The Relevance of Bargaining in International Politics

Power, Proximity, and Uncertainty in Interstate Conflict*

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Abstract

Bargaining theory offers a compelling logic of the causes of war and peace, but the perspective has proven remarkably resistant to empirical assessment. There is also considerable ambiguity about the conditions under which novel predictions of bargaining theory matter substantively, and where the insights of other perspectives are at least as valid. I use interactions among three major bodies of "rationalist" theory to identify unique empirical implications and scope conditions for the bargaining perspective. Bargaining and the realist perspective emphasize, respectively, uncertainty and relative capabilities as predictors of war, while neither pays much attention to the impact of distance on their respective causal arguments. Political geography introduces the notion of the loss-of-strength gradient (among other insights), while failing to incorporate the effects of relative power and information asymmetry. A simple bargaining model illustrates how capabilities, proximity and uncertainty interact to affect conflict. I then provide evidence of an interaction between capabilities and distance predicted by the bargaining model. Weak states seldom fight far from home, while conflict increases with distance for the most capable countries. Capabilities have limited salience for conflict beyond mitigating distance.

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1 Introduction

Students of inter- and intra-national conflict have increasingly turned to bargaining theories to account for political violence (c.f., Fearon 1994a; Filson & Werner 2002, 2004; Powell 2004; Reed, et al. 2008; Slantchev 2003, 2005, 2010; Smith and Stam 2004; Wagner 2000; Walter 2001, 2003).[1] Most disagreements between individuals, groups or nations should be resolvable short of force, provided that fighting is costly and opponents are able to identify and maintain appropriate agreements. The causes of war thus reside in whatever prevents successful bargains (Morrow 1989; Fearon 1995).

The bargaining approach is popular largely due to logical coherence, not because of empirical validity. Indeed, bargaining theories have proven extremely difficult to test (Schultz 2001). While bodies of thinking may be widely ascribed to without much evidence, there are certainly reasons to prefer explanations whose predictions have been verified empirically. Falsifiability is a basic requirement of scientific research. By some definitions, a theory is not a theory unless it is testable. Hair splitting about whether a perspective makes testable predictions that are not "yet" amenable to empirical testing with current data and methods does little to remedy the basic problem. Evidence is also needed to adjudicate evolving theoretical debates and guide the development of new theory.

One approach to identifying observable correlates of bargaining theory is to look for ways in which the predictions of bargaining theories interact with, or are contingent on, other determinants of conflict. This approach also has the advantage of helping to delineate scope conditions for respective theories. Since bargaining failures are necessary but not sufficient to predict costly contests, and since necessary conditions for conflict are sufficient conditions for the absence of conflict, it seems highly likely that the empirical impact of bargaining theories will ebb and flow with the relative importance of factors emphasized by *other* bodies of theory. It may be appropriate, interesting, and much more practical to ask where, rather than whether, bargaining matters most.

In the pages that follow, I seek to identify a major empirical domain of bargaining theories by contrasting predictions of bargaining failure with hypotheses drawn from two other "rationalist" perspectives on conflict. Realist theories emphasize the juxtaposition of power relations as an important determinant of whether nations or coalitions fight. While realists differ in their predictions

[1] See, Powell (2002) and Reiter (2003) for early reviews of this literature.

about how power relations influence conflict and peace, all agree that the relationship is non-linear, requiring assessment of the interaction of capabilities to determine which nations are most, and least, likely to fight. An important tradition in political geography, in contrast, emphasizes monotonic constraints on the ability of nations to project power. Fighting is harder far from home, leading to a so-called "loss-of-strength gradient" between distance and conflict (Boulding 1962).

In contrast to bargaining theory, these other two perspectives on conflict have been subjected to extensive empirical scrutiny. Yet, this research has yet to determine how key implications of more traditional perspectives interact empirically with bargaining theory. Explaining war and peace may have as much to do with determining how different perspectives interrelate as with refining each perspective independently. Neither bargaining nor realist balance of power perspectives make much effort to integrate geography into their basic theoretical frameworks. Geopolitics, in contrast, has little to say about how strategic interaction might condition the effects of proximity. Here, I focus on the relationship between two observable variables, distance and capabilities, and the impact this interaction has on the salience of international bargaining. For most pairs of states, proximity is the binding constraint; bargaining theory offers little in the way of unique insights for nations that a weak and geographically distant. For proximate and/or capable countries, however, the loss-of-strength gradient may be less salient than sources of increased uncertainty. Distance decreases capability and adds ambiguity, causing states to vary their dispute propensity in a complex manner.

After a discussion and comparison of existing literatures on capabilities and conflict, I modify a simple formal model of interstate bargaining to incorporate relevant effects of geography. The model reveals a curvilinear relationship between power, proximity and the probability of disputes. Increased uncertainty about the intentions of powerful states leads to a reverse of the familiar loss-of-strength gradient, with the most capable countries fighting more frequently with *distant* adversaries. Power is largely irrelevant for the conflict propensity of neighbors. For all but the most powerful states, nations in close proximity fight or not with substantially the same frequency. In contrast, the conflict behavior of distant nations is highly dependent on power relations, but here it is opportunity, or uncertainty, more than relative power, that explains the impact of capabilities on interstate conflict. The study provides a series of empirical tests to substantiate these claims.

2 (Almost) Everyone Likes a Good Bargain

Harold Lasswell famously defined politics as "who gets what, when, and how." However, students of international politics have shown less interest in "who gets what" than with questions of "how." In the perennial comparison of means and ends, international security fixates on the former to the decided detriment of the latter. Warfare is studied less as a method of achieving certain political objectives as Clausewitz famously advised, than as an outcome to be understood in its own right.

Realists in particular associate different distributions of capabilities with interstate conflict. Structural realists argue that local, regional, or systemic (major power) parity translates into more stable interstate relationships, since rough parity ensures that states are maximally uncertain about which side will win a contest (Waltz 1979).[2] Other realists view disparity, preponderance, or hegemony as doing more to stabilize world affairs (Organski 1958; Organski and Kugler 1980; Gilpin 1981; Blainey 1973). Imbalances minimize uncertainty about the likely victor (assuming competitors are equally resolved), making the weaker party more docile. Still others argue that multipolarity is more stable than bipolarity, as nations face the prospect that enemy coalitions formed or revealed in wartime will dominate their own capabilities (Deutsch and Singer 1964).[3]

Realist theories have plenty of detractors. Liberals argue that realists underestimate the prevalence of cooperation under anarchy (Axelrod 1984; Moravcsik 1997), and are excessively pessimistic about the ability of international institutions to rein in externalities (Keohane 1986, 1998; Oye 1985). Constructivists claim that realists discount the role of community (Ruggie 1998; Barnett and Duvall 2005), or that realists ignore the social-transformative effects of ideas and identities (Wendt 1999). Rational theorists dispute the deductive rigor of realist claims (Niou and Ordeshook 1986, 1994; Niou, et al. 1989), while empirical challenges abound (Bueno de Mesquita and Lalman

[2]It is often argued that structural realism is a "systemic theory" that must be studied and tested at the system level. This is simply not correct. Like all realists, Waltz emphasizes the atomistic behavior of egoists operating under anarchy. "A balance-of-power theory, properly stated, begins with assumptions about states" (Waltz 1979, page 118). System structure evolves up from individual units (states) only because the units are enmeshed in *pre-existing* dyadic power relations. To form blocs (poles), states must be motivated by the local balance of power. "Balance-of-power theory is microtheory precisely in the economist's sense. The system, like a market in economics, is made by the actions and interactions of its units, and the theory is based on assumptions about their behavior" (1979, page 118). Structural realism offers unit-level and dyadic predictions that are themselves testable implications of the theory.

[3]Contrasting claims about polarity could result from different assumptions about risk (Bueno de Mesquita 1981).

1988, 1992; Bueno de Mesquita 2003; Huth, et al. 1993; Stam and Reiter 1998; Schroeder 1994).[4]

Given the scope and intensity of criticism, it is surprising that attacks are seldom aimed at the bedrock realist assertion of an association between capabilities and conflict. Indeed, critics frequently turn to realist arguments to explain why states do occasionally fight. Opponents resort to incremental ("capabilities don't matter as much"), or inclusionist ("other variables also matter") arguments in attempting to counter realist assertions of the centrality of power.[5] Much less attention has been devoted to questioning the basic premise that conflict, whether ubiquitous as realists claim or exceptional as critics charge, is a creature of relative power. This consensus is doubly surprising considering that the association between capabilities and conflict is far from established.

Over the years, scholars have posited just about every possible relationship between capabilities and conflict, with the possible exception of no relationship at all. Parity is said to be dangerous (Moul 2003; Lemke and Werner 1996; Reed 2003), but so is disparity (Siverson and Tennefoss 1984; Mansfield 1992). A balance of capabilities is argued to be better than an imbalance, except for those who believe that preponderance leads to peace. Unipolarity, bipolarity, and multipolarity all have champions and critics. The diversity of these claims alone suggest the need for some caution, and the possibility that existing theoretical alternatives are incomplete. What might be missing?

It is widely recognized that structural realist approaches lack a theory of "normal" war. Conflict is said to result from changes in system structure that are themselves slow to materialize. It is less well understood that these theories remain problematic in their chosen domain. By specifying constraints or opportunities, balance of power arguments offer a logic of motives not synonymous with a logic of outcomes. The story line from an episode of the animated television series *South Park* will illustrate the basic problem. In "Gnomes (Underpants Gnomes)" [episode # 217], a gang of gremlins are busily engaged in appropriating childrens' undergarments. The gnomes have the following business model: 1.) Collect underpants. 2.) ??? 3.) Profit! Of course, the flaw in their plan, as even the children quickly recognize, is that there is no second step. The gnomes have failed to identify how second hand underwear generates revenue. They have simply assumed that profits

[4] Clarke (2001) re-estimates Huth et al. (1993) and Stam and Reiter (1998) using strategic nonnested models.

[5] Even the "lawlike" democratic peace observation is characterized by proponents as adjunct to power politics. "Of course, realist principles still dominate interstate relations between many states" Oneal, et al. (2003, page 389).

attend used underpants. Presumably, the garments must be sold, but to whom, for what, and how?

Blainey (1973) was among the first to address the problem of the missing middle step. Whatever causes conflict must typically be resolved by fighting in order for a contest to end. Blainey rejects the idea that power relations first foment, and later remove, the need for force. If, for example, preponderance sparks a contest, then fighting must produce parity for fighting to abate. Conversely, wars precipitated by parity generally require disparity to conclude. Blainey argues that conflict must instead be caused by uncertainty about power relations, rather than the relations themselves. War is a ruthless teacher. Misperceptions are remedied as fighting reveals actual capabilities. Force comes full circle as combatants agree about the likely consequences of continued fighting. Indeed, to the degree that actors agree about relative power in peacetime, the exercise of force becomes redundant. Variation in perceptions about power, rather than actual power, resolves the duality.

Fearon (1995) extends Blainey's insights, reformulating them within a rationalist theoretical framework, and providing a more comprehensive logical typology of the causes of war. According to Fearon, three mechanisms exist that can make countries choose force. Briefly, nations can clash when they are uncertain about the probability of victory, or when influence cannot be exercised through peaceful means due to indivisibilities or commitment problems. Leaders need not be deluded about an opponent's weaknesses, or irrationally optimistic about their own martial potency. They need simply err or be misinformed. It is not power relations, *per se*, that are the cause of war, but what nations know, or don't know about relative power that is responsible for contests.

The most distinctive implications of the bargaining approach are both profound and extremely difficult to identify empirically. It is problematic, perhaps impossible, for researchers to observe the effects of bargaining in existing data (Schultz 2001). Scholars have sought to isolate relationships indicative of signaling (Fearon 1994; Schultz 1998; Partell and Palmer 1999) — itself indicative of bargaining behavior — but this evidence is circumstantial and contested (Downes and Sechser 2010). Others focus on the relationship between power and the distribution of resources (Powell 1999; Reed, et al. 2008). Despite these and other studies, bargaining theories continue to rest heavily on logical plausibility and lightly on actual empirical content. To begin to confirm the theory and refine its arguments, researchers will need to unearth novel, testable implications of the bargaining approach.

3 Beam me Up, Scotty

If bargaining theories offer deductive advantages, and possibly empirical deficiencies, in addressing the missing link between motive/opportunity and the method for conflict, bargaining theory unites with realism and other mainstream approaches in a somewhat surprising indifference to geography.[6] Place is perhaps less interesting to students of politics than questions of agency or structure. Yet, geography clearly determines which enemies a nation can confront easily, and which are difficult to reach. Proximity may also affect affinities and animosities. However, precisely because distance is not pliable, geography has special salience for bargaining theories of war. Geography conditions where bargaining failures are likely to lead to war, and where material factors, such as capabilities, are probably more salient. This contingency in turn offers an avenue for testing bargaining theories.

In the original television series *Star Trek*, the five year mission of the starship *Enterprise* to explore strange new worlds placed Captain James T. Kirk and his crew in serial jeopardy. Each episode, Kirk would call for "more power, Scotty," only to be told that the capabilities of the *Enterprise* were at their limits. Sometimes, power involved inflicting or defending against harm (shields, phasers, photon torpedoes). On other occasions, Scotty's warp drives overcame the vast distances of space. These two uses of power differ in ways that are relevant to theories of conflict.

To the degree that competition is zero sum, variables such as power or capabilities that strengthen (weaken) a given actor have the converse effect on opponents. A country is only more powerful in relation to another nation that is by the same token less powerful. If one country becomes less capable, this need not alter the likelihood of a contest by much if weakness invites aggression from opponents. Conversely, increasing a nation's capabilities may diminish the prospect that the country will be attacked, but only by increasing the ability for the newly capable country to act aggressively. Conflict can be avoided if strength is combined with a lack of interest in altering the status quo, but peace then relies on factors beyond mere material power (Slantchev 2005).

Distance or proximity are not zero sum; geographical conditions that make it harder for one country to assail another also make it harder for the second country to attack the first. It is not clear how, for example, one nation could be proximate to an adversary, while the adversary is at the

[6] Exceptions abound. Classics include Mahan (1915; 1987[1890]), Mackinder (1962[1919]), Spykman (1942; 1944).

same time far from the first nation. The non-zero sum nature of changes in proximity mean that distance can have a considerable effect on the probability of warfare, at least when both nations are weak. This distinction helps to explain why geography can discourage conflict more effectively than power relations. Neighboring nations may be willing and able to fight each other, but as the distance between states increases, *both nations* eventually prefer to refrain from initiating a dispute.

If space proves more peaceful than most episodes of *Star Trek*, it will doubtless be because there is so much of it. Habitable planets are separated by vast distances that must keep interplanetary contact, let alone conflict, to a minimum. To induce disputes, the writers of *Star Trek* were forced to fudge their physics and to fill space with an absurd density of sentient beings. Episodes in which the crew of the *Enterprise* sat idly as the starship traversed endless galactic nothingness would not sell dishwasher detergent. Terrestrial conflict differs because populations are packed together.

The concept of a loss-of-strength gradient (Boulding 1962), captures the variable impact of capabilities across space. Boulding's framework implies that the capabilities of dyads must vary with the distance between member states. If comparably capable countries are far apart, then for A to attack B, A must accept a significant *inferiority* in terms of what it can actually bring to bear on its opponent. Similarly, B will be weak relative to A if B attacks A on A's territory. In effect, distance has taken a dyad in which states are roughly equally matched and has created two directed dyads, each of which contains a potential attacker that is weak relative to its target. If instead A or B is materially stronger than its opponent, physical distance can create conditions *equivalent to parity*, assuming an appropriate gradient for the stronger state's loss-of-strength.

Bargaining theories face an analogous, if different, confrontation with geography. While at least one of Fearon's (1995) trio of causes may be required for war to occur, it does not follow that any are sufficient. Nations that are weak and/or physically distant from each other are unlikely to go to war, regardless of whether either faces strategic uncertainty, indivisibilities, or commitment. More generally, the effect of the loss-of-strength gradient is to prevent contests among states with weak or modest power projection capabilities, regardless of other motives to use force. Only when (and where) nations can credibly claim to project power is Fearon's typology likely to prove relevant.

Bargaining theories are most likely to prove empirically informative in relationships involving neighbors or capable countries.[7] In particular, integrating geography into bargaining theory suggests that Boulding's prediction about conflict decreasing with distance is correct, but incomplete. As the loss-of-strength gradient interacts with Fearon's three causes in explaining war, the probability of conflict could become flat or even *increase* with distance for the most capable countries.

In bargaining theory, competitors seek to divide up disputed stakes to find mutually acceptable bargains. Changes in conditions affecting the appeal of fighting translate into different compromises, represented by "interior solutions" to a bargaining game. Different bargains absorb at least some of the effect of varying capabilities, diminishing the apparent connection between power relations and the probability of a contest (Powell 1999). Disputes ensue because some types of competitors are able to bluff about their unwillingness to accept compromise bargains. States in competition know that some opponents will be tempted to bluff, but they are uncertain prior to a contest whether a particular opponent is resolved enough to fight or if that opponent is seeking advantage by bluffing.

Yet, the ability to bargain and to bluff depends on there being additional concessions an opponent can make. If one side in a conflict has already conceded all of the stakes, then there is no point in raising demands or bluffing. Normally, willingness to fight can be converted into a better bargain, but in a "corner solution," the capable side has already reached the boundary representing the entirety of the stakes. If even the least resolved or capable type of opponent is strong enough or capable enough to demand, and receive, everything under dispute, then further advantages for the capable side cannot be used to pursue additional concessions, since everything has already been conceded. Instead, preponderance is translated into a reduction in uncertainty about acceptable bargains. Contests become relatively less frequent as each side can bargain more effectively.

Under these conditions, strategic uncertainty is largely irrelevant, since it cannot result in different bargains. Powerful states get what they want without having to fight and conversely cannot get much more from fighting. Targets recognize that accommodating even the least resolved powerful opponent is preferred to a contest, since preponderance and the boundedness of the stakes trumps the usual willingness of competitors to accept some risk of war in return for better bargains.

Distance weakens effective capabilities, but the combination of geography and bargaining gen-

[7] The sample of dyads affected by bargaining problems is similar to the notion of "politically relevant dyads." Note, however, that here the conception of relevance is being generated theoretically, not simply as a sampling assumption.

erate different consequences for powerful states than for the less capable. For the powerful, interior solutions begin to emerge with the loss-of-strength gradient, as the decline in relative power creates opportunities for different bargains. Increasing the salience of uncertainty in turn raises the prospect of bargaining failures. Corner solutions are most likely to occur where power is most potent (i.e. capable states with proximate targets). This means that the risk of a contest actually contradicts the nominal effect of the loss-of-strength gradient. Since the capable can fight anywhere they like, the binding constraint for powerful states is uncertainty about where they have the will to fight. Close to home, uncertainty is minimized by several factors, including the prospect that high costs or low resolve are still sufficient to motivate warfare, given sufficient military advantages.

Weak states are less dispute prone with distance, both because of the loss-of-strength gradient, and because of the opposite corner solution. A weak challenger can prefer conceding all of the stakes, rather than fighting a losing and costly contest with a distant opponent. Uncertainty is not relevant because all types of weak challenger find a distant war unappealing. A target cannot prefer to refuse an offer in which the challenger concedes everything. Once a challenger prefers to concede, the probability of fighting cannot increase given the effect of the loss-of-strength gradient.

4 Bargaining Over Distance

To see why this is so, imagine a world with just two countries (A, B). Nature (N) first randomly assigns A as potential challenger $(i)$and B as target (j) with probability $Q\ (A \rightarrow i, B \rightarrow j)$. Assume for simplicity that $Q = 1 - Q$, where $1 - Q$ implies $(B \rightarrow i, A \rightarrow j)$. Since solutions in each case are symmetric, I focus on solving for equilibria and optimal strategies in terms of i and j.[8]

Players compete over some disputed goods or prerogatives, represented by an issue space of unit interval. Without loss of generality, I place player i's ideal point at zero, while j most prefers one. Players have linear loss utility functions. Each player has private information about its cost for fighting. Let types $(c_{(i,j)})$, be drawn randomly by N.[9] The distribution of types for each player

[8]A game in which players adopt roles endogenously is much more complex and adds little insight here. There are advantages to being able to make a proposal in the game, but there are few restrictions to making such an offer in international affairs (as opposed to proposal power in a legislative committee, say, or in a domestic referendum).

[9]One can also model the typespace in terms of the "slope" of players' utility for outcomes on the issue space.

is continuous and uniformly distributed over the interval $t_{(i,j)} \in [\bar{t}, 1]$, where $0 < \bar{t} < 1$.[10]

Assume that each state has some finite capability to harm its opponent. The distributional effect of a contest can be expressed in terms of the probability p that player i wins. Victory is some function of the capabilities (power) of combatants, plus other elements. Rather than assuming a particular formulation of the relationship between power and victory, I can treat p as a parameter. However, I also want to model the effects of proximity/distance on power and the probability of victory. Challengers suffer the loss of strength gradient because they must "take the fight to the enemy." Let p_0 equal the probability that i wins a contest against a contiguous opponent j. For more distant opponents, I assume that the loss of strength takes the following functional form:

$$p = \frac{p_0}{1 + \alpha k^{\beta}} \tag{1}$$

where p is the probability that player i wins at distance k from its home territory, and where α and β are positive parameters. While variables can take on any values, it is useful to assume that α is small ($\alpha < 0.001$), so that k can be measured in standard units, such as miles. Similarly, a value for $\beta < 1$ is consistent with a declining marginal impact for the gradient, as Boulding preferred.

The sequence of play is as follows: N assigns each player a type and a role (challenger i, or target j). For simplicity, I assume that the status quo point q is at j's ideal point ($q = 1$).[11] Assuming a status quo point in the interior implies that both states might be revisionist powers. This requires a more complex setup, while adding little to the intuition provided by the model.

After nature assigns players roles and types, the challenger decides what to offer the target (d, $0 \leq d \leq 1$). If j accepts d, the game ends with payoffs ($\frac{1-d}{t_i}$, $\frac{d}{t_j}$). If j refuses the demand, then i must decide whether to relent or fight j. If i does not fight, then the status quo is retained ($q = 1$). It is also possible that i incurs some reputational cost for failing to pursue its interests through force. Assume that i faces an "audience cost" equal to a, ($a \geq 0$) should it choose to back down.

If i chooses to fight, then i wins the entire stakes under dispute in the contest with probability p, and again the status quo is retained (i.e., i receives nothing) with probability $(1 - p)$. The

[10] The interval chosen is entirely arbitrary, but these results should generalize to any other choice of interval.

[11] q should be in the Pareto set $(0, 1)$, which also helps to explain why demands are bounded in the same interval.

probability of victory and payoffs for player j are just the converse. In either case, each player pays some price for fighting $c_{(i,j)}$, $c > 0$. I will relax the assumption later, but for now let us imagine that the costs of fighting are exogenous and fixed. Utility functions for each player appear below:

$$U_i = (1-r) * ((1-d)/t_i) + r * ((1-f) * (-a) + f * (p * (1/t_i) - c_i)) \tag{2}$$

$$U_j = (1-r) * (d/t_j) + r * ((1-f) * (1/t_j) + f * ((1-p) * (1/t_j) - c_j)) \tag{3}$$

where r is j's decision to accept ($r = 0$) or reject ($r = 1$) i's offer, and f is i's fight decision.

Substituting Eq 1 for p in Eq 2 and Eq 3 and simplifying the resulting equations produces:

$$U_i = \frac{(d-1)(r-1)}{t_i} + r\left(a(f-1) - c_i f + \frac{f p_0}{t_i(1+\alpha k^\beta)}\right) \tag{2a}$$

$$U_j = -\frac{d\left(1+\alpha k^\beta\right)(r-1) + r\left(f p_0 + c_j f t_j + \alpha k^\beta * (c_j f t_j - 1) - 1\right)}{t_j\left(1+\alpha k^\beta\right)} \tag{3a}$$

The game if solved using the Bayesian Perfect Equilibrium solution concept. Backward inducting, i must decide whether to fight. Define $t_i' \equiv \frac{-p_0}{(a-c_i)\left(1+\alpha k^\beta\right)}$ as the type i just indifferent between fighting and backing down. Types are in the denominator, so if $t_i \geq t_i'$, i backs down. Else, i fights.

Before i's fight decision, j must choose whether to accept or reject d. Player j first estimates the probability that i will choose to fight if j turns down i's offer. $Prob\,(f = 1|r = 1)$ simply equals the range of types i that prefer to fight in the next stage, $(\bar{t}_i - t')$, divided by the domain of types i, $(\bar{t}_i, 1)$. As with all probabilities, the fraction is bounded by the unit interval, $1 \geq \frac{(\bar{t}_i - t')}{(\bar{t}_i - 1)} \geq 0$. Substituting for f in j's utility function and taking the partial derivative with respect to r yields:

$$\begin{aligned}\frac{\partial U_j}{\partial r} &= \left(\frac{-1}{t_j\left(1+\alpha k^\beta\right)}\right)\Big\{d + \alpha k^\beta d - \Big[p_0^2 + \left(1+\alpha k^\beta\right) p_0 \left(\bar{t}_i (a-c_i) + c_j t_j\right) + (a-c_i) \\ &\quad \left(1+\alpha k^\beta\right)^2 \left(1 + \bar{t}_i (c_j t_j - 1)\right)\Big] / \Big[(a-c_i)\left(1+\alpha k^\beta\right)(1-\bar{t}_i)\Big]\Big\}\end{aligned} \tag{4}$$

Setting $\frac{\partial U_j}{\partial r} = 0$, solving for t_j and simplifying the resulting equation yields t_j', the type of player j that is just indifferent between accepting i's offer (d) and rejecting the offer:

$$t'_j \equiv \frac{(a-c_i)(d-1)\left(1+\alpha k^{\beta}\right)^2(1-\bar{t}_i)-(a-c_i)\left(1+\alpha k^{\beta}\right)p_0\bar{t}_i-p_0^2}{c_j\left(1+\alpha k^{\beta}\right)\left(p_0+(a-c_i)\left(1+\alpha k^{\beta}\right)\bar{t}_i\right)} \tag{5}$$

Player i can now use t'_j to estimate the probability that j will reject a given demand d as $Prob\,(r=1|d)=\frac{\bar{t}_j-t'_j}{\bar{t}_j-1}$. Again, $1 \geq Prob\,(r=1|d) \geq 0$. Substituting this probability for r in Eq 2a, i can determine its optimal offer. Taking the partial of i's utility function with respect to d, setting the result equal to zero, solving for d and simplifying produces $d^{\star}$, i's optimal offer:

$$\begin{aligned} d^{\star} \;=\; & \Bigg[c_j t_i\left(p_0+(a-c_i)\left(1+\alpha k^{beta}\right)\bar{t}_i\right)(1-\bar{t}_j)\Bigg(\frac{1}{t_i}+\frac{p_0^2}{c_j\left(1+\alpha k^{\beta}\right)t_i\left(p_0+(a-c_i)\left(1+\alpha k^{\beta}\right)\bar{t}_i\right)(1-\bar{t}_j)} \\ & +\frac{2(a-c_i)\left(1+\alpha k^{\beta}\right)(1-\bar{t}_i)}{c_j t_i\left(p_0+(a-c_i)\left(1+\alpha k^{\beta}\right)\bar{t}_i\right)(1-\bar{t}_j)}-\frac{(a-c_i)\left(1+\alpha k^{\beta}\right)\left(a(f-1)-c_i f+\frac{f p_0}{t_i+\alpha k^{\beta} t_i}\right)(1-\bar{t}_i)}{c_j\left(p_0+(a-c_i)\left(1+\alpha k^{\beta}\right)\bar{t}_i\right)(1-\bar{t}_j)} \\ & +\frac{(a-c_i)p_0\bar{t}_i}{c_j t_i\left(p_0+(a-c_i)\left(1+\alpha k^{\beta}\right)\bar{t}_i\right)(1-\bar{t}_j)}+\frac{\bar{t}_j}{t_i(1-\bar{t}_j)}\Bigg)\Bigg] \Big/ \left[2(a-c_i)\left(1+\alpha k^{beta}\right)(1-\bar{t}_i)\right] \end{aligned} \tag{6}$$

Substituting $d^{\star}$ back into t'_i and t'_j makes it possible to solve for $Prob\,(f=1|r=1)$ and $Prob\,(r=1|d)$ explicitly. The resulting equations are cumbersome, so I do not include them here. I next review the equilibria and players' optimal strategies and then provide a graphical representation of the probability of conflict in the game for values of the key parameters geographic distance (k) and capabilities (p_0). Player i's optimal demand ($d^{\star}$) equals Eq 6 if $1 \geq$ Eq $6 \geq 0$. Else, if Eq $6 < 0$, $d^{\star}=0$, and if Eq > 1, $d^{\star}=1$. Player j rejects $d^{\star}$ if $t_j < t'_j$. Else, j accepts $d^{\star}$, with payoffs $\left(\frac{1-d^{\star}}{t_i}, \frac{d^{\star}}{t_j}\right)$ for i and j respectively. If j does not accept $d^{\star}$, then i fights if $t_i < t'_i$, with expected payoffs $\frac{p}{t_i}-c_i$ and $\frac{1-p}{t_j}-c_i$. If instead, $t_i \geq t'_i$, then i incurs $-a$, while j receives $\frac{1}{t_j}$.

The probability of a costly contest between i and j is thus equal to the joint probability that both $t_j < t'_j$ and $t_i < t'_i$ (that j rejects $d^{\star}$ and that i chooses to fight). Label this probability $Prob\,(war)$. Eq 7 reports the partial derivative of $Prob\,(war)$ with respect to k, metric distance.

$$\frac{\partial Prob\,(war)}{\partial k} \;=\; \frac{\alpha\beta k^{\beta-1}p_0\left(-2p_0+\left(1+\alpha k^{\beta}\right)\left(-a(f(1-\bar{t}_i)+\bar{t}_i)+c_i(f+\bar{t}_i-f\bar{t}_i)+c_j(1-2\bar{t}_j)\right)\right)}{2(a-c_i)c_j\left(1+\alpha k^{\beta}\right)^3(1-\bar{t}_i)(1-\bar{t}_j)} \tag{7}$$

Setting Eq 7 equal to zero and solving for p_0 yields $\bar{p}_0$, such that the peace-producing effects of the loss-of-strength gradient and conflict-producing effects of interior solutions just cancel.

$$\bar{p}_0 = \frac{1}{2}\left(1+\alpha k^{\beta}\right)\left(-a\left(f\left(1-\bar{t}_i\right)+\bar{t}_i\right)+c_i\left(f+\bar{t}_i-f\bar{t}_i\right)+c_j\left(1-2\bar{t}_j\right)\right) \tag{8}$$

For challengers with capabilities less than $\bar{p}_0$, the probability of a contest is declining in k. For $p_0 > \bar{p}_0$, $Prob\,(war)$ is increasing in k. Empirically, the portion of challengers that experience a decline in conflict with distance, and the portion that experience an increase in conflict depends on the estimation of parameters of the model. Nevertheless, we can derive the following hypotheses.

Hypothesis 1 *States are generally less likely to experience contests with increasing distance.*

Hypothesis 2 *Powerful states are more likely to experience contests with increasing distance.*

Figure 1 plots $Prob\,(war)$ in terms of p_0 and k for a given set of values of relevant parameters.[12] The x axis details state i's contiguous capabilities or the probability of victory (p_0). The y axis measures distance. The maximum value of 12,500 roughly equals half the distance around the world at the equator, measured in miles. The vertical (z) axis reports the probability of fighting in the model. Note the complex surface created by the interaction of the three axes. $Prob\,(war)$ is increasing in distance for high values of p_0 and decreasing in k for most other values of the capability variable. State i is more likely to make an offer that j prefers to fighting if i is powerful and j is close geographically, or if i is weak and j is distant. Both Boulding's loss-of-strength gradient and what I will term an "increase-in-uncertainty gradient" are supported, under different conditions.

Hypothesis 2 is a novel implication of the model and of the joining of bargaining theory with political geography proposed here. While other research suggests that the loss-of-strength gradient may be diminished by power, time or technological innovation (Boulding 1978; Buhaug and Gleditsch 2006), no other theory predicts increased conflict with distance for powerful states.

At the same time, the effect of capabilities or the balance of power on conflict is muddy at best. First, as Figure 1 illustrates, $Prob\,(war)$ is monotonically increasing in p for distant states due both to the increase in uncertainty and to the fact that weak states are excluded by an inability to project

[12] Assumed values are as follows: $\bar{t}_i = \bar{t}_j = 0.001$, $\alpha = 0.001$, $\beta = 0.9$, $a = 0.05$, $c_i = c_j = 0.2$, $f = 1$, $t_i = 0.25$.

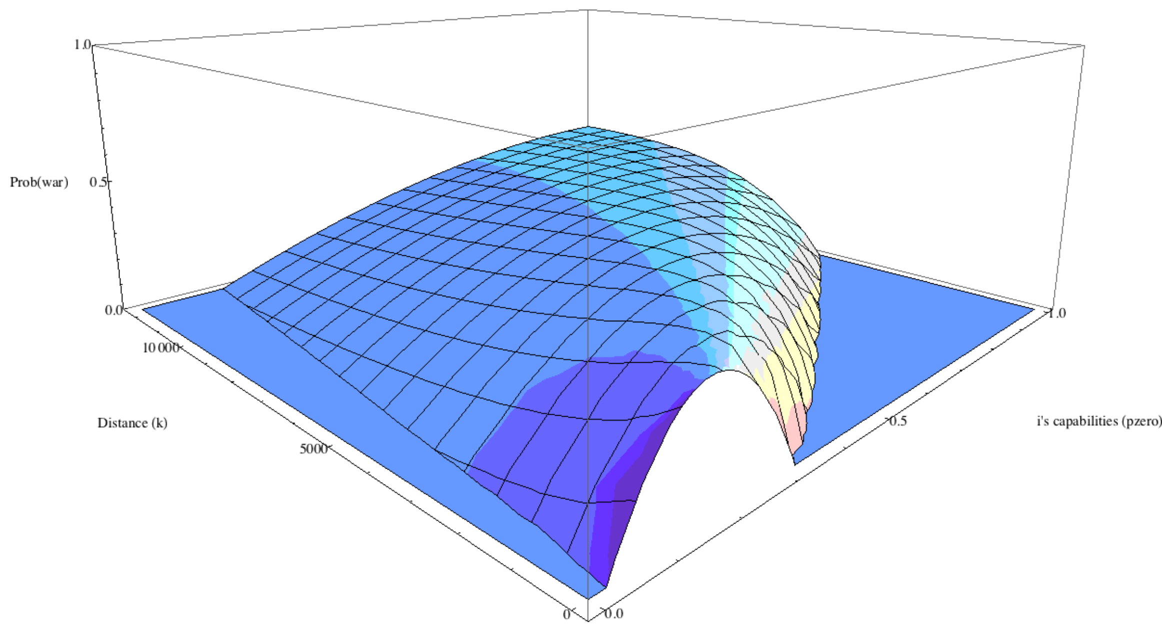

Figure 1: Relationship between Power, Proximity, and the Probability of Conflict

power. For proximate states, on the other hand, the relationship is more convoluted. Powerful neighbors more often get their way without fighting, while the weak seldom initiate conflicts.

The fact that weak states are unlikely to initiate contests does not mean that no disputes will ensue. It is not practical to model the ability of the target state, j, to make endogenous counter-demands, nor is it necessary in the framework here, where I assume that the status quo point (q) is already at j's ideal point. In the empirical world, the combination of the effect of distance, and two-sided bargaining is likely to minimize the effect of power on conflict, independent of distance.[13]

Hypothesis 3 *Powerful states are no more likely to experience contests, independent of distance.*

5 Research Design: Finding power

Scholars disagree about what power is, how to measure it, how it relates to observable capabilities, and how to compare findings from different indicators (Sullivan 1990; Geller and Singer 1998). This level of controversy regarding the central variable in international politics is not just disconcerting,

[13] Additional extensions of the model, including endogenizing war costs, are handled in an appendix to the paper.

but could also derail attempts to test theories of international conflict. However, there is much more congruence in practice than in the surrounding scholarly rhetoric. Waltz, for example, offers the following list of ingredients of power: "size of population and territory, resource endowment, economic capability, military strength, political stability and competence" (Waltz 1979, page 131). While not identical, Waltz's list is similar to the Correlates of War (COW) Composite Indicators of National Capabilities (CINC). I proceed acknowledging the potential limitations of my efforts.

A distinction can also be made between latent and kinetic power (Rothgeb 1993). Power represents either the ability to influence or actual acts of influencing. These versions of power can differ in one of two ways. First, since scholars disagree about which variables constitute the inputs to power, particular operationalizations could bias estimates of the effects of power on conflict if in fact omitted determinants correlate poorly with the included factors. While possible, advocates of more inclusive conceptions of power have yet to make the case that omitting these elements biases estimates of the relationship between power and conflict, as opposed to simply making estimates less efficient (Nye 2004). Since the focus here is on explaining militarized force rather than more subtle forms of influence, use of material capabilities as a measure may arguably prove sufficient.

Second, some process might intervene between nominal capabilities and national policy. This possibility is more demanding of attention in assessing relationships between capabilities and conflict, especially since I propose two such processes myself. Diplomacy can short-circuit the effects of material power on conflict. Influence also occurs if targets act in anticipation of the application of capabilities, rather than after an actual use of force. I have incorporated this possibility into the analysis by considering factors that might account for a failure to anticipate capabilities (and thus that invite a use of force). More elaborate treatments of these effects awaits a theory of diplomacy.

The other intervening process proposed in this study is geography. This is explicitly integrated into the statistical model, both directly and in its interactive effect on capabilities. While certainly not complete, I assume that an adequate operationalization of material power as influence, rather than simple nominal capabilities, can be had by interacting capabilities and geographic distance. For the purposes of this study, power can be defined *either* as the ability to influence — either through the use of military force, or the shadow of force — or as actual influence. While power as preferences theories are ambiguous about whether capabilities equal power, or whether power is capabilities discounted by distance, an assessment of both alternatives is on hand in this analysis.

Having dutifully discounted expectations, let me note that this study intentionally relies on the most conventional data and estimation procedures. I use probit estimation in a sample of wars and militarized disputes in the period 1816-2000. Analyses were conducted on both directed and undirected dyad years. I address temporal dependence with splines and peace years (Beck, et al. 1998), correct for clustering in dyads, and use robust standard errors to correct for spatial dependence. Unless otherwise noted, data were obtained from *EUGene* (Bennett and Stam 2000).

5.1 Data

Dependent Variables: I use Zeev Maoz's construction of dyadic militarized interstate disputes (DYMID) as the basis for three versions of the dependent variable, with a standard dichotomous coding of "1" for the initial year of a MID, a fatal MID (a militarized dispute involving at least one battle-related death), or a war (at least 1000 battle deaths) in the dyad and "0" otherwise (Gochman and Maoz 1984; Jones, et al. 1996). The Maoz data are formatted for dyadic analysis.[14]

In addition to conflict onset or initiation, I examine the location of a militarized dispute as a dependent variable. To the degree that my arguments about political geography are correct, capabilities should be a particularly potent predictor of where, as opposed to whether, nations fight. Braithwaite (2009) identifies the latitude and longitude of each MID in the COW dataset.

Capabilities: COW offers the Composite Index of National Capabilities (CINC) based on six components: military spending and personnel, total and urban population, and iron & steel production and energy consumption (Singer, et al. 1972, Singer 1987). While these data are certainly not perfect (Leng 2002), they are the most widely used quantitative measure of capabilities in international relations (c.f. Bueno de Mesquita and Lalman 1988; Bremer 1992; Maoz and Russett 1993). Data coverage extends from 1816 to 2000 (Correlates of War Project 2005). Controversy continues about how best to measure power (c.f. Organski 1958; Schweller 1998), but there is no reason to believe, ex ante, that these data are biased in favor of my hypotheses, particularly given that the

[14] The codebook and DYMID dataset are at: `http://psfaculty.ucdavis.edu/zmaoz/`. I use the *EUGene* version.

data collection effort was predicated on the conviction that power was a key determinant of warfare (Singer 1963; Wayman et al. 1983). I include each state's CINC score and the dyadic interaction between CINC scores, as well as interactions between CINC scores and geographic distance.

There are certainly many other ways to operationalize material power relationships. For example, researchers often include a measure of the ratio of capabilities of the stronger state to the weaker state in a dyad (Bremer 1992, 1993; Oneal and Russett 1997, 1999). However, such a formulation assumes a particular structure to power relations. A ratio also conflates rough parity of two weak states with that of two strong states, of critical concern for this research design (Hegre 2008).

Geographic Contiguity and Distance: States that are geographically distant are generally less likely to fight (Bremer 1992; Maoz and Russett 1992; Buhaug and Gleditsch 2006). One of the contentions of this study is that much of the apparent effect of capabilities on conflict is really power mitigating distance. For this reason, I use the metric distance between national capitals.[15] In addition, I measure contiguity as the proximity of land borders and the distance separating countries by water. Contiguity also addresses boundary effects for large states (Diehl 1985; Senese 2005).[16]

Military Alliances: Alliances are formal agreements intended to influence conflict behavior. The alliance variable is dichotomous, coding the presence of a defense pact in the dyad based on the COW alliance data (Singer and Small 1966; Small and Singer 1990; Gibler and Sarkees 2004).[17]

Major Power Status: Powerful countries are more active internationally, leading more often to warfare. The major power variable is a dummy coded "1" if at least one state in a dyad is a major power according to the COW list. Since the variable confounds some of the distinctions I make between interests and distance, I only include major power in some of the econometric models.[18]

Democracy: The Polity IV project codes regime type (Jaggers and Gurr. 1995). I construct annual democracy scores for each state as the difference between Polity's DEMOC and AUTOC variables, as is conventional. I adopt the method recommended in the Polity codebook (Marshall

[15]Another approach is to use "minimum distance" between states (Gleditsch and Ward 2001). However, national borders are in part a reflection of power relationships, and previous efforts to project power. While far from perfect, measuring distance between central locations (i.e. national capitals) is arguably a better indicator here.

[16]It is conventional to include both contiguity and distance in the models. Omitting contiguity never results in a positive, significant effect for either CINC variable, though occasionally, these are negative and marginally significant.

[17]I also examined models with a dummy for all alliance ties. This variable does not significantly alter results.

[18]For a discussion of methodological problems with control variables, see Achen (2005); Ray (2005); Clarke (2005).

and Jaggers 2002, pages 15-16) for recoding cases of interregnum and transition. To compute a dyad-level democracy score, I apply Dixon's (1994) weak-link logic (in dyadic analysis), or the monadic values plus an interaction term (in directed dyads), much as with the capabilities variables.

Temporal Splines: A well-established problem in Time-Series–Cross-Section Analysis (TSCS) is the non-independence of observations. Beck et al. (1998) recommend the use of a set of lagged dependent variables to control for temporal dependence. This approach has become the standard in the literature. I create four "spline" variables for each of the three dependent variables.[19]

6 Analysis

Results for the study are organized into four tables and five figures.[20] The first two tables contain seven regressions each, while the third table includes four regressions and the fourth table lists two regressions. Table 1 reports three regressions involving "All MIDs," two regressions of "Fatal MIDs," and two regressions predicting MID "Wars," all at the dyad unit-of-analysis. Table 2 continues the analysis in a sample of directed dyads, this time focusing on "MID Initiations", "Fatal MID Init." and "War Initiations." Details of Tables 3 and 4 are discussed later in the text.

The first three regressions of "All MIDs" in Table 1 include the minimum of right-hand-side variables, just various combinations of the CINC scores, distance, contiguity, "peaceyears" and temporal splines (peaceyears and splines are omitted from all tables to save space). In the first column of coefficients and standard errors, each CINC variable has a statistically significant impact on whether states fight. The relationship is log-additive; the greater the capabilities of either state, the more likely the dyad is to experience a MID. Contiguity and distance are also significant predictors of conflict (higher contiguity values equal a looser definition of contiguity). Still, this initial model specification assumes that the effect of power on conflict is independent of proximity.

The second column of coefficient estimates and standard errors in Table 1 adds interaction terms between the two monadic CINC variables and the distance variable. This makes it possible to differentiate the effect of power on opportunity, and on willingness (Most and Starr 1990; Siverson

[19] Coefficients and standard errors for spline variables are not reported since they lack a substantive interpretation.
[20] A *STATA* "do" file is available from the author that reproduces all aspects of data manipulation and analysis.

Table 1: The Effect of Capabilities and Other Variables on Conflict (Probit, Dyad years)

	All MIDs			Fatal MIDs		Wars	
Variable	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)
$CINC_A$	3.721 ***	0.501	0.0416	2.834 ***	-0.115	1.995 ***	-0.682
	(0.301)	(0.609)	(0.619)	(0.481)	(0.971)	(0.591)	(0.940)
$CINC_B$	4.446 ***	-0.362	-1.322	2.286 **	-2.074	3.045 ***	-1.501
	(0.450)	(1.230)	(1.013)	(0.773)	(1.411)	(0.770)	(1.320)
$CINC_A$×Distance		0.520 ***	0.590 ***		0.551 ***		0.0007 ***
		(0.082)	(0.082)		(0.130)		(0.0002)
$CINC_B$×Distance		0.731 ***	0.864 ***		0.833 ***		0.001 ***
		(0.153)	(0.121)		(0.173)		(0.0002)
$CINC_A$×$CINC_B$			21.35	11.57	30.14		37.08 †
			(25.45)	(8.274)	(22.41)		(16.63)
$CINC_A$×$CINC_B$×Distance			-3.153		-3.461		-2.627
			(3.358)		(2.807)		(1.956)
Distance (ln)	-0.165 ***	-0.197 ***	-0.199 ***	-0.097 ***	-0.132 ***	-0.00005 *	-0.0001 ***
	(0.006)	(0.006)	(0.006)	(0.016)	(0.016)	(0.00002)	(0.00003)
Contiguity	-0.117 ***	-0.114 ***	-0.116 ***	0.671 ***	0.648 ***	0.930 ***	0.850 ***
	(0.019)	(0.019)	(0.019)	(0.120)	(0.117)	(0.105)	(0.107)
Alliance				-0.136	-0.150 †	-0.130	-0.118
				(0.078)	(0.074)	(0.111)	(0.108)
Major Power						0.309 **	0.483 ***
						(0.110)	(0.111)
Democracy (low)						-0.059 **	-0.059 *
						(0.019)	(0.020)
Democracy (high)						0.032 †	0.028
						(0.015)	(0.015)
Intercept	-0.374 *	-0.197	-0.178	-2.277 ***	-2.102 ***	-3.318 ***	-3.107 ***
	(0.130)	(0.123)	(0.123)	(0.160)	(0.161)	(0.133)	(0.145)
N	656621	656621	656621	656621	656621	533097	533097
Log-likelihood	-12279.445	-12063.424	-12058.264	-2979.710	-2919.417	-1147.074	-1125.181
$\chi^2_{(9,11,13,11,14,13,17)}$	1572.34	1979.26	2271.40	884.39	943.34	689.32	500.87

Significance levels : † : 5% $*$: 1% $**$: 0.5% $***$: 0.1% Splines suppressed to save space.

and Starr 1990). These results suggest that the major impact of capabilities is in the ability to overcome distance. The interaction terms between distance and CINC scores are both highly statistically significant, while the CINC scores themselves are no longer significant. The distance variable, however, continues to significantly influence dispute propensities, as does contiguity.

The specification in the second model in Table 1 ignores other interactions between the two monadic capabilities variables and distance. To be thorough, interaction terms must consider all combinations of component variables, as well as the components themselves (Braumoeller 2004). The third and final "All MIDs" regression introduces interaction terms between the two monadic capability variables ($CINC_A \times CINC_B$) and a measure of the complex interaction between distance and both CINC scores ($CINC_A \times CINC_B \times Distance$). Neither of the two additional interaction variables is statistically significant and none of the other variables in this model is much altered from the previous model. Only the $CINC \times Distance$ interaction variables are statistically significant.

Figure 2 plots predicted probabilities of a MID based on the third All MIDs regression in Table 1. The x axis varies state A's capabilities, ($CINC_A$), while the y axis lists the natural log of the distance variable (*Distance (ln)*). Since it is impossible to plot relationships in more than three dimensions, I set State B's CINC score to the global mean (just under 1% of the world total).[21] All other interval variables are held at their means, while dummy variables take modal values.

The surface representing the probability of a war is curled up at opposite ends, like a kite in a brisk wind or a skate swimming along the bottom of the ocean. The high points, where disputes are most likely, occur at the front and back of the image, between weak-proximate states, and between distant states when at least one dyad member is a capable country. Proximate states experience slightly fewer disputes as one country in the dyad becomes disproportionately powerful, but the effect is extremely small, and apparently statistically insignificant. In contrast, distant dyads behave in substantially different ways depending on the dyadic balance of power. As political geographers such as Boulding predict, dyads containing two weak states are much less likely to host disputes as distance increases. For the weak, the constraining effect of geography dominates other motives for conflict. As at least one state in a dyad becomes highly capable, however, the decay in conflict

[21] Other values of $CINC_B$ can be used, or State A can be the state with fixed CINC score, with equivalent results.

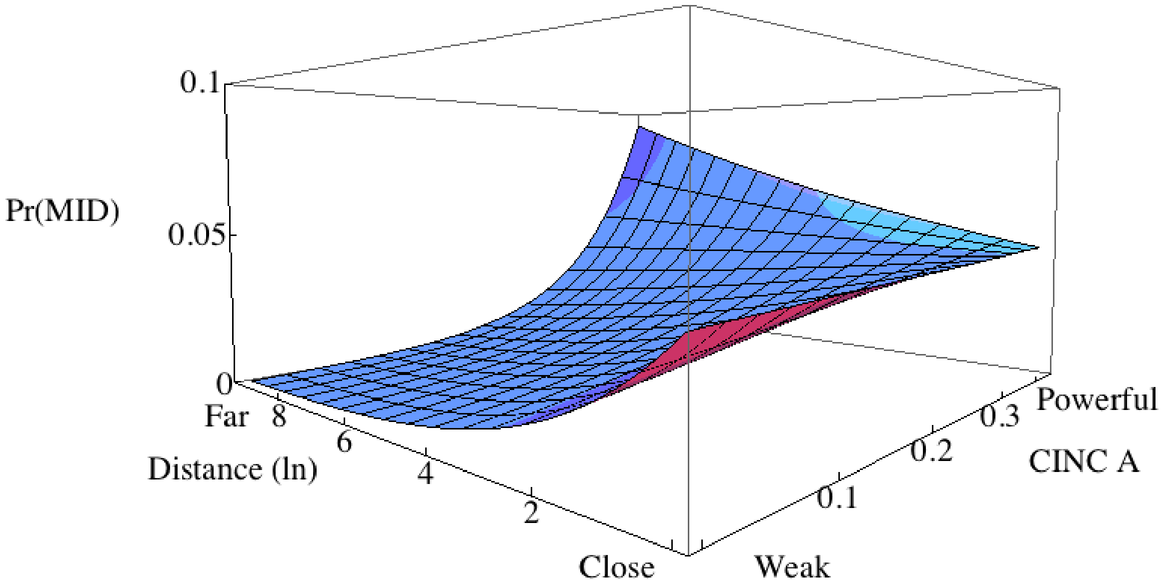

Figure 2: The Impact of Power and Proximity on War (Logit, based on Model 3, Table 1)

propensity with distance flattens out, eventually reversing. Dyads containing the most powerful states are actually more likely to experience conflict with increasing distance. The effect of power on dispute propensity is almost wholly intermediated through distance. Powerful states are slightly less likely to fight their neighbors but (surprisingly) are much more likely to fight far from home.

Many of the disputes in the All MIDs sample involve relatively minor clashes. Non-fatal MIDs arguably fall short of the dispute intensity that some theories of conflict seek to explain. To begin to address this concern, the fourth and fifth columns list coefficient estimates and standard errors in a sample of militarized disputes involving at least one battlefield fatality. Though it was added to the third model in the All MIDs regressions, I include the interaction between the capabilities of states in the dyad. Arguments about power often imply non-linear effects. It has been claimed, for example, that rough parity is associated either with a decrease (Waltz 1959), or an increase (Kugler and Lemke 1996) in conflict. I also add a dummy variable for alliance status (Snyder 1997; Walt 1987). Interacting CINC scores fails to reveal a statistically significant relationship, while monadic CINC scores are again significant, as in the first All MIDs regression. Alliance ties are marginally statistically significant only in the second Fatal MIDs model.[22] With

[22]Leeds (2003) and Johnson and Leeds (2011) find that defensive alliances are successful in deterring aggression.

the interaction terms between capabilities and distance in the second Fatal MIDs regression, results again parallel those for the all MIDs sample, with significance shifting to the interaction terms.

The last two regressions in Table 1 repeat the process of comparing the direct and indirect effects of capabilities and distance, this time by examining MID wars. In the penultimate model in the table, I drop the interaction term between monadic CINC scores as it was not statistically significant. I add controls for major power status and regime type. Major power dyads are more warlike, while democratic dyads are less inclined to experience wars. The final model in Table 1 again introduces the interaction terms between capabilities and distance. Monadic CINC scores are again insignificant, while the joint effect of capabilities appears marginally significant at the 5% level with all interaction terms included in the MID war model. Pairs of capable states are slightly more likely to experience wars, though the effect is modest. Finally, interactions between capabilities and distance are again highly statistically significant, as predicted by the formal model.

Table 2 extends the analysis to directed dyads, making it possible to separate the effect of power on potential initiators and targets. The table again lists three sets of regressions, roughly conforming to regressions in Table 1. The first set of three regressions examines the determinants of "MID Initiations" for all militarized disputes. In the absence of the *CINC* × *Distance* interaction terms, capable states appear more likely to initiate disputes, and more likely to become targets of MIDs. Introducing the interaction terms again causes the direct effects of capabilities to become statistically insignificant. In comparing coefficients and standard errors, capabilities again influence conflict primarily through interacting with distance. Other variables perform largely as expected.

Given complex interactions between key variables, the reported tabular results are far from intuitive. For example, standard significance tests cannot indicate whether non-linear relationships are statistically significant for all values of relevant variables (Braumoeller 2004). An interesting non-linear effect could turn out to be statistically insignificant precisely whre it becomes interesting. If the apparent increase in MID behavior with distance for powerful states is not in itself statistically significant, this would considerably weaken the validity of my interpretation of these results.

To address this concern, and as an additional check on the results reported in Figure 2 and the tables, I plot the predicted relationship between capabilities, distance, and militarized disputes

Table 2: The Effect of Capabilities and Other Variables on Conflict (Probit, Directed dyad years)

Variable	**All MID Initiations**			**Fatal MID Initiations**		**War Initiations**	
	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)
$CINC_A$	2.257 ***	0.162	-0.160	1.909 ***	-0.266	1.587 †	-0.640
	(0.338)	(0.405)	(0.458)	(0.484)	(0.678)	(0.663)	(0.982)
$CINC_B$	2.375 ***	-0.318	-0.763	1.840 ***	-0.194	2.560 †	0.206
	(0.474)	(0.633)	(0.699)	(0.475)	(0.659)	(1.076)	(1.660)
$CINC_A \times$Distance		0.0007 ***	0.0007 ***		0.0005 ***		0.0006 ***
		(0.00007)	(0.00008)		(0.0001)		(0.0002)
$CINC_B \times$Distance		0.0009 ***	0.0009 ***		0.0004 ***		0.0005 *
		(0.00008)	(0.00009)		(0.0001)		(0.0002)
$CINC_A \times CINC_B$			9.100		10.29		12.70
			(6.073)		(7.188)		(12.36)
$CINC_A \times CINC_B \times$Distance			0.0002		0.0018		0.0005
			(0.0011)		(0.0016)		(0.0023)
Distance (ln)	-0.00007 ***	-0.0001 ***	-0.0001 ***	-0.138 ***	-0.193 ***	-0.00005 *	-0.0001 ***
	(0.000008)	(0.00001)	(0.00001)	(0.0217)	(0.0273)	(0.00002)	(0.00003)
Contiguity	-0.205 ***	-0.191 ***	-0.191 ***	-0.0449	0.0237	-0.185 ***	-0.172 ***
	(0.0097)	(0.0093)	(0.0093)	(0.0350)	(0.0424)	(0.0212)	(0.0216)
Alliance	-0.0088	-0.0273	-0.0219	-0.0853	-0.0815	-0.200	-0.187
	(0.0389)	(0.0367)	(0.0367)	(0.0469)	(0.0451)	(0.108)	(0.105)
Major $Power_A$	0.442 ***	0.514 ***	0.542 ***	0.373 ***	0.466 ***	0.517 ***	0.640 ***
	(0.0586)	(0.0559)	(0.0571)	(0.0745)	(0.0731)	(0.111)	(0.108)
Major $Power_B$	0.185 *	0.266 ***	0.306 ***	0.390 ***	0.477 ***	-0.0556	0.122
	(0.0719)	(0.0711)	(0.0730)	(0.0744)	(0.0737)	(0.222)	(0.230)
$Major_A \times Major_B$	-0.130	-0.0790	-0.192	-0.0673	-0.140	-0.0448	-0.232
	(0.0996)	(0.0784)	(0.103)	(0.0978)	(0.111)	(0.173)	(0.242)
$Democracy_A$	0.0513 ***	0.0460 ***	0.0459 ***	0.0614 ***	0.0565 ***	0.0418 **	0.0347 †
	(0.0058)	(0.0056)	(0.0056)	(0.0074)	(0.0071)	(0.0139)	(0.0137)
$Democracy_B$	0.0595 ***	0.0546 ***	0.0546 ***	0.0611 ***	0.0562 ***	0.0468 *	0.0435 †
	(0.0064)	(0.0061)	(0.0061)	(0.0074)	(0.0071)	(0.0174)	(0.0176)
$Dem._A \times Dem._B$	-0.0104 ***	-0.0100 ***	-0.0100 ***	-0.0154 ***	-0.0149 ***	-0.0124 ***	-0.0118 ***
	(0.0009)	(0.0008)	(0.0009)	(0.0014)	(0.0013)	(0.0032)	(0.0032)
Intercept	-1.428 ***	-1.300 ***	-1.299 ***	-1.018 ***	-0.976 ***	-2.614 ***	-2.509 ***
	(0.0596)	(0.0579)	(0.0580)	(0.0740)	(0.0753)	(0.117)	(0.113)
N	1066194	1066194	1066194	1066194	1066194	1066194	1066194
Log-likelihood	-14063.79	-13828.07	-13819.97	-12678.35	-12564.89	-1276.62	-1258.86
$\chi^2_{(16,18,20,16,20,16,20)}$	3076.05	3288.88	4414.06	2608.25	2870.20	830.78	566.83

Significance levels : † : 5% $*$: 1% $**$: 0.5% $***$: 0.1% Splines suppressed to save space.

using the CLARIFY software (Tomz, et al. 2003).[23] Figure 3 plots the predicted probability that a State A with CINC capabilities of 0.1 experiences a MID based on the third regression model in Table 2. Distance increases in the x axis, normalized by percentages of directed dyadic relationships. All other values are held at their medians. As Figure 3 illustrates, the predominant effect is that of the loss-of-strength gradient. As 95% confidence intervals around the mean predicted probabilities line reveals, this relationship is statistically significant across the full range of distance values.

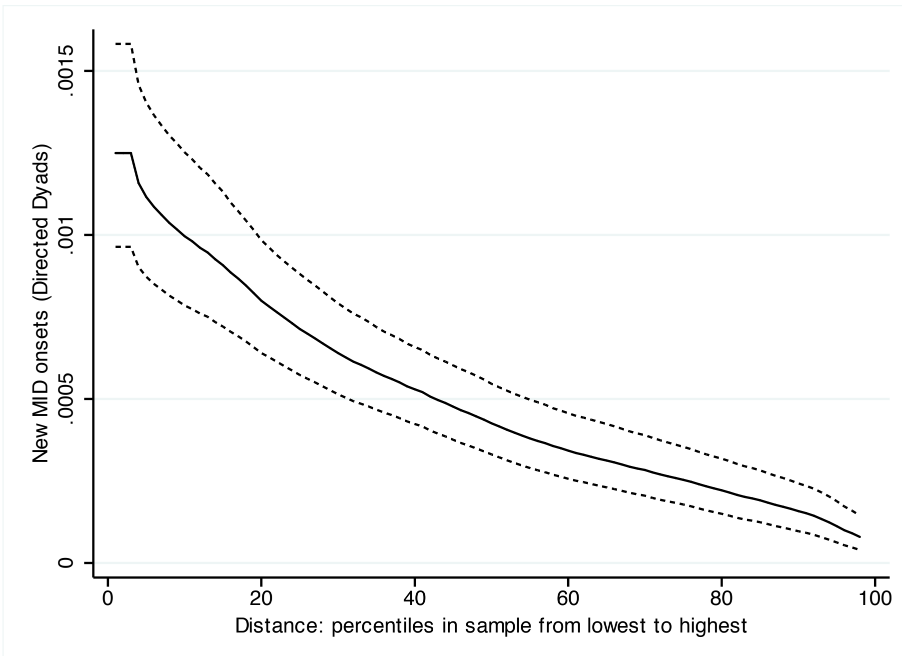

Figure 3: Impact of Proximity on War, CINC = 0.1 (Probit Estimates, Model 3, Table 2)

Figure 4 uses an identical setup to Figure 3, with the exception that State A's CINC score is now assumed to be 0.2. As the Figure reveals, the effect of the loss-of-strength gradient is now roughly equally balanced by the increase-in-uncertainty gradient. Powerful states weaken with distance, but they remain strong enough to fight where they wish. Uncertainty about what a capable country is willing to do almost exactly cancels out the effect of the loss-of-strength gradient. The confidence intervals are also large, reflecting uncertainty in the estimation of the relationship. Indeed, this uncertainty may be indicative of uncertainty among participants about the probability of a dispute.

[23]CLARIFY creates probability distributions around point estimates from regression coefficients by resampling. Alex Weisiger generously shared a STATA "do" file automating the process of calculating and plotting these values.

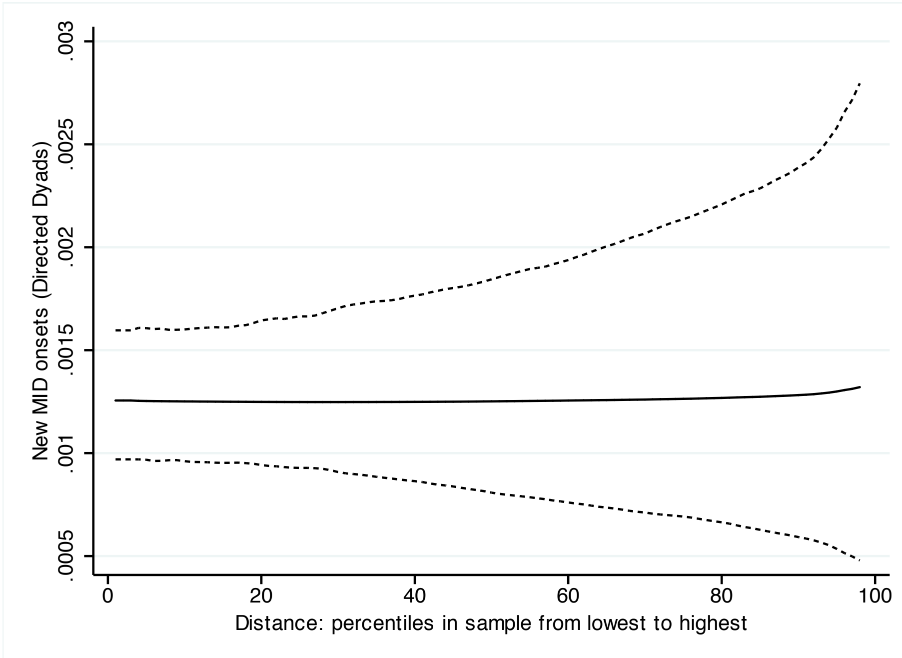

Figure 4: Impact of Proximity on War, CINC = 0.2 (Probit Estimates, Model 3, Table 2)

In Figure 5, State A's capabilities are again increased, this time to a CINC score of 0.3. Here, the effect of proximity has reversed itself, leading to more directed dyadic MIDs with distance. While the most capable countries are still affected by the loss-of-strength gradient, the increase-in-uncertainty gradient is now a more important determinant of conflict. As the confidence interval again reveals, this relationship is statistically significant at the 95% level across the entire range of values for the distance variable, though here again uncertainty increases with distance, possibly reflecting the informational problem among actors that the estimation is meant to identify.

The direct effect of material power can be assessed independent of distance by holding distance constant, and varying State A's capabilities.[24] As Figure 6 reveals, for most values of the relevant variables, changes in State A's power have no effect on whether A and B fight. The plot of the effect of A's capabilities on the probability of a MID is flat until somewhere above the 90 percentile. The fact that the estimated relationship curves upward steeply at high levels of $CINC_A$ provides some support for the power as preferences perspective. Indeed, this evidence substantiates

[24]Distance is set to zero, since other values allow the indirect effect of capabilities through the interaction terms.

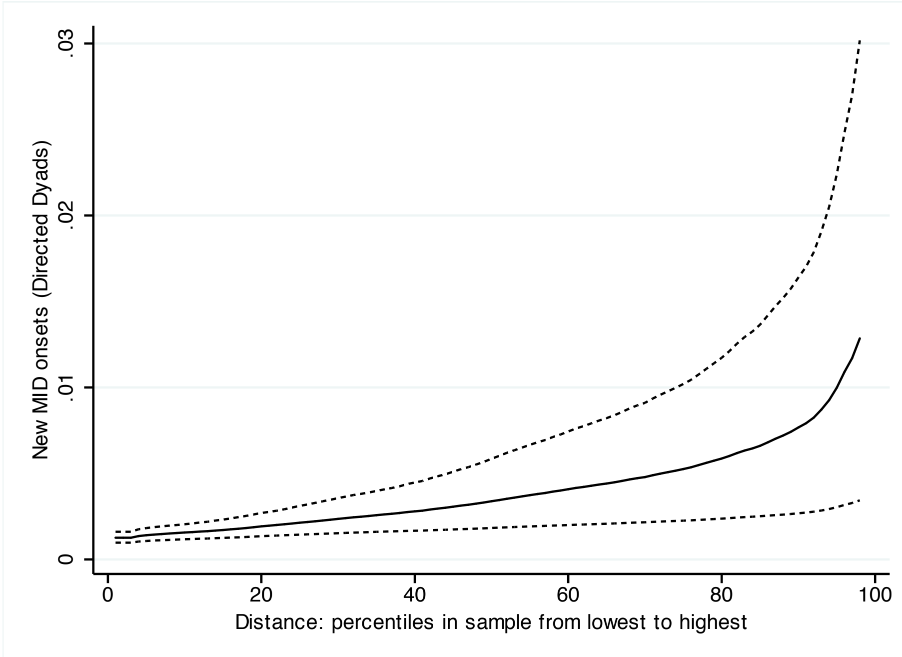

Figure 5: Impact of Proximity on War, CINC = 0.3 (Probit Estimates, Model 3, Table 2)

the assertion among realist scholars that great power conflict is distinct and worthy of separate attention. Additional research is needed to determine whether this effect is the result of great power competition, or whether it is produced by hegemonic policing of the international system. For now, we can interpret these findings as showing that power relations are irrelevant for predicting conflict in over 90% of directed dyads, once the indirect effects of capabilities on distance are addressed.

The fourth and fifth columns of estimated coefficients and standard errors in Table 2 examine dispute initiation involving fatal MIDs, while the final paired columns predict MID war initiation. Results for key variables are similar for all of the models.[25] Introducing a measure of the interaction between distance and capabilities causes the effect of material power on conflict to disappear.

Several interesting relationships emerge from the other independent variables. First, in most cases major power status is a significant determinant of dispute initiation, though not for targets

[25] In examining many combinations of models I found that the interaction terms are always statistically significant. One or both of the monadic CINC scores can sometimes become statistically significant in certain model specifications, typically when the sample of disputes is small (i.e. MID war initiations), and when I fail to include control variables.

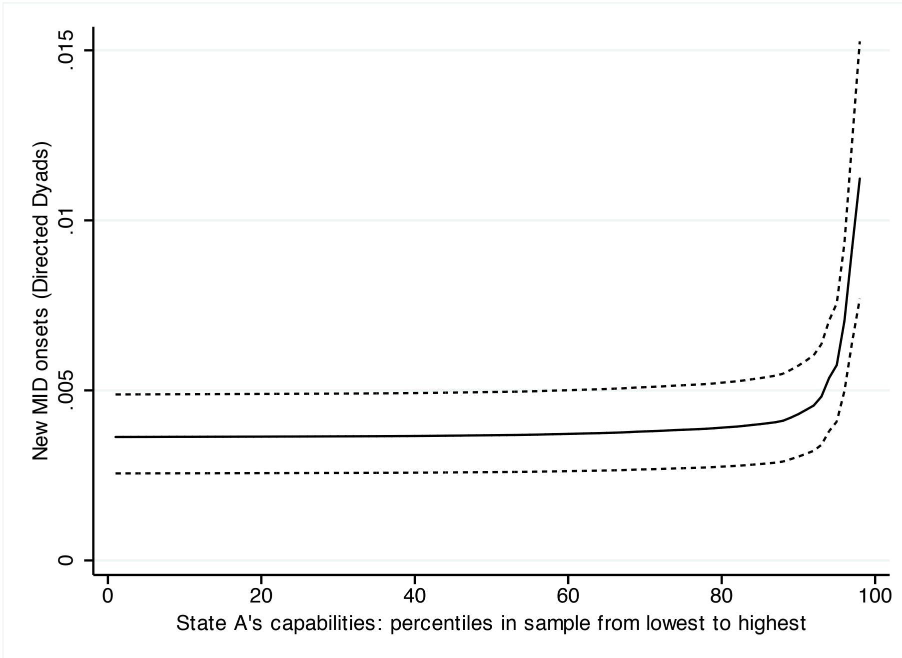

Figure 6: Impact of Power on War, Contiguous States (Probit Estimates, Model 3, Table 2)

in MID wars.[26] This finding may reflect Snyder's (1965) stability-instability paradox.[27] Opponents are modestly deterred from initiating full-scale wars against major powers. Instead, there is an increase in smaller-scale conflict, perhaps involving brinkmanship. Indeed, pairs of major powers are less likely to experience MIDs, though the relationship is not statistically significant. Relations among major powers appear no more dispute prone. Instead, most of the impact of major power status occurs in relation to non-major powers. Finally, the effects of regime type appear to vary with conflict intensity. The dyadic democratic peace is best reflected in the MID wars sample. The dyadic relationship is contrasted with monadic *increases* in conflict at lower dispute intensities.

Proximity seems to matter most in determining the impact of capabilities. Still, countries could fight in places distant or distinct from the homeland, and the most powerful nations are the most likely to relocate their contests. Since disputes can occur far from any participant, a different and arguably more precise test of the claim that power conditions distance can be had by looking at the location of disputes. Data from (Braithwaite 2010) identifies the location of each MID.

[26]Coding of major power status by COW is subjective and reflects capabilities and involvement in interstate politics.
[27]For a recent study documenting the stability-instability paradox in nuclear weapons, see Rauchhaus (2009).

Additional work by Braithwaite and this author produced a dataset of distances from the latitude and longitude of every MID to the capital cities of each dispute participant. Since these data select on the dependent variable (how does one assign a location to a non-dispute?), it is not possible to evaluate the MID location data in the same manner as when studying dispute onset or initiation. I adopt two approaches to assess the impact of capabilities and other variables on dispute location. First, I examine the determinants of location in the sample of disputes. Next, using two-stage regression, I first estimate the probability of a MID, and then model the resulting conflict location.

Table 3 provides four regressions in which capabilities, dyadic distance and other variables predict the distance from the capital of the initiating country to the location of the militarized dispute. Ordinary Least Squares (OLS) is used, since the dependent variable is metric and continuous. The first regression is "monadic" as only the CINC score of the initiating state and monadic control variables are included in the regression. The more capable the country initiating a contest, the more distant is the dispute from the capital of the initiating nation. Having more neighbors tends to cause a country to fight closer to home, while increasing the sample of countries in the world causes contests to occur farther from the initiator's capital (probably an artifact of how colonial dependencies are coded in the COW data). The number of countries variable helps to ensure that the analysis is not driven by evolving national boundaries. The number of great powers appears to decrease the distance to disputes, but as we shall see, this result is really an artifact of time.

The second regression in Table 3 introduces "dyadic" variables, though the model is again minimalist to show that relationships are not contingent on model specification (Ray 2005; Clarke 2005). While the capabilities of the initiator continues to significantly increase the distance between the initiator's capital and the location of the dispute, the CINC score of the target does the opposite. Capable targets tend to force initiators to fight closer to the initiator's home, constraining *where* initiators fight, a "balance of location," rather than a balance of power effect. The interaction between capabilities is not statistically significant. The location of contests is determined by a tug-o-war between the capabilities of disputants, *not* by the relative power of the two nations.

The second regression adds a conventional dyadic distance variable. The variable shows that the relationship between capabilities and distance-to-dispute is not just a by-product of correla-

Table 3: Estimating the Effects of Capabilities and Other Variables on Where Disputes Actually Occur (OLS, Dispute Dyads)

	"Monadic"		**"Dyadic"**		**Distance to Initiator**		**Distance to Target**	
Variable	Coeff	(S.E.)	Coeff	(S.E.)	Coeff	(S.E.)	Coeff	(S.E.)
$CINC_A$	24921.6 ***	(2465.1)	14774.1 ***	(1614.4)	12625.1 ***	(1725.4)	-7724.1 ***	(1677.5)
$CINC_B$			-8468.6 ***	(1796.8)	-7610.1 ***	(1670.0)	12972.7 ***	(1810.3)
$CINC_A \times CINC_B$			33957.1	(21090.8)	27219.4	(17312.9)	26965.5	(17673.5)
Distance			0.725 ***	(0.0558)	0.741 ***	(0.0479)	0.731 ***	(0.0486)
$Energy/Pop._A$					26.39	(21.41)	-58.94 **	(19.91)
$Energy/Pop._B$					-60.11 **	(19.81)	27.54	(21.69)
$E/P_A \times E/P_B$					186.2 †	(78.80)	179.6 †	(82.11)
$Population_A$					-0.000735	(0.000522)	0.00243 ***	(0.000746)
$Population_B$					0.00236 **	(0.000756)	-0.000807	(0.000529)
$Democracy_A$					97.40 ***	(22.81)	-76.12 **	(25.08)
$Democracy_B$					-79.18 **	(25.20)	97.17 ***	(22.56)
$Dem._A \times Dem._B$					-1.000	(3.678)	-1.202	(3.734)
# $Neighbors_A$	-115.1 ***	(25.79)	-48.17 †	(20.16)	-1.232	(17.46)	-21.19	(17.94)
# $Neighbors_B$			47.74 †	(19.08)	-14.13	(16.97)	4.152	(18.78)
# Great Powers	-100.9 †	(43.65)			-16.96	(41.97)	-17.91	(40.79)
System Con.			-2772.1	(2051.5)	-3626.8	(2278.7)	-3590.5	(2277.5)
# Countries	5.972 ***	(1.759)	-1.007	(2.152)	-3.566	(2.248)	-3.481	(2.243)
Intercept	1771.1 ***	(342.9)	1621.0	(848.2)	2175.4 †	(1031.0)	2167.8 †	(1032.5)
N	5837		5837		5627		5627	
R^2	0.244		0.432		0.51		0.505	
$F_{(4,1426;8,1426;17,1336;17,1336)}$	32.94		59.98		43.741		39.765	

Significance levels : † : 5% $*$: 1% $**$: 0.5% $***$: 0.1%

tion between power and proximity. Powerful states could cluster closer together (Gleditsch 2003). Alternately, powerful states could cause neighbors to become weaker, endogenously generating a correlation between capabilities and distance. Whatever the relationship, it does not appear to confound the analysis. The distance between capital and conflict increases with the distance between states, but the effect of power on distance remains statistically significant. The respective effects of the *# Neighbors* variables are also informative. While having more neighbors forces an initiator to stay closer to home in fighting a given opponent, it does the opposite for a target. Neighbors make a target more vulnerable to contagion effects or side-disputes, allowing the initiator to be bolder in incurring on the target's territory. While not significant, I replace the *# of Great Powers* variable with the COW *System Con.* variable, which measures the concentration of global capabilities.

The third regression in Table 3 introduces variables to address heterogeneity in development, population and regime type. Tremendous changes in the last century risk generating a spurious correlation between power and proximity. Economic development has increased exponentially. Advances in technology diminish the impact of distance, even as they alter priorities (Buhaug and Gleditsch 2006). Average national population has grown from roughly 10 million before 1850, to more than 32 million today. Research also emphasizes differences in democratic foreign policy (Doyle 1986; Owen 1997; Russett and Oneal 2001). While these variables do matter, they do not appear to alter the impact of power on location in a fundamental way. Capable initiators still fight farther from home, while powerful targets force fighting to occur closer to the initiator's capital.

Energy consumption per capita correlates closely with economic development, but allows the analysis to extend well into the 19th century. Intensive energy consumption by initiators does not significantly affect the location of contests, but initiators fight closer to home when the target is a developed state. The population size of initiating countries does not much matter for the location of militarized contests, but populous targets tend to encourage the initiator to fight a bit farther from home. Perhaps because they desire to secure domestic populations from harm, democratic initiators and targets tend to fight at greater distances from the homeland. Again, this may reflect a "not in my back yard" bias attributable to popular rule. Other variables perform as expected.

The fourth regression in Table 3 uses distance from the target state to the MID as an additional test of the effects of power on the proximity of contests. All independent variables are as in the previous regression model. If power is conditioning distance, then we should expect the two monadic capability variables to swap signs and coefficient magnitudes, while most other variables remain unaffected. This is exactly what we observe. The CINC score of the initiator now decreases the distance between a dispute and the target's capital, while a capable target forces the fight to occur farther from the target's home. The monadic development, population, and regime type variables also change signs, magnitudes and statistical significance levels, indicating that the distance to dispute dependent variable is probably capturing distance and not another process (such as time).

An important source of concern involves selection. An assessment of the location of contests may bias estimates if the determinants of dispute distance are related to the determinants of disputes. Obviously, many of the variables used in Table 3 are similar or identical to those used in Tables 1 and 2. Heckman (1978) offers the classic exposition of a solution to this problem in the form of two-stage regression. Heckman's two-stage estimator first models the biasing effect of participation, and then corrects for this bias in estimating within-sample differentials. In estimating differences in location between weak and capable states, one must correct for any disparity in the propensity of weak and capable countries to experience disputes. If less capable states experience less (or more) conflict, then this will tend to underestimate (or overestimate) the effect of capabilities on location. Not coincidentally, the dispute onset stage estimation is also a useful test of the hypotheses.

Table 4 lists two two-stage Heckman regressions, in which the first stage (selection equation) estimates the probability of MID onset, and the second stage (outcome equation) predicts the location of disputes. These regressions repeat the format of the third and fourth regressions in Table 3, with the first set of coefficients and standard errors predicting the distance from the capital of the initiator to the location of the dispute and the second set of coefficients and standard errors modeling dispute locations relative to the target. As these results make clear, selection bias is not interfering with the results in Table 3. The size and significance levels of coefficients in the outcome equation are essentially unchanged. Nor is Heckman's selection statistic (ρ) significantly different from zero. Equally salient, CINC scores in the selection equation are statistically insignificant; capable nations are not more likely to fight. Instead, distance continues to interact with capabilities

Table 4: Two-Stage Models of Dispute Distance (Heckman, Directed Dyads)

Variable	Coeff	(S.E.)	Coeff	(S.E.)
Equation 1:	**Distance to Initiator**		**Distance to Target**	
$CINC_A$	12641.5 ***	(1729.6)	-7685.2 ***	(1686.1)
$CINC_B$	-7594.5 ***	(1677.7)	13010.2 ***	(1806.8)
$CINC_A \times CINC_B$	27527.1	(17300.6)	27703.3	(17702.2)
Distance	0.739 ***	(0.0545)	0.726 ***	(0.0551)
Energy/Pop.$_A$	26.19	(21.85)	-59.42 **	(20.31)
Energy/Pop.$_B$	-60.31 **	(20.29)	27.07	(22.05)
$E/P_A \times E/P_B$	188.4 †	(85.89)	184.6 †	(87.29)
Population$_A$	-0.0007	(0.0005)	0.0024 ***	(0.0007)
Population$_B$	0.0024 **	(0.0008)	-0.0008	(0.0005)
Democracy$_A$	98.18 ***	(21.90)	-74.25 **	(24.50)
Democracy$_B$	-78.40 **	(25.00)	99.05 ***	(21.53)
Dem.$_A \times$Dem.$_B$	-1.160	(3.496)	-1.584	(3.496)
# Neighbors$_A$	-1.245	(17.41)	-21.22	(17.89)
# Neighbors$_B$	-14.15	(16.94)	4.083	(18.74)
# Great Powers	-17.26	(42.12)	-18.63	(40.93)
System Con.	-3599.2	(2271.4)	-3524.2	(2268.4)
# Countries	-3.541	(2.223)	-3.422	(2.216)
Intercept	2139.5 †	(1041.9)	2081.8 †	(1039.0)
Equation 2:	MID Onset		MID Onset	
$CINC_A$	-0.112	(0.471)	-0.126	(0.470)
$CINC_B$	-0.0793	(0.475)	-0.0675	(0.469)
$CINC_A \times$Distance	0.0008 ***	(0.00008)	0.000808 ***	(0.00008)
$CINC_B \times$Distance	0.0008 ***	(0.00008)	0.000792 ***	(0.00008)
$CINC_A \times CINC_B$	5.550	(5.969)	5.556	(5.962)
$CINC_A \times CINC_B \times$ Distance	0.00126	(0.0012)	0.00126	(0.0012)
Distance	-0.0002 ***	(0.000009)	-0.0002 ***	(0.000009)
Contiguity	-0.192 ***	(0.0077)	-0.192 ***	(0.0077)
Alliance	0.0143	(0.0304)	0.0143	(0.0304)
Major Power$_A$	0.438 ***	(0.0563)	0.438 ***	(0.0566)
Major Power$_B$	0.436 ***	(0.0570)	0.437 ***	(0.0561)
Dem.$_A \times$Dem.$_B$	-0.184 †	(0.0882)	-0.184 †	(0.0882)
Democracy$_A$	0.0610 ***	(0.0049)	0.0609 ***	(0.0049)
Democracy$_B$	0.0610 ***	(0.0049)	0.0611 ***	(0.0049)
Dem.$_A \times$Dem.$_B$	-0.0119 ***	(0.0007)	-0.0119 ***	(0.0007)
Intercept	-0.861 ***	(0.0492)	-0.861 ***	(0.0492)
ρ	0.00565	(0.0490)	0.0135	(0.0485)
$\ln(\sigma)$	7.639 ***	(0.0346)	7.644 ***	(0.0351)
N	1062585		1062585	
Log-likelihood	-73062.49		-73091.97	
$\chi^2_{(17,17)}$	721.71		644.25	

Significance levels : † : 5% ∗ : 1% ∗∗ : 0.5% ∗∗∗ : 0.1% Splines suppressed.

in the selection stage. Powerful countries are more likely to fight *if* the dispute occurs far from home, while weak nations are slightly more dispute prone when contests are more proximate.

7 Conclusion

This study attempts to identify some scope and scale conditions for bargaining theories of war by comparing three approaches to "rationalist" interstate conflict. While the propensity to fight usually decays with distance, the effects of this decay first diminish and then are reversed with rising capabilities. The weak and distant are at peace, if only out of necessity. The proximate and powerful can fight, but may or may not need war to exact concessions from opponents. While Boulding's insight about the loss-of-strength gradient is generally correct, capable countries exhibit a "gain of uncertainty gradient," becoming more disputatious with targets that are far from home.

Each perspective on capabilities and conflict offers insights that are partial and incomplete. Treating capabilities as preferences is perhaps least sustainable, though the approach may be defensible in the context of great powers, as realists have long argued. For the vast majority of interactions in international affairs, the juxtaposition of capabilities is relatively impotent as an explanation for interstate conflict. Indeed, future research may focus with additional confidence on the atypical role of great powers. However, it remains to be shown whether power itself is the cause of this divergence or whether it is the result of other factors, such as leadership or hegemony.

The most important events in international politics may indeed be explained by differences in the capabilities of nations, but rationalizing this claim may well require researchers to focus on what is important to practitioners, rather than academics. Nations in competition seek to redistribute benefits and prerogatives. Power relations fundamentally affect the division of global resources and national prerogatives, but whether this results in warfare really depends on other factors. The boundaries on spheres of influence may move much more than the nominal probability of fighting. The powerful are not challenged close to home. Disputes begin when, and more importantly where, influence is uncertain or control disputed. To paraphrase Mearsheimer, the locations of contests are mainly a function of the balance of power, though the causes of war and peace lie elsewhere.

Distance is something that nations cannot dispel through diplomacy. Proximate adversaries would be better off if they could agree to separate, like an estranged couple with a restraining order. Unfortunately, space on this little planet is limited, with most locations already under different management. Making conflict more costly by increasing the distance between countries is impractical.[28] Instead, nations seek to impose weakness through other means, like arms control treaties or third-party guarantees. These efforts are flawed, since it is difficult to contract to impair both parties equally, and since competitors have incentives to cheat. The weakness imposed by distance also has the advantage of being symmetric, impairing both sides in a potential dispute.

If geography helps by imparting context to bargaining theory, improving the empirical fit, bargaining theory resolves the empirical anomaly identified here, that capable states appear to cancel and even contradict the loss-of-strength gradient. Boulding still assumed that capabilities cause conflicts. If, as Fearon suggests, war is more a product of error than power, then the increase in distant disputes among the capable reflects geographically-induced uncertainty. Nations capable of projecting power make conflict possible with more counterparts. Uncertainty about whether the powerful will resort to force increases the risk of violence because possibilities can be underestimated. Increasing the ability to project power increases uncertainty about where and when power will be projected, raising the prospects of bargaining failure, and war. The tendency of powerful nations to reverse the effect of the loss-of-strength gradient reflects growing uncertainty with distance about what powerful states prefer, given many possibilities and the temptation to bluff.

[28] Occasionally, this is precisely what is attempted, with the creation of "weapons free" and "buffer" zones.

Appendix A: Endogenizing the Effect of Distance on War Costs

One of the weaknesses of the model (and indeed most other formal models of conflict) is the implausible assumption that war costs are uncorrelated with other parameters, such as the probability of victory, or an actor's resolve. Actors are bound to be more willing or able to incur costs if they are rich/powerful, or if they have a high value for the stakes. It is conceivable that endogenizing war costs could lead to different predictions. However, H1-3 still hold, as I briefly demonstrate below.

Begin with Eqs 1-3. In addition, let us imagine that i's war costs originate from some function:

$$c_i = g_i + \rho_i (1 - p_0) + \gamma * k^{\phi} \tag{A1}$$

where g is some non-negative constant such as "fighting spirit," $(1 - p_0)$ is the probability that j wins if i is contiguous, k is the distance variable, and ρ, γ and ϕ are all non-negative parameters.

By analogy, j's war costs, where the loss-of-strength for the target is zero, are as follows:

$$c_j = g_j + \rho_j p_0 \tag{A2}$$

Substituting Eqs 1, A1, and A2 into Eq 2 and 3, and solving the model as outlined in the text yields relationships for $Prob\,(war)$ and $\bar{p}_0$ equivalent to those generated previously. In fact, because c_i is now increasing in k, the effects of distance in decreasing conflicts involving weak attackers (i.e. loss-of-strength) and increasing corner solutions for the strong (increase-in-uncertainty) is enhanced. As Figure A1 illustrates, endogenizing war costs leads to relationships that are somewhat "steeper" than in Figure 1 in the text, but the overall comparative statics remain substantively unchanged.

Appendix B: Varying the Effect of the Loss-of-Strength with Power

The impact of the loss-of-strength gradient (LSG) might vary with capabilities. Stronger states could experience less (or more) than proportional effects of the LSG. Eq 1 is generalized as follows:

$$p = \frac{p_0}{1 + \alpha \left(\theta k^{\beta} + (1 - \theta)\, k^{\beta} (1 - p_0)\right)} \tag{A3}$$

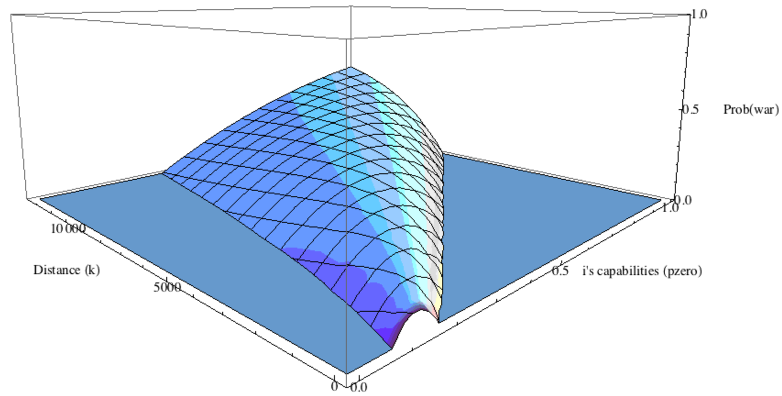

Figure A1: Relationship between Power, Proximity, and Conflict with Endogenous Costs

where θ, $(1 \geq \theta \geq 0)$ is an exogenous parameter weighting and other parameters are as before.

Where $\theta = 1$, Eq A3 is just Eq 1. In contrast, if $\theta = 0$, then $(1 - p_0)$ in the denominator means that the discounting effect of distance (k) is inversely proportional to i's capabilities. If i will win with certainty against a contiguous enemy ($p_0 = 1$), then the denominator is just 1 and $p = p_0$. If instead p_0 is very small, then the discounting effect of distance is largely undiminished. By varying θ, one can generate any discounting of the LSG for the effects of power that is desired.

As one might expect, if $\theta = 1$, then all aspects of the game and solution are identical to the game in the text. For $\theta < 1$, because the LSG varies with p_0, changes to optimal strategies, equilibria, $\bar{p}_0$ and $Prob\,(war)$ are also proportional to p_0. Weak challengers behave much the same regardless of the value of θ. In contrast, capable challengers are less affected by the LSG as θ becomes smaller. In the extreme, where $\theta = 0$, capable countries experience corner solutions at distance exactly as they do with contiguous opponents (an explicit solution is available from the author).

For weak potential initiators, Figure 1 and Figure A2 are basically identical. Differences arrive with increasing power. For the most capable, the probability of conflict is uniform at all distances, since k does diminish p, allowing for interior solutions and a role for uncertainty in bargaining.

Varying the LSG with power thus diminishes differences between capable and weak potential initiators, and reduces the unique contribution of bargaining. To the degree that the LSG varies with capabilities, one should not expect capable states to be more likely to fight distant adversaries. Given the results reported here, the LSG probably varies less with capabilities than some imagine.

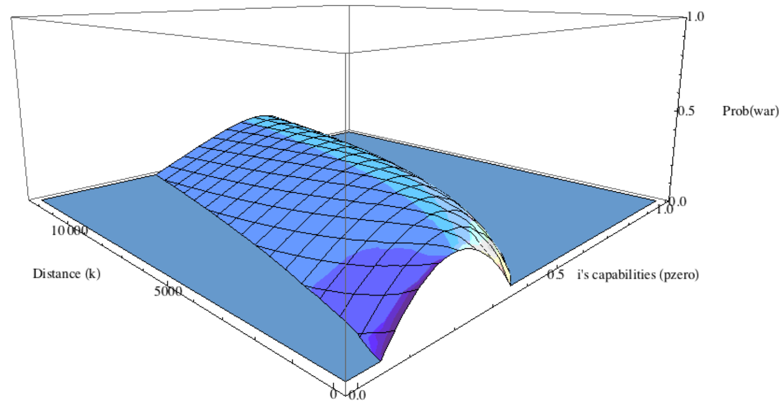

Figure A2: Relationship between Power, Proximity, and Conflict with Endogenous Costs

Appendix C: Alternatives to the Use of Corner Solutions

There are at least two other ways to generate an increase in conflict correlated with distance for powerful states (but not for the weak). For brevity, I offer only a sketch of the arguments here.

First, since capable countries can project power farther than weak states, the number of countries with which they can interact is naturally much larger. Yet, if countries still face opportunity costs in the exercise of military violence, then force used against one state cannot be exercised simultaneously against other nations. Capable countries must choose more selectively than weak states from a larger number of potential targets. At the same time, all countries desire to obtain preferred outcomes. This means that capable states have more incentives to bluff when dealing with the larger number of distant states. Distant adversaries must rationally infer that the probability of attack is lower with distance, and thus they are more likely to (incorrectly) reject i's demands.

Second, interest may decline in distance. Even with no LSG, powerful states are less likely to generate corner solutions if distance reduces resolve. The effect is then much the same as the model in the text. Capable countries generate corner solutions with neighbors, while interior solutions are produced in interactions with distant states. Weak countries, that must search for interior solutions even with neighbors, find that the loss of value for distant issues and territory leads to the opposite corner solution, where the weak state prefers conceding everything rather than risk fighting.

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