still higher than with no trade whatsoever.

As a final modeling note, a careful reader may observe that changing the cost of conflict in the above setup alters both the mean and variance of the distribution of the receiver's reservation values. More generally, one may note that increasing α actually has three effects:

- It increases A's overall cost of war.
- It increases each type of B's overall cost of war.
- It increases the difference between the resolved type's reservation value for war and the unresolved type's reservation value for war.

Correspondingly, one may wonder which causes the increase in war. The intuition from Figure 2 indicates that the increased variance is to blame because it incentivizes riskier offers.[17] Furthermore, the problem goes away once α transitions the game to the corner solution, at which point the difference in types' reservation values decreases. This is a new and key insight especially in comparison to Polachek and Xiang's model or any other model in which the uncertainty is purely over military costs. In those models, increasing α increases the overall costs of war; changing the mean of the distribution results in no change in the probability of war as costs increase (within the interior solution).

This has a reasonable logic. Regardless of the bargaining protocol, when the variance of the distribution increases, A functionally faces more uncertainty about its opponent. Exacerbating this information problem incentivizes the uninformed party to make riskier offers, which in turn leads to more conflict. In contrast, increasing the cost of war when there is uncertainty over military costs does not exacerbate uncertainty about resolve—the parameter τ_B has no interaction with the costs A is uncertain about. Consequently, increasing the opportunity cost for war does not increase the probability of conflict.

[17] Reed (2003) also shows that increasing variance in the probability of victory also leads to more conflict.

Overall, increasing trade does not always have the monotonic effect on the probability of conflict that economic interdependence theories would predict. Rather, interdependence can increase the likelihood of conflict initially before eventually decreasing it.

4 Tracing the Model: Sino-Indian Relations, 1949-2007

In this section, we use the case of Sino-Indian relations from 1949-2007 to illustrate the model's main propositions. We focus on three different periods in the dyad where varying bilateral trade flows led to outcomes inconsistent with the predictions of the trade-conflict literature. Conventional wisdom suggests Sino-Indian tensions should have dropped when trade flows were growing, but, in fact, the opposite occurred. This deviation in expected behavior enables us to leverage the case to explore the mechanism at play. Examining three different periods in the relationship also helps us test whether the model's key conditions and propositions materialize. If traditional economic interdependence theory applies, then we should see no informational asymmetries arise as a result of changing trade flows. If our model's scope conditions hold, we expect growing bilateral trade to exacerbate information problems. Screening should result. During the case study's exploration of Indian decision-making and beliefs about Chinese resolve, we find evidence consistent with the model's main predictions.

We choose to use a case study because the model relies on strategic logic, uncertainty, resolve, and other parameters of interest not easily operationalized for use in a statistical model. Formal models provide a framework for conceptual discussion. Even if the prediction of a model bears out, statistical tests cannot say whether the model is correct (Primo and Clarke 2012). Instead, process-tracing and historical case studies provide the best means to analyze the theoretical concepts and parameters of interest in the model. The case study is an opportunity for exploring the plausibility of the model's main propositions. Nevertheless, we believe the testable hypotheses from this model, namely the nonmonotonic effect of growing trade on the probability of war, have already been tested and corroborate the model's main empirical predictions (Beck and Baum 2000).

Our focus in this case study is the history of Sino-Indian relations from 1949-2007 for three reasons. First, as we expand on shortly, this case matches the model's scope conditions due to the signing of several profitable trade agreements, India's relative uncertainty about Chinese resolve, and the discrepancy in new trade gains relative to the ratio of original military capabilities between the two countries. Second, focusing on one dyad allows us to control for potential time-invariant confounders that could also affect the probability of conflict.[18] Third, it allows us to use interstate war as the dependent variable of interest rather than lower-level militarized interstate disputes that are common in empirical tests of economic interdependence. These lower-level disputes do not accurately record the strategic logic and decision-making outlined in the model above because these incidents are often accidental or involve non-state actors (Gleditsch and Pickering 2013).

The model highlights three critical features under which increasing trade will lead to a nonmonotonic effect on the probability of war. We argue decision-making during three periods of Sino-Indian relations meets these conditions. First, there must be changes in the trade flows between countries across these three periods. After 1949, economic interdependence between India and China was minuscule until a 1954 trade agreement between the two countries increased gains from trade for both sides.

One of the adversaries must also face uncertainty about its opponent's willingness to fight over an issue at stake. The primary territorial dispute between the two countries was, and continues to be, centered over the high desert area of Aksai Chin in the west, Bara-Hoti in the center, and the mountainous North-East Frontier Agency (NEFA) in the east. The origins of the dispute lie in a 19th century disagreement between British, Tibetan, and Chinese officials about ancient trade routes, including parts of Shipki La (the Silk Road), and control over trading posts around the eastern city of Tawang.[19]

In his personal papers and diplomatic correspondence, the first Indian Prime Minister Jawaharal Nehru repeatedly expressed uncertainty over Chinese intentions regarding the border issue. Despite the Chinese military's harassment of Indian traders operating in the Tibetan region, impediments in existing trade routes, and a growing militarized presence in Tibet after the 1959 rebellion, Nehru remained uncertain about "whether it [was] just local aggressiveness or just to show us our place" (Jetly 1979, 84). Indeed, much of India's policy banked on the belief that China would likely prefer to back down than start a war over the seemingly valueless territories (Slantchev 2011, 185-186). Thus, in relating the case to the model we develop, India plays the role of state A (the uncertain state), while China plays state B.

Finally, the ratio of the uncertain state's military costs to the opponent's military costs must be greater than the ratio of the uncertain state's trade benefits to the opponent's trade benefits ($\frac{c_A}{c_B} > \frac{\tau_A}{\tau_B}$). Under these conditions, as Figure 3 illustrates, we would expect the

[18] The model makes no predictions about the temporal dynamics or conflict sequencing and this is a coincidence in the dyad.

[19] For a longer history of the territorial dispute, see Maxwell (1970).

probability of conflict to initially intensify with the addition of these benefits before eventually tapering off. To operationalize the key ratio, we capture the relative ratio of military costs each side would incur by fighting by comparing each country's military expenditures to yield a measure of c_A and c_B. Higher military expenditures are inversely related to the expected costs of fighting. The parameters τ_A and τ_B measure the relative value of trade, which we operationalize using data on bilateral trade flows between the countries.

To preview our case study, in the early 1950s, before the countries established strong trade relations, Prime Minister Nehru overlooked Chinese aggression along the Indian-Tibetan border and hawkish domestic opposition to preserve the peace. Low trade flows but high military costs for fighting meant that India would not risk war against China. In other words, α was nearly zero. Risking high costs of war was not worth screening out unresolved types.

Following a 1954 trade deal, India's relative benefits from trade increased so that α was now non-zero. At the same time, Chinese harassment of traders in and around the disputed territory exacerbated India's uncertainty over Chinese willingness to fight and disrupt what India perceived as mutually-valuable trade flows. These issues culminated in the 1962 Sino-Indian War because India was more willing to screen China over the disputed good (Proposition 1).

In the third period of relations, during the 1990s, the mutual pursuit of economic development and market integration between China and India overshadowed the lingering border dispute. The rapid growth in the opportunity costs of war made trade so valuable relative to the military costs of fighting that α was large and peace between these two monoliths sustainable (Proposition 3).

4.1 1949-1954: Low Trade, Little Incentive to Gamble, Peace

In the first period of Sino-Indian relations, India refused to gamble on war with China despite minor trade flows and domestic pressure to fight. India's independence from Britain in 1947 and the creation of the People's Republic of China in 1949 transformed the political landscape of Asia. Nehru saw cooperation between India and China as important for "it has been to some extent a trade relationship " (Nehru 2001b, 241). During the first half of 1950, India built up relations by advocating China's entry to the United Nations, publicly denouncing Chiang Kai-Shek's government in Taiwan in public speeches, and lobbying for potential trade talks (Jetly 1979, 11).

On October 7, 1950, Chinese forces annexed Tibet, which, until then, had been India's primary buffer state with China and a principal trading partner for the Indian economy. The event sparked fears in India that China would next challenge the McMahon Line and seize the disputed NEFA region. Members of Parliament in India urged Nehru to militarily respond in defense. It was "dangerous self-delusion," they argued, to appease China, especially as the latter threatened India to not "obstruct the exercise of its sovereign rights" (Jetly 1979, 16, 18). Despite domestic pressure to act militarily, Nehru reiterated his "desire to maintain friendly relations" with China (Jetly 1979, 29). In May 1951, India formally signed a treaty recognizing China's control over Tibet, effectively closing debate about whether India would escalate the Tibetan crisis.

India's willingness to keep the status quo during this period follows the model's prediction in Proposition 1. At the time, Nehru faced virtually no second-order uncertainty through the loss of trade; flows between the two countries in 1950 was a paltry USD $6.1 million and followed a 75% drop from pre-Chinese Communist regime trade levels (Barieri, Keshk, and Pollins 2009). Meanwhile, China was spending about five times more than India on an army ten times as large. The key point here is *not* that China militarily dominated India; the probability of victory from the model subsumes that aspect and does not determine whether a gamble is optimal within any one case.[20] Rather, this military discrepancy meant that, win or lose, India would pay high military costs for conflict and no real losses in trade. In other words, α was approximately zero; the difference in facing an unresolved China versus a resolved China was not worth screening with a small offer.[21] As a result, India acted cautiously, pursuing a policy that was acceptable to both a resolved or unresolved China.

Nehru's cautious behavior in this period is particularly compelling evidence in support of the model because competing explanations would predict an *increase* in conflict likelihood. First, Nehru was a relatively new leader with reputational incentives to stand firm against China (Wolford 2007), but he instead chose to do nothing. Second, domestic political opinion was in favor of taking more aggressive action against China. This should have tied his hands and made it harder for Nehru to back down, but he instead faced little meaningful backlash from elites during the crisis. Finally, preventive war logic would predict that Nehru had large and compelling incentives to address the threat of China in the present, but Nehru took relatively minor military actions apart from a few routine defensive measures to protect

[20]The value p_B, however, determines the size of α that shifts the parameter range from one space to another. The larger p_B is, the greater α needs to be before it will begin decreasing the probability of war. Given that p_B reflects China's relative power here, this suggests that the quantity of trade needed to be vast before the positive effects would kick in.

[21]More explicitly, increasing in the uncertain party's costs of war (c_A) increases the cutpoint for q^*, making it more likely that the uncertain party makes the safe offer.

the border.[22] Given that Nehru's behavior counters the prediction of alternate theories, it suggests these explanations are not potentially confounding our interpretation.

4.2 1954-1962: Rising Trade, Rising Tensions, and War

In the second period, conflict emerged between India and China despite rising opportunity costs. After India acknowledged China's sovereignty over Tibet, the former tried to capitalize on this concession by advocating for additional economic and confidence-building measures to re-institute critical trade talks. The two parties formed a number of Indo-Chinese Friendship Associations in 1952, and those trade talks materialized in December 1953. Four months of negotiations produced the Sino-Indian Agreement on Trade and Intercourse on April 29, 1954. It established new commerce and new trade routes through the disputed border areas.

After China and India signed the 1954 trade agreement, both countries boasted about the strength and durability of their friendship. A second agreement in October 1954 outlined additional tradeable goods and services. Both countries renewed it in 1956 and 1958 (Jetly 1979, 47). Together, these agreements substantially improved transport technology and ease of access across the Himalayan trade routes.

The model emphasizes that the ratio of military costs ($\frac{c_A}{c_B}$) and trade costs ($\frac{\tau_A}{\tau_B}$) affects the conditions under which war is more likely. This is evident in Sino-Indian relations during this period. After 1954, α began to increase due to trade flows from the landmark agreement. This marked the beginning of a foreign policy period remembered by the moniker "Hindi Chini Bhai-Bhai" (*India and China are brothers*) as trade relations between the two countries grew from USD $4.4 million in 1953 to USD $36.6 million by 1959, an absolute gain of 831% (Anderson and Geiger 2010, 129). The trade benefited both sides immensely such that $\frac{\tau_A}{\tau_B}$ was in relative parity. In contrast, the military balance remained heavily in China's favor. Chinese military expenditures outweighed Indian military expenditures at a ratio of five to one. Under these conditions, India's military costs of fighting remained much higher than China's such that the ratio $\frac{c_A}{c_B}$ was very large. This pins $\frac{\tau_A}{\tau_B}$ as less than $\frac{c_A}{c_B}$. Under this condition, the model indicates that increasing trade flows further would increase the risk of conflict.

As trade grew during this decade, reports also emerged about a number of Indian and Chinese intrusions into the central Bara Hoti area on the Tibetan-Indian border (India Ministry of External Affairs 1959, 5). Soon after, reports emerged that Chinese forces in Tibet began impeding trade by freezing merchandise, harassing traders, demanding currency

[22]See "Nehru reaffirms border." *New York Times*. November 21, 1950.

changes, and creating obstacles to move goods. These actions generated uncertainty in Indian political discussions about whether China was willing to risk harming (what India believed were) new and valuable trade flows over an old border dispute.

In protests sent back and forth between the countries over the incidents, Nehru argued Chinese actions in the area were hampering peaceful commerce. The Prime Minsiter wrote that "we certainly want normal trade to be restored and have pointed out to the Chinese authorities in Tibet the difficulties that have arisen in it" (Nehru 2001a, 469). Although India knew China was benefiting from their new trading agreements, it did not know how China weighed those costs relative to the potential gains from fighting over the border. Sustaining trade through the disputed area was important to India and, as Nehru incorrectly surmised, also important to China.

The Tibetan Revolt in March 1959 created additional challenges for Sino-Indian relations, but did not assuage or exacerbate Nehru's uncertainty about Chinese resolve. Importantly, Nehru wrote "there has been pressure on the Indian traders even before these Tibetan developments" (Nehru 2001, 448). This event alone did not create uncertainty about China's willingness to challenge India; it also checks against competing explanations that exogenous political shocks might be driving an increase in India's uncertainty rather than trade itself.

Shortly after the rebellion, India reasserted its demand that China remove its new border defense, which would both free up trade routes and distance the Chinese military. Why? This bluff stemmed from Nehru's uncertainty over Chinese resolve. He wrote that it was "unlikely that the Chinese force [would] take up any aggressive line on this frontier" (Maxwell 1970, 130).[23] When Nehru sent troops to Bara-Hoti and other disputed areas to match Chinese forces, the PLA's restrained, peaceful response led Nehru to underestimate China's valuation of the stakes compared to continued trade. Nehru believed that the probability he was facing the unresolved type was high.

Because China enjoyed gains from trade, screening the types became more attractive for India. At this time, Nehru adopted his "Forward Policy" in 1961 to screen and "serve as a test of long-range intentions regarding China" (Patterson 1963, 279). The policy worked by having Indian troops systematically construct more posts deeper in the disputed territory to match Chinese advances in Aksai Chin and NEFA. Nehru thought this policy would "irritate

[23]This raises a secondary question about two-sided information problems. How accurate were India's beliefs about Chinese resolve? The Chinese government's main propaganda channel, the newspaper *People's Daily*, paid little attention to threats by the Indian governments (Whiting 1975, 48). In retrospect, we know now that China had also likely intercepted Indian military communication in the period at this time enabling it to track both the size and movements of Indian troops in the region further alleviating potential informational asymmetries (Whiting 1975, 44).

the Chinese, but no more" (Jetly 1979, 149).

When talks to renew the series of trade agreements fell through in 1962, China increased its military presence in the border region to between 140,000 and 150,000 by the fall—a hefty investment given the logistical difficulties of sending troops out to the border and a "more than ample superiority" of personnel (Whiting 1975, 93). In October 1962, China invaded India to end the border standoff, catalyzing the Sino-Indian war. To summarize, Nehru's uncertainty about Chinese willingness to fight over the border misled the development of India's Forward Policy and increased the risk of war.

4.3 1984-2007: Massive Trade and Return to Stability

In the final period of Sino-Indian relations, the relative valuation of trade flows compared to the military costs of fighting dominated Indian decision-making. In terms of the model, α was so large that the old military costs of fighting became unimportant. India would not risk opportunity costs from trade despite any lingering second-order uncertainty. When Rajiv Gandhi became Prime Minister in 1984, India's foreign policy centered on rapprochement and re-starting bilateral trade flows with China (Andersen and Geiger 2010, 132). Direct border trade formally resumed in July 1992, helping to contribute to the sum total USD $270 million in dyadic trade flows that year. By 1995, trade flows surpassed USD $1 billion, with plans to push trade higher. Both sides pledged a mutual commitment to forge an everlasting agreement on the disputed border to best strengthen the countries' "long-term interests and overall bilateral relationship" (Sandhu 2008, 23). Concurrently, both countries agreed to reduce troop levels in the NEFA region now known as Arunachal Pradesh. Over the next ten years, economic trade flourished, rising to $18 billion by 2005 and turning China into India's top trading partner (Rusko and Sasikumar 2007, 110). In the language of the model, this pushed α to increasingly larger values.

By 2000, both countries' relative economic gains from trading with each were too valuable to risk sacrificing for potential gains on the border. Scholars attributed the trade ties as "the most agreeable instrument of China-India rapprochement" and a strong cornerstone of peace and cooperation (Singh 2005, 62). It reflects the strategic logic that sufficiently high levels of trade flows make screening unattractive. In 2003, both countries agreed to re-open Nathu La, the traditional trade route between India and China closed after the 1962 War. The re-opening of Shipki La followed in 2006, reaffirming the predictions of economic interdependence theory (Anderson and Geiger 2010, 136). Thus, trade flows outweighed the potential gains either country could yield from flaring up the border dispute.

Overall, the Sino-Indian dyad from 1947-2007 shows how growing trade had varying effects on India's willingness to fight China. Even though India signed increasingly fruitful trade agreements with China in 1954, 1956, and 1958 that should have increased the costs of war, Nehru became more aggressive towards China because of informational asymmetries about the relative value of these prospective gains (Blainey 1988, 50). The decision-making at three distinct periods of Sino-Indian relations fits the formal model's theoretical predictions that varying trade flows have non-monotonic effects on the probability of war.

5 Conclusion

A large literature on economic interdependence and international conflict argues trade decreases the probability of war due to rising opportunity costs. Although we do not disagree with this work's main findings, we think it is important to analyze under what conditions this claim holds true given the gaps in existing theoretical explanations.

This paper's main contribution is to identify the precise conditions under which economic interdependence can increase the probability of war despite rising opportunity costs. We show that, unlike other mechanisms, rising trade flows may counterintuitively make war more likely because it also increases the difference between reservation points for unresolved versus resolved opponents. As a result, these informational asymmetries can lead states to screen their opponents and risk war.[24]

Our work helps bridge the gap in current research between the opportunity cost model and lingering empirical challenges to it. It critically provides new insight on the causes of war at odds with traditional economic interdependence theories where opportunity costs increased, yet conflict still erupted. It also demonstrates the important, but subtle, effects of changing trade flows for informed versus uninformed parties. The model complements a growing recognition that various sources of uncertainty have disparate effects on crisis bargaining. Empirical analyses must carefully trace what parties do not know about each other to draw the correct inference. It also suggests new research should disaggregate the effect of instruments like trade beyond the opportunity cost mechanism.

Moving forward, the results speak to two lines of research predicated on how raising the costs of conflict through deterrence and coercion should similarly lower the probability of war. Standard nuclear deterrence theory argues that possessing nuclear weapons increases

[24]One caveat not addressed here is that costly signaling fixes the problem with uncertainty over resolve but not over power (Arena 2013). Thus, while the model predicts the risk of conflict should increase, the resulting conflict, if any, may be relatively constrained.

the costs of war for potential challengers due to the risk of a retaliatory nuclear response (Morgenthau 1961, 280; Gilpin 1983, 213-219). The logic of alliance formation similarly relies on the assumption that entering these pacts induces peace by raising the costs of conflict for a potential opponent (Morrow 1994). Together, these mechanisms presume raising the costs of war through the increased precision and destructive capacity should decrease conflict, but our results demonstrate this effect may be highly conditional. We find increased costs of conflict can exacerbate issues with uncertainty over resolve even if both states possess destructive weaponry.

In contrast to conventional wisdom, increasing interdependence can at times have a countervailing effect of *raising* the risk of war. This model highlights the importance in understanding how different economic instruments affect the probability of conflict and recognizing different pathways can imply an increased probability of war when it is not expected.

6 Appendix: Proof of Claims in the Paper

By backward induction, a type with value V accepts x if:[25]

$$Vx > Vp_B - c_B - \alpha\tau_B$$
$$x > p_B - \frac{c_B + \alpha\tau_B}{V}$$

A's decision is substantially more complicated. We break down the equilibrium space into five cases.

6.1 When $p_B - \frac{c_B+\alpha\tau_B}{\underline{V}} > 0$ and $c_A + \alpha\tau_A < (c_B + \alpha\tau_B)\left(\frac{1}{\underline{V}} - \frac{2}{\overline{V}}\right)$

If $x < p_B - \frac{c_B+\alpha\tau_B}{\underline{V}}$, all types reject. If $x > p_B - \frac{c_B+\alpha\tau_B}{\overline{V}}$, all types accept. In all other cases, we must run through the distribution function to obtain a probability of settlement. Recalling that the PDF is $\frac{1}{V^2}$ and the lower bound on V is $\underline{V}$, the corresponding CDF is $\frac{1}{\underline{V}} - \frac{1}{V}$. Rearranging $x > p_B - \frac{c_B+\alpha\tau_B}{V}$ in terms of V and placing the result into the CDF, the probability B accepts an offer x is:

$$\frac{1}{\underline{V}} - \frac{p_B - x}{c_B + \alpha\tau_B}$$

Therefore, A's expected utility for an offer x (on the interior) is:

[25] Because the indifferent type has measure zero, how an indifferent type responds is immaterial.

$$(1-x)\left(\frac{1}{\underline{V}}-\frac{p_B-x}{c_B+\alpha\tau_B}\right)+(1-p_B-c_A-\alpha\tau_A)\left(1-\frac{1}{\underline{V}}+\frac{p_B-x}{c_B+\alpha\tau_B}\right)$$

The first order condition for this yields a unique solution:

$$\frac{\underline{V}(2p_B+c_A+\alpha\tau_A-2x)-c_B-\alpha\tau_B}{\underline{V}(c_B+\alpha\tau_B)}=0$$

$$x^*\equiv p_B+\frac{c_A+\alpha\tau_A}{2}-\frac{c_B+\alpha\tau_B}{2\underline{V}}$$

This is a maximum because the second derivative is $-\frac{2}{c_B+\alpha\tau_B}$, which is negative. If the maximum is greater than $p_B-\frac{c_B+\alpha\tau_B}{\overline{V}}$, then $p_B-\frac{c_B+\alpha\tau_B}{\overline{V}}$ yields the best payoff for A; this is because that amount is the smallest offer that guarantees acceptance. Otherwise, x^* is the optimal offer. The condition for x^* being the optimal offer is therefore:

$$p_B+\frac{c_A+\alpha\tau_A}{2}-\frac{c_B+\alpha\tau_B}{2\underline{V}}<p_B-\frac{c_B+\alpha\tau_B}{\overline{V}}$$

$$c_A+\alpha\tau_A<(c_B+\alpha\tau_B)\left(\frac{1}{\underline{V}}-\frac{2}{\overline{V}}\right)$$

This condition holds for this case. We therefore turn to the comparative statics on α. Using the solution to the first order condition, the probability of B accepting in equilibrium is:

$$\frac{1}{\underline{V}}-\frac{p_B-\left(p_B+\frac{c_A+\alpha\tau_A}{2}-\frac{c_B+\alpha\tau_B}{2\underline{V}}\right)}{c_B+\alpha\tau_B}$$

$$\frac{1}{2\underline{V}}+\frac{c_A+\alpha\tau_A}{2(c_B+\alpha\tau_B)}$$

Increasing levels of α results in more war if this value is decreasing. Therefore, we must investigate where the first derivative is negative:

$$\frac{\tau_A c_B-c_A\tau_B}{2(c_B+\alpha\tau_B)^2}<0$$

$$\frac{c_A}{c_B}>\frac{\tau_A}{\tau_B}$$

This is the same condition as in Proposition 1. By analogous argument, the probability of war is decreasing if $\frac{c_A}{c_B}<\frac{\tau_A}{\tau_B}$. This completes the proof for Propositions 1 and 2.

6.2 When $p_B - \frac{c_B+\alpha\tau_B}{\underline{V}} > 0$ and $c_A + \alpha\tau_A > (c_B + \alpha\tau_B)\left(\frac{1}{\underline{V}} - \frac{2}{\overline{V}}\right)$

By the first case's argument, A's optimal offer is the corner solution of $x = p_B - \frac{c_B+\alpha\tau_B}{\overline{V}}$. Because this is a corner solution, the probability of war is locally unchanging. However, we still must investigate how the probability of war transitions from the corner solution to the interior solution. Such a transition can only occur if increasing α flips the sign of Condition 1. To find out if that can happen, note that we may rewrite the condition's inequality as:

$$\frac{c_A + \alpha\tau_A}{c_B + \alpha\tau_B} - \left(\frac{1}{\underline{V}} - \frac{2}{\overline{V}}\right) > 0$$

Taking derivative of the left hand side with respect to α and investigating when it is decreasing yields:

$$\frac{c_B\tau_A - c_A\tau_B}{(c_B + \alpha\tau_B)^2} < 0$$

$$\frac{c_A}{c_B} > \frac{\tau_A}{\tau_B}$$

Recall that this is the same condition that resulted in expanded trade flows increasing the probability of war in Proposition 1. A similar logic prevails here—if that condition holds, increasing trade flows can shift the parameters out of the corner solution to the interior solution. This moves the probability of war from 0 to some strictly positive value. But if $\frac{c_A}{c_B} < \frac{\tau_A}{\tau_B}$, increasing trade flows only reinforces A's incentive to make the safe offer. In turn, the probability of war remains static at 0.

6.3 When $p_B - \frac{c_B+\alpha\tau_B}{\overline{V}} > 0 > p_B - \frac{c_B+\alpha\tau_B}{\underline{V}}$ and $c_A + \alpha\tau_A < (c_B + \alpha\tau_B)\left(\frac{1}{\underline{V}} - \frac{2}{\overline{V}}\right)$

The latter condition implies that A prefers making the interior solution to offering $x = p_B - \frac{c_B+\alpha\tau_B}{\overline{V}}$. However, the first condition now says that some types of B have a negative payoff for war. Thus, the interior solution may be *less* than 0. In turn, A's optimal demand becomes the maximum of x^* and 0.

If the maximum is 0, then the probability of war is strictly decreasing in α locally. To see why, note that offering 0 maximizes the probability of war given B's best response function. Local increases to α increase the portion of types of B that have negative war payoffs and thus accept all offers. In turn, no matter what offer A proposes after α increases, the probability of war must be *lower* than before the change.

If the maximum is x^*, then the comparative statics for the first case apply. Locally, if $\frac{c_A}{c_B} > \frac{\tau_A}{\tau_B}$, the probability of war is strictly increasing; if $\frac{c_A}{c_B} < \frac{\tau_A}{\tau_B}$, it is strictly decreasing.[26]

6.4 When $p_B - \frac{c_B+\alpha\tau_B}{\overline{V}} > 0 > p_B - \frac{c_B+\alpha\tau_B}{\underline{V}}$ and $c_A + \alpha\tau_A > (c_B + \alpha\tau_B)\left(\frac{1}{\underline{V}} - \frac{2}{\overline{V}}\right)$.

Under these parameters, some types of B have negative war values, and A optimally offers the minimum amount that all types accept. The comparative static on the probability of war is locally unchanging because it remains fixed at 0. Increasing α does not transition the parameters to the third case if $\frac{c_A}{c_B} < \frac{\tau_A}{\tau_B}$ because it only makes A more inclined to pursue the corner solution. In contrast, if $\frac{c_A}{c_B} > \frac{\tau_A}{\tau_B}$, then the parameters can transition to the third case, and war may occur with positive probability. This increase in the probability of war is consistent with Proposition 1's condition.

6.5 When $p_B - \frac{c_B+\alpha\tau_B}{\overline{V}} < 0$

All types of B have negative war payoffs and accept all offers. Trivially, A's optimal offer is 0. Increasing α retains the negative war payoffs for all types and therefore has no effect on the zero probability of war. This proves Proposition 3.

7 Appendix: General Conditions for War to Be Increasing in Trade Flows

We now investigate technical conditions of probability distributions over beliefs that are sufficient to have increasing trade flows cause more war. In this general setup, let $F(V)$ be A's prior belief about B's valuation V, where $F(V)$ is continuous and strictly increasing, $F(\underline{V}) = 0$, and $F(\overline{V}) = 1$. The function $f(V)$ is the corresponding PDF. Meanwhile, let $I(\alpha)$ be the implicit function that maps α to the equilibrium offer x. Then the following are sufficient for the probability of war to be strictly increasing in α for the interior solution:[27]

[26]Note that if the probability of war is strictly increasing locally in α, it can eventually decrease. This is because sufficiently large values of α can transition the optimal offer from x^* to 0, and the probability of war is strictly decreasing once the optimal offer becomes 0. For this to be the case, x^* must be decreasing in α, or $\tau_A - \frac{\tau_B}{\underline{V}} < 0$.

[27]Because these are sufficient conditions, they are not the only conditions that generate the main result. For example, the condition on the reverse hazard rate guarantees a unique solution to the first order condition on A's offer. Without a unique solution, the equilibrium probability of war may increase. However, to show

1. The reverse hazard rate of the distribution function $\frac{f(V)}{F(V)}$ is weakly decreasing in V.[28]
2. The PDF $f(x)$ is not decreasing sufficiently fast, as defined by the technical condition below.
3. A's optimal offer size is decreasing in α sufficiently fast (i.e., $\frac{\partial}{\partial\alpha}I(\alpha) < -\frac{\tau_B(p_B - I(\alpha))}{c_B+\alpha\tau_B}$).

Proof: As before, any given type of B accepts if $x > p_B - \frac{c_B+\alpha\tau_B}{V}$. Reworking in terms of V, a given type accepts if $V < \frac{c_B+\alpha\tau_B}{p_B-x}$. Therefore, $F\left(\frac{c_B+\alpha\tau_B}{p_B-x}\right)$ gives the probability of acceptance for an offer x. This generates A's utility for any offer x on the interior:

$$F\left(\frac{c_B+\alpha\tau_B}{p_B-x}\right)(1-x) + \left(1 - F\left(\frac{c_B+\alpha\tau_B}{p_B-x}\right)\right)(1-p_B-c_A-\alpha\tau_A)$$

We now take the derivative of this with respect to x. Note that doing so requires us to use the chain rule on the CDFs. Writing this as the first order condition gives:

$$\begin{aligned}0 =& f\left(\frac{c_B+\alpha\tau_B}{p_B-x}\right)\left(\frac{c_B+\alpha\tau_B}{(p_B-x)^2}\right) - f\left(\frac{c_B+\alpha\tau_B}{p_B-x}\right)\left(\frac{c_B+\alpha\tau_B}{(p_B-x)^2}\right)x \\ &- F\left(\frac{c_B+\alpha\tau_B}{p_B-x}\right) - f\left(\frac{c_B+\alpha\tau_B}{p_B-x}\right)\left(\frac{c_B+\alpha\tau_B}{(p_B-x)^2}\right)(1-p_B-c_A-\alpha\tau_A)\end{aligned}$$

Rearranging yields:

$$\frac{f\left(\frac{c_B+\alpha\tau_B}{p_B-x}\right)}{F\left(\frac{c_B+\alpha\tau_B}{p_B-x}\right)} = \left(\frac{1}{p_B+c_A+\alpha\tau_A-x}\right)\left(\frac{c_B+\alpha\tau_B}{(p_B-x)^2}\right)$$

The left hand side is the reverse hazard ratio and is thus weakly decreasing in its input. Increasing x increases the input and therefore decreases the function. Because $p_B > x$ on the interior, the right hand side is strictly increasing in x. Therefore, if there is a solution to the function, it is unique. Taking the second derivative, it is also a maximizer if:

$$-\left(\frac{c_B+\alpha\tau_B}{(p_B-x)^2}\right)\left[f'\left(\frac{c_B+\alpha\tau_B}{p_B-x}\right)\left(\frac{c_B+\alpha\tau_B}{p_B-x}\right) + f\left(\frac{c_B+\alpha\tau_B}{p_B-x}\right)\right] < 0$$

$$f'\left(\frac{c_B+\alpha\tau_B}{p_B-x}\right) > -f\left(\frac{c_B+\alpha\tau_B}{p_B-x}\right)\left(\frac{p_B-x}{c_B+\alpha\tau_B}\right)$$

that, we would need to compare A's utility for each solution, which cannot be done cleanly for a general distribution function.

[28] Weakly decreasing reverse hazard rates are common in many standard distributions, including the uniform and variants of the beta.

All of the constituent components are guaranteed to be positive on the interior except for $f'\left(\frac{c_B+\alpha\tau_B}{p_B-x}\right)$. This is the technical condition referred to earlier that requires the derivative of the PDF to not be too negative.

Recall that $I(\alpha)$ is the implicit function that maps α to an optimal offer x, through the first order condition given. Then the probability of rejection equals $1 - F\left(\frac{c_B+\alpha\tau_B}{p_B-I(\alpha)}\right)$. We want to know how this changes as a function of α. Using the chain rule, the derivative of the probability of rejection is:

$$-f\left(\frac{c_B+\alpha\tau_B}{p_B-I(\alpha)}\right)\left[\frac{\partial}{\partial\alpha}\left(\frac{c_B+\alpha\tau_B}{p_B-I(\alpha)}\right)\right]$$

$$\frac{-f\left(\frac{c_B+\alpha\tau_B}{p_B-I(\alpha)}\right)\left[\tau_B(p_B-I(\alpha))+\left(\frac{\partial}{\partial\alpha}I(\alpha)\right)(c_B+\alpha\tau_B)\right]}{(p_B-I(\alpha))^2}$$

This probability is increasing in α if:

$$\frac{\partial}{\partial\alpha}I(\alpha) < -\frac{\tau_B(p_B-I(\alpha))}{c_B+\alpha\tau_B}$$

This is the third sufficient condition. □

To further tie this generalization to the presented results, note that the right hand side of the first order condition must grow larger in α for the probability of war to increase; otherwise, the offer size grows and thus more types of B accept. The derivative of the right hand side with respect to x is:

$$\frac{\tau_B(c_A+p_B-x)-c_B\tau_A}{(p_B-x)^2(c_A\alpha\tau_A+p_B-x)^2}$$

Investigating when this value is greater than 0 allows us to rearrange it to:

$$\tau_B(c_A+p_B-x) > c_B\tau_A$$

Because $p_B - x > 0$, we can set $p_B = x$ to show that a sufficient condition for this to hold is:

$$\frac{c_A}{c_B} > \frac{\tau_A}{\tau_B}$$

This was the same cutpoint found in the main text.

8 Appendix: Proofs for Increasing Costs under other Conflict Mechanisms

8.1 Uncertainty over Costs of War but not Resolve (Polachek and Xiang 2010)

Consider two states, A and B, bargaining over an object standardized to value 1. As in the standard setup, A makes an ultimatum offer, which B accepts or rejects. Accepting implements the proposed settlement; rejecting leads to war.

Rejecting leads to more complicated payoffs. Suppose that A faces two types of costs: $c_A > 0$ and $\tau_A > 0$, which are respectively the military costs of war and the opportunity cost of lost trade. Both of these are common knowledge. B also faces two types. The lost value of trade $\tau_B > 0$ is common knowledge. In contrast, B has private information about its military cost of war. Specifically, Nature draws that cost as c'_B with probability q and c_B with probability $1 - q$, where $c'_B > c_B$.[29]

War also probabilistically distributes the prize in dispute. Let $p_B \in [0, 1]$ reflect the probability that B prevails, with A winning with probability $1 - p_B$. All told, A's payoff for war is $1 - p_B - c_A - \tau_A$, the low-cost type of B's is $p_B - c_B - \tau_B$, and the high-cost type of B's is $p_B - c'_B - \tau_B$.

Under these conditions, Polachek and Xiang show that increasing the value of trade monotonically decreases the probability of war. To see this, note that only one of two offers can be made in equilibrium: $p_B - c_B - \tau_B$ and $p_B - c'_B - \tau_B$.[30] If A makes the first proposal, both types will accept—buying off the low-cost type is sufficient to ensure that the high-cost type will accept as well.[31] If A makes the second proposal, the high-cost type accepts but the low-cost type declares war.

All told, A's utility for the first offer is:

[29] We use a discrete, two-type model to explain both their results and the results of our model because they are more transparent. Polachek and Xiang use a continuous type model in their paper.

[30] This follows for the standard reasons. If A makes an offer that neither type would accept, it could profitably deviate to making peace for a low amount with at least one of the types. If the offer exceeds $p_B - c_B - \tau_B$, A could reduce that offer by a small amount so that both types will still accept but A can keep more of the good. And if the offer is strictly between $p_B - c_B - \tau_B$ and $p_B - c'_B - \tau_B$, and can reduce the offer by a small amount to still ensure that the high cost type will accept, again allowing A to keep more of the good.

[31] We assume here that a type will accept when indifferent between that and rejecting. That said, in the appendix, we explain that no equilibria exist in which a type of B rejects when indifferent.

$$1 - (p_B - c_B - \tau_B)$$

And A's utility for the second offer is:

$$q[1 - (p_B - c_B - \tau_B)] + (1 - q)(1 - p_B - c_A - \tau_A)$$

State A therefore prefers making the riskier offer if:

$$q[1 - (p_B - c_B - \tau_B)] + (1 - q)(1 - p_B - c_A - \tau_A) > 1 - (p_B - c_B - \tau_B)$$
$$q > \frac{c_A + \tau_A + c_B + \tau_B}{c_A + \tau_A + c'_B + \tau_B}$$

Note that increasing the value of the trade flow in this example leads to a monotonic decrease in conflict as Polachek and Xiang argue. This is because inflating τ_A or τ_B pushes the fraction closer to 1. If τ_A is large enough, then it will exceed the 0-to-1 constrained q. Intuitively, increasing the opportunity costs for war forces A to be more sure that it is facing the high-cost type to make the risky offer.

8.2 Preventive War

Consider the basic preventive war commitment problem model with two states, A and B, bargaining over two periods. In the first period, the players bargain over a good valued at 1; in the second period, they bargain over a good valued at $\delta > 0$, where δ reflects the common evaluation of present payoffs versus future payoffs. If the states fight in period 1, A and B lock in respective shares of $1-p_B-c_A$ and p_B-c_B for each period, netting respective overall payoffs of $(1+\delta)(1-p_B-c_A)$ and $(1+\delta)(p_B-c_B)$, where $p_B \in [0,1)$ and $c_A, c_B > 0$. Let x represent B's share of a deal in the first period and y represent B's share in the second. If they reach an agreement in both periods, they receive respective peaceful payoffs $x + \delta y$ and $1 - x + \delta(1-y)$. Finally, if they reach an agreement in the first period but not the second, state B's power increases to $p'_B \in (p_B, 1]$ to reflect its newfound power. Thus, overall respective payoffs equal $1 - x + \delta(1 - p'_B - c_A)$ and $x + \delta(p'_B - c_B)$.

For peace to prevail in the second period, note that B must receive at least its war value of $p'_B - c_B$; all other accrued payoffs are sunk, and thus B has a strict preference to fight if it receives any less than that amount. Consequently, A's choice whether to strike a deal in the first period weighs locking in a share of the good commensurate with B's lower power level versus avoiding spoiling the costs of war. In fact, for non-corner cases, even if A can capture the entire good for the first period, A would still prefer to fight if:

$$(1+\delta)(1-p_B-c_A) > 1+\delta(1-p_B'+c_B)$$

In other words, war is inevitable if A's pre-shift war payoff is greater than the payoff of taking everything in the first period plus the value of the maximal demand B will accept in the second period.

Note that increasing either side's cost of war monotonically increases the difficulty of having this constraint hold. That is, increasing c_A decreases the left side, making it more difficult for it to be greater than the right side. Meanwhile, increasing c_B increases the right side, making it more difficult for it to be less than the left side. Thus, *any* increase to the cost of war—regardless of the extent or the relative changes—decreases A's preventive war motive and increases the probability of peace.

8.3 Uncertainty about Probability of Victory

We extend a similar logic when A faces uncertainty about B's probability of victory in war. Suppose Nature begins an interaction by drawing B's probability of victory as p_B with probability q and p_B' with probability $1-q$. B sees the draw, but A only knows the common prior distribution. A then makes a take-it-or-leave-it offer $x \in [0,1]$ which B accepts or rejects. Accepting locks in the settlement, whereas rejection leads to the war payoffs $1-p_B-c_A$ and p_B-c_B if B is the weaker type and $1-p_B'-c_A$ and $p_B'-c_B$ if B is the stronger type.

Clearly, A should propose a settlement that has some probability of acceptance. It also should not propose anything strictly greater than the strong type's payoff or anything strictly between the strong type and weak type's payoff, as such offers provide needless concessions. Thus, for non-corner cases, A should either propose $x = p_B' - c_B$ to buy off both types or $x = p_B - c_B$ to extract more out of the weaker type but provoke war against the stronger type. This is a classic "risk-return tradeoff" (Powell 1999); A's best move depends on whether the weak type is sufficiently likely to justify paying the costs of war in the event that the strong type rejects. Despite the risk entailed, note that A prefers making the aggressive demand if:

$$q(1-p_B+c_B)+(1-q)(1-p_B'-c_A) > 1-p_B'+c_B$$

$$q > \frac{c_A+c_B}{p_B'-p_B+c_A+c_B}$$

Once again, increasing either player's cost of war monotonically decreases the probability of conflict. This is because making c_A or c_B larger pushes the right-hand side closer to 1. In turn, eventually the fraction will exceed q, which is a probability bound between 0 and 1.

8.4 Uncertainty over Value with Endogenous Armaments

We now blend two different sources of uncertainty: uncertainty over value (as in the main model) and second-order uncertainty over the probability of victory due to endogenous armaments. The game begins with Nature choosing a value V for B with probability q and V' with probability $1-q$. State A then makes an offer x, which B accepts or rejects. Accepting implements the agreement, while rejecting means that B must decide on a level of armaments. Specifically, it chooses $m_B \geq 0$. Nature awards the prize to A with probability $\frac{m_A}{m_A+m_B}$ and to B with complementary probability, where $m_A > 0$ is A's (exogenous) level of armaments.[32] A's overall payoff is therefore $\frac{m_A}{m_A+m_B} - c_A - \alpha\tau_A$, while the low type's is $V\left(\frac{m_B}{m_A+m_B}\right) - m_B - c_B - \alpha\tau_B$ and the high type's is $V'\left(\frac{m_B}{m_A+m_B}\right) - m_B - c_B - \alpha\tau_B$, where the $-m_B$ term reflects B's costs to develop that level of armaments.

We proceed with backward induction, focusing on the interior solution and beginning with B's armament decision. The first order condition of the low type's objective function with respect to m_B is:

$$V\left(\frac{m_A + m_B - m_B}{(m_A+m_B)^2}\right) - 1 = 0$$

$$m_B^2 + 2m_Am_B + m_A^2 - Vm_A = 0$$

The quadratic equation produces a unique positive root:

$$\frac{-2m_A + \sqrt{4m_A^2 - 4m_A^2 + 4Vm_A}}{2}$$

$$\sqrt{Vm_A} - m_A$$

Analogously, the high type's equilibrium armament is $\sqrt{V'm_A} - m_A$. Note that these differing armament decisions give A second-order uncertainty over its probability of victory. That is, the high type produces higher levels than the low type. Consequently, if A fights a war, it might not know how much it expects to receive from fighting.

Now consider B's accept/reject decision. Placing the optimal level of armaments back

[32]Thus, B's probability of victory is increasing in m_B, while A's probability of victory is decreasing.

into B's utility function, the low value type earns the following if it rejects:

$$\frac{\sqrt{Vm_A}-m_A}{m_A+\sqrt{Vm_A}-m_A}-\sqrt{Vm_A}-m_A-c_B-\alpha\tau_B$$
$$(\sqrt{V}-\sqrt{m_A})^2-c_B-\alpha\tau_B$$

If the low type accepts an offer, it receives Vx. Therefore, it is willing to accept if:

$$Vx \geq (\sqrt{V}-\sqrt{m_A})^2-c_B-\alpha\tau_B$$
$$x \geq 1-\frac{2\sqrt{m_A}}{\sqrt{V}}+\frac{m_A-c_B-\alpha\tau_B}{V}$$

Analogously, the high type is willing to accept if:

$$x \geq 1-\frac{2\sqrt{m_A}}{\sqrt{V'}}+\frac{m_A-c_B-\alpha\tau_B}{V'}$$

Now consider A's offer. For the standard reasons, only two offers can be a part of an equilibrium: $1-\frac{2\sqrt{m_A}}{\sqrt{V}}+\frac{m_A-c_B-\alpha\tau_B}{V}$ (just enough for the low type to accept) and $x \geq 1-\frac{2\sqrt{m_A}}{\sqrt{V'}}+\frac{m_A-c_B-\alpha\tau_B}{V'}$ (just enough for the high type to accept, which is also sufficient for the low type to accept). Offering the smaller amount is preferable for A if:

$$\frac{2\sqrt{m_A}}{\sqrt{V'}}-\frac{m_A-c_B-\alpha\tau_B}{V'} > q\left(\frac{2\sqrt{m_A}}{\sqrt{V}}-\frac{m_A-c_B-\alpha\tau_B}{V}\right)+(1-q)\left(\sqrt{\frac{m_A}{V}}-c_A-\alpha\tau_A\right)$$

$$q > \frac{\frac{2\sqrt{m_A}}{\sqrt{V'}}+\frac{c_B+\alpha\tau_B-m_A}{V'}-\frac{\sqrt{m_A}}{\sqrt{V'}}+c_A+\alpha\tau_A}{\frac{2\sqrt{m_A}}{\sqrt{V}}+\frac{c_B+\alpha\tau_B-m_A}{V}-\frac{\sqrt{m_A}}{\sqrt{V'}}+c_A+\alpha\tau_A}$$

The question is whether this value can be decreasing in α; if it is, the range of parameter values for which war occurs with positive probability increase. Taking the first derivative and solving for τ_B yields:

$$\tau_B > \frac{\frac{\frac{2\sqrt{m_A}}{\sqrt{V'}}-\sqrt{\frac{m_A}{V'}}+c_A}{V}-\frac{\frac{2\sqrt{m_A}}{\sqrt{V}}-\sqrt{\frac{m_A}{V'}}+c_A}{V'}}{\frac{2\sqrt{m_A}}{\sqrt{V}}+\frac{c_B-m_A}{V}-\frac{2\sqrt{m_A}}{\sqrt{V'}}+\frac{c_B-m_A}{V'}}$$

This holds for sufficiently high τ_B. The critical difference between this and uncertainty over value without endogenous armaments is that the probability of victory depends on the specific value. The extra terms (involving p_B) that had previously canceled out do not do so here as a result, leading to the murkier cutpoint. Nevertheless, the intuition remains the same: if τ_B is sufficiently large, the difference between the potential offers grows, incentivizing state A to screen the types with the small offer.

9 References

Anderson, David A. and Isabel Geiger. 2010. "Sino-Indian Trade Relations and the Ongoing Border Dispute." *The China and Eurasia Forum Quarterly* 8 (4): 125-141.

Arena, Philip. 2013. "Costly Signaling, Resolve, and Martial Effectiveness." Manuscript, University of Buffalo.

Arena, Philip and Anna Pechenkina. 2015. "External Subsidies and Lasting Peace." *Journal of Conflict Resolution*. 60 (7): 1278-1311.

Barbieri, Katherine, Omar M. G. Keshk, and Brian Pollins. 2009. "Trading Data: Evaluating our Assumptions and Coding Rules" *Conflict Management and Peace Science*. 26 (5): 471-491.

Beck, Nathaniel and Matthew Baum. 2000. "Trade and Conflict in the Cold War Era: An Empirical Analysis Using Directed Dyads." Paper presented at the Workshop on Trade and Conflict of the 2000 ECPR Joint Workshops, Copenhagen, Denmark. `https://www.hks.harvard.edu/fs/mbaum/documents/Beck_and_Baum_2000.pdf`

Blainey, Geoffrey. 1988. *Causes of War.* New York: Simon and Schuster.

Copeland, Dale C. 1996. "Economic Interdependence and War: A Theory of Trade Expectations." *International Security* 20 (4): 5-41.

Dal Bó, Ernesto and Robert Powell. 2009. "A Model of Spoils Politics." *American Journal of Political Science* 53 (1): 207-222.

Fearon, James D. 1994. "Domestic Political Audiences and the Escalation of International Disputes." *American Political Science Review* 88 (3): 577-592.

Fearon, James D. 1995. "Rationalist Explanations for War." *International Organization* 49 (3): 379-414.

Fearon, James D. 1997. "Signaling Foreign Policy Interests: Tying Hands versus Sinking Costs." *Journal of Conflict Resolution* 41 (1): 68-90.

Fey, Mark and Kristopher W. Ramsay. 2011. "Uncertainty and Incentives in Crisis Bargaining: Game-Free Analysis of International Conflict." *American Journal of Political*

Science 55 (1): 149-169.

Frieden, Jeffry A., David A. Lake, and Kenneth A. Schultz. 2013. *Interests, Interactions, Institutions: World Politics, Second Edition.* New York: W.W. Norton.

Gartzke, Erik. 2007. "The Capitalist Peace." *American Journal of Political Science* 51 (1): 166-191.

Gartzke, Erik, Quan Li, and Charles Boehmer. 2001. "Investing in the Peace: Economic Interdependence and International Conflict." *International Organization* 55 (2): 391-438.

Gartzke, Erik and Yonatan Lupu. 2012. "Trading on Preconceptions: Why World War I Was Not a Failure of Economic Interdependence." *International Security* 36 (4): 115-150.

Gilpin, Robert. 1983. *War and Change in World Politics.* Cambridge: Cambridge University Press.

Gowa, Joanne and Raymond Hicks. 2015. "Commerce and Conflict: New Data about the Great War." *British Journal of Political Science.*

Hirschman, A. O. 1977. *The Passions and the Interests: Political Arguments for Capitalism Before Its Triumph.* Princeton: Princeton University Press.

Hoffman, Steven A. 1990. *India and the China Crisis.* Berkeley: The University of California Press.

Huth, Paul. 2009. *Standing Your Ground: Territorial Disputes and International Conflict.* University of Michigan Press.

Jetly, Nancy. 1979. *India-China Relations, 1947-1977: A Study of Parliament's Role in the Making of Foreign Policy.* New Delhi: Radiant Publishers.

Keohane, Robert Owen and Joseph S. Nye. 1977. *Power and Interdependence: World Politics in Transition.* Boston: Little, Brown.

Kertzer, Josh. 2016. *Resolve in International Politics.* Princeton: Princeton University Press.

Maxwell, Neville. 1970. *India's China War.* New York: Pantheon Books.

Mearsheimer, John J. 1984. "Nuclear Weapons and Deterrence in Europe." *International Security* 9 (3): 19-46.

Morgenthau, Hans. 1961. *Politics among Nations: The Struggle for Peace and Power.* New York: Knopf.

Morrow, James D. 1989. "Capabilities, Uncertainty, and Resolve: A Limited Information Model of Crisis Bargaining." *American Journal of Political Science* 33 (4): 941-972.

Morrow, James D. 1994. "Alliances, Credibility, and Peacetime Costs?" *Journal of Peace Research* 36 (4): 481-489.

Morrow, James D. 1999. "How Could Trade Affect Conflict?" *Journal of Conflict Research* 38 (2): 270-297.

Mueller, John. 1989. *Retreat from Doomsday: The Obsolescence of Major War.* New York: Basic Books.

"Nehru Reaffirms Border With Tibet," New York Times, Nov. 20, 1950.

Nehru, Jawaharlal. 2001a. *Selected Works of Jawaharlal Nehru. Vol. 51.* Cambridge: Oxford University Press.

Nehru, Jawaharlal. 2001b. *Selected Works of Jawaharlal Nehru. Vol. 52.* Cambridge: Oxford University Press.

India Ministry of External Affairs. 1959. *Notes, Memoranda and Letters Exchanged and Agreements Signed Between the Governments of India and China, 1954-1959.* Ministry of External Affairs.

Oneal, John R. and Bruce M. Russett. 2001. *Triangulating Peace: Democracy, Interdepenedence, and International Organizations.* New York: W. W. Norton.

Patterson, George N. 1963. *Peking versus Delhi.* London: Faber and Faber.

Polachek, Solomon. 1980. "Conflict and Trade." *Journal of Conflict Resolution* 24 (1): 55-78.

Polachek, Solomon, Carlos Seiglie, and Jun Xiang. 2007. "The impact of foreign direct investment on international conflict." *Defence and Peace Economics* 18(5): 415-429.

Polachek, Solomon and Jun Xiang. 2010. "How Opportunity Costs Decrease the Probability of War in an Incomplete Information Game." *International Organization* 64(1): 133-144.

Powell, Robert. 1999. *In the Shadow of Power: States and Strategies in International*

Politics. Princeton: Princeton University Press.

Powell, Robert. 2004. "Bargaining and Learning While Fighting." *American Journal of Political Science* 48 (2): 344-361.

Reed, William. 2003. "Information, Power, and War." *American Political Science Review.* 97 (4): 633-641.

Rusko, Christopher J. and Karthika Sasikumar. 2007. "India and China: From Trade to Peace?" *Asian Perspective* 31 (4): 99-123.

Sandhu, Bhim. 2008. "Sino-Indian Relations, 1947 to Present: From Conflict to Cooperation." *International Journal of South Asian Studies* 1 (1): 24.

Simmons, Beth. 2005. Rules over real estate trade, territorial conflict, and international borders as institution. *Journal of Conflict Resolution*, 49(6), 823-848.

Singh, Swaran. 2005. "China-India Bilateral Trade: Strong Fundamentals, Bright Future." *China Perspectives* 62.

Slantchev, Branislav L. 2011. *Military Threats: The Costs of Coercion and the Price of Peace.* Cambridge: Cambridge University Press.

Spaniel, William and Peter Bils. 2017. "Slow to Learn: Bargaining, Uncertainty, and the Calculus of Conquest." *Journal of Conflict Resolution* 62 (4): 774-796.

Waltz, Kenneth N. 1988. "The Origins of War in Neorealist Theory." *Journal of Interdisciplinary History* 18 (4): 615-628.

Whiting, Allen S. 1975. *The Chinese Calculus of Deterrence.* Ann Arbor: University of Michigan Press.

Wolford, Scott. 2007. "The Turnover Trap: New Leaders, Reputation, and International Conflict." *American Journal of Political Science* 51 (4): 772-788.