Interdependence Really is Complex[*]

Erik Gartzke[†]

15 February 2010

Abstract

Researchers, pundits, and policy makers have long debated whether economic interdependence pacifies or provokes conflict among states. Here, I suggest how interdependence can do both. Valuable linkages offer a mechanism for signaling and coercion short of military violence that stands to increase moderate (non-militarized) conflict behavior while reducing more intense conflict or uses of force. I offer a formal model of interdependence and conflict, testing hypotheses derived from the model against COPDAB and WEIS events datasets. Interdependence reduces militarized violence, but increases non-violent conflict. The argument also helps to account for differences between symmetry and asymmetry (i.e., interdependence as opposed to dependence).

[*]I thank David Bearce, Kristian S. Gleditsch, Robert Keohane, Eric Reinhardt and Dan Reiter for their comments and suggestions. *Stata* "do" files that replicate all aspects of the empirical analysis are available from the author.

[†]University of California, San Diego, Department of Political Science, 9500 Gilman Ave., Room 327 Social Sciences Bldg., La Jolla, CA 92037, USA. E-mail: `egartzke@ucsd.edu`.

1 Introduction

A venerable debate in international relations involves the impact of cross-border economic linkages on cooperation and conflict. On the one hand, liberal theory expands on the conviction that global commerce helps to pacify the politics of nations. On the other hand, diverse research argues that dependence can serve as leverage or friction, increasing tensions among nations. Researchers have reasonably sought to adjudicate this debate empirically, but the evidence is not definitive. While a large literature has developed that mostly favors the claim that interdependence promotes interstate peace, the best available studies are neutral or at best weakly supportive of the liberal perspective.[1]

Another possibility is that both perspectives are at least partially correct. It has long been suspected that the symmetry or asymmetry of dependence is important. Using a formal model, I show how interdependence precipitates both signaling and substitution, discouraging violent contests while actually increasing less intense forms of dispute behavior. I find evidence of these relationships in tests using COPDAB and WEIS events datasets. The theory helps to explain why the relationship between interdependence and conflict is not more distinct in large pooled datasets, and why case studies can be found that support either optimists or pessimists. The argument also accounts for the impact of dependence, as opposed to interdependence, on interstate conflict.

Rather than deterring disputes directly, interdependence can limit the intensity of contests by creating an alternative venue where states can compete that does not require military violence. Dependence increases the opportunities for non-dependent states to exercise coercion against their dependent partners. The presence of a cheaper mechanism actually *increases* conflict, as states are less inhibited by trade wars than by the high cost of actual war. Interdependent states should be more likely to compete over relatively minor issues that are left unaddressed by non-interdependent states. While less likely to go to war or use major violence, interdependent countries are more likely to experience non-militarized forms of conflict. In general, research must be more careful in identifying where trade inhibits conflict, and where economic linkages may encourage additional attempts to coerce concessions from competitors. I seek to provide such an explanation below.

[1] Mansfield and Pollins (2001, 2003a) and McMillan (1997) summarize the rich literature on the subject. Mansfield & Pollins (2003*b*) and Schneider, et al. (2003) offer collections of recent research that highlight key controversies.

2 Literature: Economic Interdependence and Peace

Interdependence is most often viewed through two conceptual lenses, classical liberal theory, and a more loosely grouped set of critics (realists, dependency theorists, and others).[2] Classical liberal theory conceives of opportunity costs associated with mutual economic activity as discouraging interstate violence (c.f. Montesquieu 1989[1748]; Cobden 1903[1867]; Wilson 1918; Angell 1933; Cooper 1968; Doyle 1986, 1997). Rosecrance (1985) offered a vision of the state as firm, or even as a virtual entity, less reliant on territory than policy (Rosecrance 1996). Keohane & Nye (1989) revived the liberal perspective as an alternative to realism, adding "neo-institutional" to the title, and characterizing "complex interdependence" as a system composed of multiple linkages, an absence of hierarchy among issues, and no war.[3] Brooks (1999, 2005) shifts the emphasis from trade to the globalization of production, arguing that the dispersion of manufacturing by multinational corporations is the critical variable. Oneal & Russett return the focus to the classical model as a key ingredient of liberal peace (Oneal, et al. 1996, 2003; Oneal and Russett 1999a, 1999b, 2001). A huge body of empirical research finds support for liberal claims (c.f. Polachek 1980, 1992, 1997; Oneal and Ray 1997; Crescenzi 2002; Reed 2003; Pevehouse 2004), though the robustness of the relationship has been challenged in the most sophisticated studies (Beck, et al. 1998).

Diverse critics focus on the leverage economic interdependence provides to powerful interests.[4] Realists see the effects of interdependence as at odds with the competitive logic of politics under anarchy (Carr 1939, Krasner 1976, Waltz 1979, Mastanduno 1998).[5] Subsequent work emphasizes the problematic role of trade in terms of relative gains (Grieco 1988, 1990; Mastanduno 1991). Marxist and realists operate with an equivalent model of inequality as the precipitant of conflict, though with contrasting rhetoric (c.f. Hamilton 1791; Hobson 1938; Kautsky 1914; Lenin 1965; Waltz 1970, 1999). Dependency theorists also highlight the effect of inequality in engendering

[2]Baldwin (1993) encapsulates the traditional debate between realists and liberals over economic interdependence.

[3]Keohane & Nye do not offer a causal theory linking interdependence and conflict. Instead, the three components of the complex interdependence "ideal type" are "assumptions" (1989, page 22) that liberal dyads do not fight.

[4]Dependence can affect the terms of trade, or be leveraged for political influence, but not both (Wagner 1988).

[5]Papayoanou (1996, 1999) synthesizes realist and liberal arguments, claiming that stability can occur among interdependent status quo powers with few economic ties to revisionist states and where economic interests are well represented domestically (1996, page 45). The theory hinges on the assumption that parity (achieved through balancing) leads to stability. For contrasting claims from similar premises about the relationship between power and satisfaction, see Organski (1958), Organski & Kugler (1980), Kugler & Organski (1989), Kugler & Lemke (1996).

tensions among core trading states and their dependents (c.f. Prebisch 1959, 1963; Dos Santos 1970; Wallerstein 1974, 1980, 1988). The emphasis is on conflict between core and periphery, rather than among core "great powers." Empirical research suggests as well that asymmetric dependence is associated with increased conflict (Hirschman 1945, 1977; Gasiorowski 1986; Barbieri 1996, 2003).[6]

The classical liberal view essentially mirrors deterrence theory. The prospect of benefits forgone inhibits disputes, just as expectations of additional costs are said to discourage aggression in deterrence theory.[7] States should be loath to fight if fighting is expected to result in the damage or loss of valuable economic linkages. As Levy puts it "the anticipation that war will disrupt trade and lead to a loss or reduction of the gains from trade creates incentives for political leaders to avoid taking actions that are likely to lead to war against key trading partners" (2003, page 128).

While plausible, there are at least three reasons to believe that the impact or the applicability of the classical perspective may be limited, or at the very least incomplete. First, to deter conflict, potential trade losses must be substantial relative to the (subjective) valuations nations place on disputed issues or resources. War is already a highly costly enterprise, while the portion of trade likely to be forfeit in a contest is often modest in scale. Where likely trade losses are small relative to the issues at stake, there is no reason to believe that interdependence will prevent fighting. Marginal increases in war costs must typically only marginally reduce states' incentives to fight.

Second, conflict is strategic. The most immediate effect of increasing the cost of warfare for one actor is to make it more appealing for opponents to behave more aggressively. If trade makes war prohibitive for one actor, then competitors have incentives to seek further concessions. Whether upping the ante for fighting leads to greater cooperation or conflict depends on whether states can capitalize on the leverage afforded by trade through other mechanisms (such as diplomacy) in a relatively flexible bargaining environment or whether leverage creates additional "friction" that spills over from the economic to the political and military spheres. That war is less (or more) likely under these circumstances is ambiguous (Morrow 1999). Some actors with limited aims may

[6]The empirical debate can be explained by the use of different statistical measures. See, Gartzke & Li (2003*b*), criticism by Barbieri & Peters (2003), Oneal (2003), and Hegre (2005), and replies by Gartzke & Li (2003*a*, 2005).

[7]Copeland (1996, 1999) contrasts the "comparative statics" of conventional opportunity cost arguments with his "dynamic" theory (1996, page 17). However, his explanation does not so much assess the rate of change in trade, as actors' expectations about "future trade levels," which is precisely a static comparison. It is hard to imagine why a trading state would focus on anything other than its expectations for future trade, since past surpluses are sunk.

choose to enjoy increased leverage in the form of a more stable peace, but others will not, given that most conflicts involve actors with considerable differences in preferences or interests. Again, mutual linkages best deter conflict where the incentives to fight are marginal from the outset.

Finally, conflict is strongly zero sum. The very point of competition is to take advantage of the vulnerabilities of an opponent. Harm can only be inflicted where there is something to be denied or destroyed. As such trade, or any other valuable linkage, is not only compatible with, but necessary for the practice of competitive punishment. If it is reasonable to suppose that nations are less inhibited by the prospect of curtailed commerce than they are by the bloodshed and destruction of battle, then we must imagine that economic bonds can do little more, and possibly much less, for the *overall* conflict propensity of states than have the increases in the lethality of war itself.[8]

3 The Complexity of Interdependence and Conflict

Even if common economic ties have limited impact in inhibiting conflict, interdependence can still be highly salient in altering the *intensity* of contests, when they occur. The costs a state incurs in competing inform competitors, encouraging settlements by reducing uncertainty about bargaining power (Morrow 1989, Fearon 1995).[9] The most informative signal is one that no one else is willing to make (Spence 1973, Crawford & Sobel 1982). Yet, actors in competition are not primarily interested in revealing information. Nor do competitors need to fight to be informative. States or other actors can simply "burn money," damaging or destroying their own assets to demonstrate resolve (Austen-Smith & Banks 2000). The problem with burning money, of course, is that it contradicts the private incentives competitors have to seek victory.[10] Since contests are strongly zero-sum, hurting oneself without harming an opponent effectively reduces the share of the spoils one can expect to obtain from any eventual bargain. If instead a competitor is able to inflict harm without incurring much damage in return, then a contest becomes much more appealing. However,

[8] Those who believe that interdependence deters conflict must, by parallel logic, embrace the view that war is less likely when nations arm. Thoughtful 19^{th} century observers like Cobden (1903[1867]) and Angell (1936) made exactly this association, claiming that, in addition to commerce, modern armaments had made war unsustainably lethal.

[9] Sartori (2002) discusses how a state's reputation can limit bluffing in diplomatic negotiations.

[10] In Monty Python's *Life of Brian*, the "Judean People's Front crack suicide squad" commits suicide. The humor in the situation is borne out of the fact that, under competition, burning money is informative but also self-defeating.

little information is revealed by fighting a costless contest, and so the contest must continue.

War combines inflicting and incurring harm, forcing competitors to reveal capabilities or resolve even as they compete for additional bargaining leverage. To appeal to participants, contests must be expected to result in an advantageous shift in the bargaining range between competitors. Leverage in bargaining is maximized by inflicting harm on others, though this does relatively little to reduce uncertainty and allow competitors to identify mutually acceptable bargains. Actions that are largely only costly to opponents will be appealing to initiators, but do little to inform. Much as war itself, interdependence forces the unification of the functions of coercion and information revelation by linking hardships inflicted with hardships incurred. Symmetric economic ties (interdependence) make it harder for states to inflict economic hardship without also experiencing harm themselves. Asymmetric dependence allows the dependent state to reveal information (through costly acts such as cutting off trade), but it provides few incentives for the dependent state to act in this way since, like burning money, the informative act fails to advantage the dependent actor. In contrast, the independent state in a dependent economic relationship has every incentive to use its leverage to material advantage, but little improvement in informational conditions is likely to result.

3.1 Chicken, Signaling, and Interdependence

In a chicken game, actors compete for preferred outcomes while possessing mutual incentives to avoid a catastrophic collision. Since neither player wishes to be the chicken, but both hope to avoid mutual disaster, chicken really embodies a psychological drama. As Schelling (1960) explains, victory involves persuading an opponent that *he* alone must act to avoid the costly and mutually unsavory event. Since claims of this type lack credibility (players want to claim to be unwilling or unable to swerve regardless of the truth), winning at chicken often involves successful deployment of commitment strategies. Players attempt to limit their ability to avoid collision (player A guzzles a large bottle of whiskey) or constrain subsequent choice (player B throws her steering wheel out the window). Of course, these actions are not useful in isolation. An opponent must observe commitment in order for the behavior to impinge on the player's subsequent decision making.

Crisis escalation differs from a game of chicken in that war (the collision) is not necessarily the worst payoff. Yet, because countries often vary in their willingness to fight, statements of resolve are again subject to credibility problems. Countries must convince opponents that they are willing to fight, either by fighting or by doing something that persuades an opponent that war is unlikely to be averted unless the opponent takes action to avoid the impending collision. If states vary in their ability to communicate non-violently, then the probability of war in dyads will vary as well.

Signaling theories of the democratic peace suggest one way in which states vary in their ability to communicate credibly short of military violence. If leaders in liberal polities are held to account by domestic audiences or opposition groups for bluffing, then claims by democratic leaders are more likely to be seen as credible. Fearon (1994*a*) argues that citizens punish leaders for dishonesty.[11] Schultz (1998) offers an illustration in which partisan politics makes bluffing harder for liberal leaders. In both cases, revelation occurs as a by-product of commitment. Cheap talk claims are more credible if a leader is destined to be punished for backing down in a crisis. If some states are differentially able to generate audience costs that produce commitment (tossing the steering wheel), then these states are more likely to be believed, and thus there is less likelihood of war.

Suppose that instead of discarding the steering wheel in the chicken game, or generating audience costs, a player is seen torching his house and possessions, ripping up his passport, defacing his driver's license, and so on. The player retains all of his original ability to swerve if desired, but the fact that the player is divesting himself of valued property suggests a certain lack of interest in acting with discretion. Just as with downing the whiskey bottle, signals of this type impart some loss of welfare regardless of subsequent actions.[12] Costs that are incurred in the contest are "sunk." They do not influence an actor's subsequent decision making because they cannot be undone.[13] To the degree that sunk costs distinguish among opponents, however, they also signal credibility.

Harming oneself can inform if the value of the items destroyed correlate with private information about an actor's resolve or capabilities. However, the intention of most competitors is gain, not

[11]It is unclear in Fearon's theory why egoistic citizens provide this service, at times to their own detriment. Smith (1998) offers a better rationale, arguing that democratic audiences infer leader incompetence from failed bluffing.

[12]One may argue that drinking whiskey produces a welfare *gain*. The distinction here is that intoxication is not designed primarily to alter the drinker's subsequent payoffs, but is instead intended to change the target's perceptions.

[13]A player who has thrown away his steering wheel may very well experience a last-minute change of heart. The point of ante commitment is precisely that it no longer matters whether the player is resolved or not. The discarded steering wheel informs competitors that, whatever an opponent's initial resolve, it has now been fortified.

loss. While burning money informs, it also lowers an actor's welfare and/or the actor's ability to compete. A leader may succeed in demonstrating her nation's resolve by putting battalions to the sword, or scuttling capital ships, but it makes more sense to endure such losses in the process of destroying an enemy's war machine. Since the intention of competitors is as much (or more) to obtain preferred settlements as to demonstrate resolve, burning money is seldom an appealing form of competition. Historically, the challenge has been that war is one of the only methods that simultaneously enhances credibility and increases bargaining power. But this aspect of history may be a thing of the past if interdependence creates a non-violent means of competing while informing.

3.2 Dependence Versus Interdependence

Economic interdependence, like war, combines the activities of revelation and coercion. Rather than burning money, harm is incurred in the process of imposing or threatening harm on opponents. Of course, economic dependence is all that is necessary to signal. Harming one's own economy can reveal the importance a state places on an issue in dispute. The problem is that avoidable, self-inflicted harm is also generally incompatible with the goal of *winning* in competition. For the same reasons that few states prefer sinking their own armadas to having them sunk by the enemy, relatively few states will choose to hobble domestic markets purely as a means to signal resolve.

Dependent states can signal but have disincentives to do so. Self-imposed hardships are revealing, but they also weaken the polity and economy in both absolute and relative terms. Conversely, asymmetric relationships in which an opponent is dependent allow coercion without much potential for signaling. States in competition naturally pursue avenues of advantage. If an opponent is highly dependent on some good (such as oil), the temptation is to use this dependence as diplomatic leverage. Economic dependence thus encourages different settlements than what might otherwise be achieved. Precisely because states possess uniform incentives to pursue asymmetric advantages, dependence provides minimal opportunity to reveal information and avoid bargaining failures.

Gartzke, et al. (2001) argue that states sharing common economic or other valuable linkages can use these linkages to communicate more credibly, and thus more often avoid wars caused by uncertainty and competition. The deterrent effect of interdependence does not by itself achieve peace. Instead, the differential response of states to the deterrent of economic linkages communicates relative resolve. Like audience costs or opposition groups, interdependence allows credible communication short of militarized violence that is unavailable in many dyads. Liberal dyads possess non-militarized methods to reveal mutually acceptable bargains and so have less need to resort to force. Rough symmetry, or interdependence, creates both an opportunity for advantage (ability to coerce) and a cost for competing (negative economic externality of costly signaling). Because interdependence, like war, combines signaling with the ability to coerce, it creates an alternative method of resolving conflict that is both self-enforcing and effective in an anarchical world.

3.3 Less Fighting but More Conflict

Strategists in the early nuclear era faced a fundamental challenge. How was competition possible when each disagreement potentially involved the end of civilization? Brodie (1946, 1959), Kahn (1960), Schelling (1966) and others realized that the situation was analogous to a game of chicken. Nuclear nations could not precipitate a cataclysmic exchange over every disagreement. Instead, conflict in the nuclear era involved manipulating the risk of mutually dreaded outcomes (Powell 1990). Competition among the superpowers became commonplace as the cost of a contest subsided from global holocaust to some finite probability of the same. Indeed, the fact that it is common knowledge in a chicken game that contests will be contained in their intensity may help to explain why the U.S. and Soviet blocs were willing to engage in a large number of relatively minor disputes.

Interdependence creates similar dynamics, though by extending the range of possible contests. Economic ties provide both the motive and opportunity for interdependent states to substitute relatively minor non-militarized contests for violent confrontations. As in clashes between the Soviet Union and the United States, the lower intensity and risk of escalation should mean that interdependent dyads actually increase conflict behavior, though at lower levels of dispute intensity. This insight contrasts with the classical liberal argument, which sees interdependence as deterring conflict and discouraging acts that run the risk of endangering trade or other profitable relationships.

Interdependence encourages additional low-level conflict. Militarized disputes are replaced with non-militarized disputes, but interdependent dyads are also free to pursue a greater variety of latent conflicts, given the lower cost of non-militarized disputes. Imagine a state that has a relatively modest grievance. The state can make demands in negotiation. Sometimes demands will be believed and issues resolved diplomatically, but the state often has no way of proving its valuation for issues, short of fighting. Given the high cost of warfare, the state may not be willing or able to act on any given dispute, but may instead let issues accumulate into a bundle of grievances. Once there are sufficient differences, or once grievances grow to sufficient intensity, this can provoke a war.

If instead economic linkages allow a state to signal the need for a more generous settlement, a contest can be averted. The presence of economic linkages, by allowing signaling, substitute a larger number of relatively minor economic conflicts for less frequent, but more intense militarized contests. Introducing a mechanism that is cheaper than war and more effective than talk encourages interdependent states to pursue issues for which fighting is prohibitively expensive. Interdependence thus creates a "middle way" between talk and war, reduces militarized conflict but increasing non-militarized conflict over a greater variety of minor issues. The need to combine the mechanisms of signaling and coercion in one conflict process in order to substitute for militarized violence also imply that interdependent dyads should be more peaceful than asymmetrically dependent dyads.

4 The Model

Two states, A and B, compete over resources or policies on a uni-dimensional issue space of domain x_j, $(0 \leq x_j \leq 1)$. Players are assigned as challenger (i) or defender (j), according to some arbitrary mapping $\Phi[A, B] = [i, j]$.[14] I assume an explicit (linear) functional form for players' utilities, and treat war as a costly lottery to make the model tractable and to focus on other elements of play.[15]

Allowing the distance between actors' ideal points to vary simulates variability in actors' preferences over a given issue or policy. Player i's ideal point is assumed to be at zero, while j's ideal point is at x_j. Varying j's ideal point reveals that interdependence differentially affects major and minor conflict. Actors also vary in the intensity with which they value movement along the issue space. Countries differ in their willingness to accept a given compromise. I represent

[14] By distinguishing between actors and roles, I allow for symmetry of play without complicating the game.

[15] Use of a lottery ignores the evolution of beliefs during a dispute (Wagner 2000), but the assumption is parsimonious given the focus on onset. Key comparative statics do not appear to be likely to be affected by iterating the game.

this variability by weighting outcomes on the issue space by t_ϕ, $\phi = [i, j]$, a player's type, where $(0 < t_{\phi_{min}} \leq t_\phi \leq t_{\phi_{max}} \leq 1)$. Large values indicate weak or unresolved states, while small values reflect more resolved or aggressive countries. Each player is privately informed about its own type.

Varying actors' preference intensities warrants additional explanation. Wagner (2000) argues that leaders know one another's preferences. Past experience probably reveals a government's ordinal rankings over outcomes. It will not come as a surprise to authorities in Iran that Washington prefers that they not proliferate nuclear weapons. Still, nations are often likely to retain private information about cardinal preferences. Much of the maneuvering that precedes, and often supplants, contests involves attempts to influence perceptions about preference intensity. Reasonable observers might differ in their estimates of US willingness to use military force to dismantle an Iranian nuclear program, even if all agree that preventing proliferation is a priority for U.S. officials. Thinking about uncertainty in this way takes into account the difference between knowing what an opponent wants, and knowing *how much* an opponent wants what he or she wants. It can come as no surprise, for example, that China prefers re-integration of Taiwan to de facto independence for the island, and that China prefers de facto independence to de jure independence. It is also obvious that the United States prefers de facto Taiwanese independence to Chinese coercion. Yet, Chinese uncertainty about US willingness to intervene if necessary, and Taiwanese uncertainty about the intensity of Chinese resolve to retain the status quo, contributed to several crises (Garver 1997).

Uncertainty can also be produced by assuming asymmetric information about capabilities or war costs. The cost of fighting ($k_\phi > 0$) in the model represents the dead weight loss associated with a military contest. States may be seen as asymmetrically informed about their own willingness to endure hardship on the battlefield. However, if all types in a game value the stakes equally, and only differ in their costs for a contest, then the tradeoff between endangering interdependence and a given change on the issue space is identical for all types. Actors will then signal only if they anticipate losing the benefit of interdependence by fighting, rather than in an ex ante attempt to obtain a more generous settlement. Using the distribution of capabilities to generate asymmetric information also suffers from the same pitfalls as relying on uncertainty about war costs.

The game tree in Figure 1 details the sequence of play.[16] Nature, a non-strategic actor, first assigns players' types as a random draw $t_\phi \sim \mathrm{U}[t_{\phi_{min}}, t_{\phi_{max}}]$. Nature also assigns players a level of interdependence, b_ϕ, such that $b_\phi \sim \mathrm{U}[0, \bar{b}]$, where $\bar{b} \ll k_\phi$. Strategic play begins with player i, who decides whether to retain the status quo, or to challenge j. I assume without loss of generality that the status quo is the defender's ideal point x_j.[17] If i does not challenge, the game ends with i receiving b_i and j receiving $\frac{x_j}{t_j} + b_j$. If i challenges, then i chooses between three possible actions.

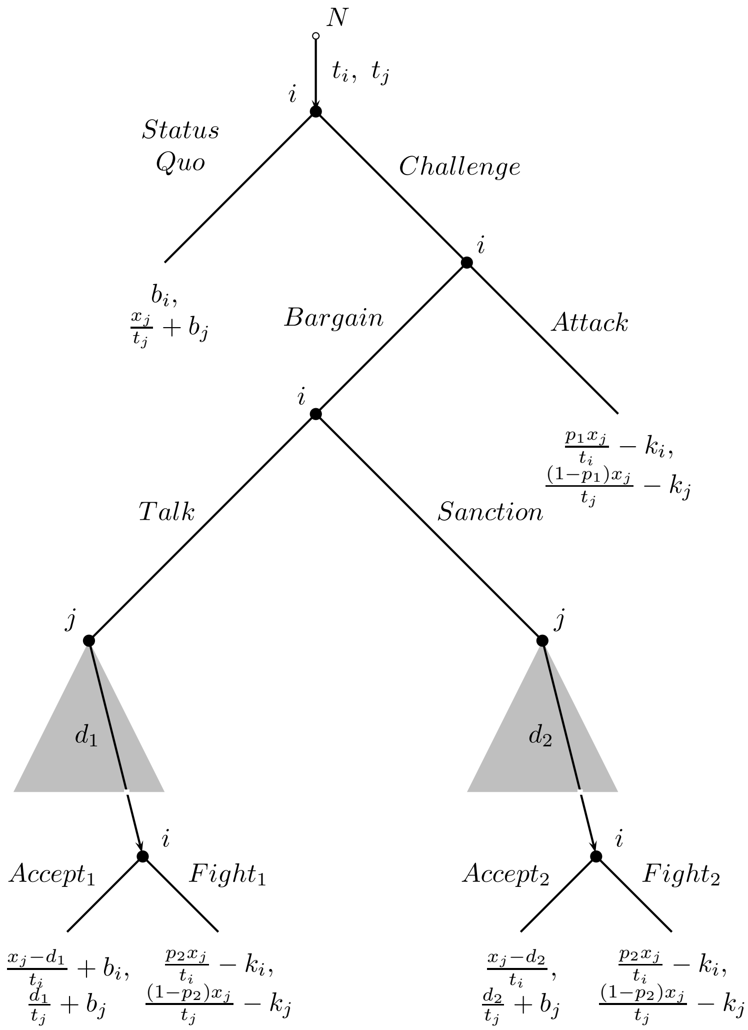

Figure 1: Interdependence Signaling Game

First, i can launch a preemptive attack.[18] Some military benefit may ensue from strategic

[16]Continuous typespaces create a game with infinite initial nodes, which cannot be represented graphically.
[17]Placing the status quo elsewhere on the issue space does not affect results, but makes the model difficult to solve.
[18]Preemption often involves an attack on the eve of an opponent's aggression. Here, i preempts itself.

or tactical surprise. Alternately, there may be a time value for outcomes on the issue space, discouraging states from tolerating delays due to negotiation. I assume that the probability of i's victory in a preemptive attack (p_1) is not less than its probability of victory after attempting to bargain $p_1 \geq p_2$. I also assume that victory in a contest results in a player obtaining its ideal outcome. Thus, i's payoff for attacking is $\frac{p_1 x_j}{t_i} - k_i$ and state j's payoff is equal to $\frac{(1-p_1)x_j}{t_j} - k_j$.

Second, i can pursue cheap talk diplomacy, either because the payoff for sanctioning is expected to be less than for retaining the benefit of interdependence, or because i lacks the required economic linkages. If i does not sanction, then state j chooses an optimal offer (d_1), which i either accepts or rejects. If i accepts j's offer, players receive $\frac{x_j - d_1}{t_i} + b_i$ and $\frac{d_1}{t_j} + b_j$ respectively. If i rejects d_1, i expects to receive $\frac{p_2 x_j}{t_i} - k_i$ while j can anticipate a payoff of $\frac{(1-p_2)x_j}{t_j} - k_j$. Traditionally, options one and two, fight or talk, represent the choices available to non-interdependent states.

Sandwiched between fighting and talking is a third option. To the degree that states are interdependent, they can use valuable assets to signal resolve and to coerce. State i can choose to sanction j. State j then makes an offer (d_2), which i chooses to accept (leading to payoffs $\frac{x_j - d_2}{t_i}$ and $\frac{d_2}{t_j} + b_j$) or reject (leading to a contest with expected payoffs $\frac{p_2 x_j}{t_i} - k_i$ and $\frac{(1-p_2)x_j}{t_j} - k_j$). Note that the payoffs for fighting are identical in options two and three (the two bargaining subgames) for both actors. Similarly, j's payoff if i accepts j's offer is the same regardless of whether i sanctions. The only difference in payoffs between the two subgames appears for i in failing to fight. One might also model state j as losing its benefit of interdependence (b_j), but this removes i's ability to coerce. The expectation of future losses can lead j to make a more generous offer. Interdependence creates coercive leverage and informative signaling. To inform, the challenger must incur a cost that differs depending on the challenger's type. To coerce, the defender must face the prospect of additional losses for failing to accommodate the challenger. Prospective losses are what matter in leveraging concessions for the challenger, and thus in justifying costly sanctions.[19]

[19] I assume that interdependence produces a non-negative benefit, and that at least some of this benefit is reduced by a contest. Interpret b_ϕ (each state's dependence) as some portion of the total interdependence between i and j (B_ϕ, where $b_\phi \leq B_\phi$) subject to loss. Trade is a flow, but choice making affecting a dynamic benefit still takes place at a finite point in time. Thus, b_ϕ equals the present value of a stream of payoffs sacrificed in a contest ($\{b_{\phi_1}, b_{\phi_2}, \ldots, b_{\phi_n}\}$, $b_\phi = \left\{b_{\phi_1} + \delta b_{\phi_2} + \cdots + \delta^{(n-1)} b_{\phi_n}\right\}$), so that the (static) model can be seen as representing a dynamic process.

Utility functions for the two players are as follows:[20]

$$
\begin{aligned}
U_i &= (1-c)(b_i) + c\Big[(1-m)\left(\tfrac{p_1 x_j}{t_i} - k_i\right) + m\Big((1-s)\Big((1-f_1)\left(\tfrac{x_j - d_1}{t_i} + b_i\right)\Big) \\
&\quad + f_1\left(\tfrac{p_2 x_j}{t_i} - k_i\right) + s\Big((1-f_2)\left(\tfrac{x_j - d_2}{t_i}\right) + f_2\left(\tfrac{p_2 x_j}{t_i} - k_i\right)\Big)\Big)\Big] \qquad (1)
\end{aligned}
$$

$$
\begin{aligned}
U_j &= (1-c)\left(\tfrac{x_j}{t_j} + b_j\right) + c\Big[(1-m)\left(\tfrac{(1-p_1)x_j}{t_j} - k_j\right) + m\Big((1-s)\Big((1-f_1)\left(\tfrac{d_1}{t_j} + b_j\right)\Big) \\
&\quad + f_1\left(\tfrac{(1-p_2)x_j}{t_j} - k_j\right) + s\Big((1-f_2)\left(\tfrac{d_2}{t_j} + b_j\right) + f_2\left(\tfrac{(1-p_2)x_j}{t_j} - k_j\right)\Big)\Big)\Big] \qquad (2)
\end{aligned}
$$

Variables c, m, s, and f are i's challenge, bargain, signal, and fight decisions ($1 =$"affirmative", $0 =$"negative"). Other variables are as previously described. The game is solved using the Perfect Bayesian Equilibrium solution concept. A complete formal solution appears in the appendix. I focus here on the intuition behind players' strategies, and on key comparative statics results.

In the final stage in each of the two bargaining subgames, player i chooses between fighting and accepting j's offer ($d_\upsilon, \upsilon \in [1, 2]$). The probability that i rejects d_υ is increasing in d_υ, the probability of victory for i in a fight (p_2), and decreasing in war costs (k_i), the distance to j's ideal point (x_j), and in the talk subgame, i's benefit of interdependence (b_i). Since a contest imposes some positive cost, there exists a non-empty subset (D') of the offer set D, ($D' \subset D[0, x_j]$), in each subgame that both players prefer to a contest. Given that players are privately informed about types (t_ϕ), however, it is possible for $d_\upsilon \notin D'$, leading to bargaining failure and a costly lottery.

Given i's private information, j's optimal demand is a function of equilibrium beliefs about which types of i will, and will not, signal by jettisoning economic benefits. If i and j are not interdependent, then i's signal is not informative and j cannot differentiate between types. Similarly, if j is dependent on i, but i is not dependent on j, no separation of types occurs. If instead there is a cost to i for sanctioning, then a semi-separating equilibrium can occur in which some types of i prefer to sanction while other types do not. The resulting divergence allows j to target its offers more effectively. As the cost to i of sanctioning rises, the difference between d_1 and d_2 also increases (for interior solutions), leading more types of i to accept j's offers rather than fight.

[20]Placing t in the denominator of the utility function, rather than in the numerator, simplifies the solution.

The decision to fight preemptively ($m = 0$) depends on i having a high prior belief that it will reject j's offer. As i's dependence on j increases, the difference in offers brought on by signaling increases as well. Types of state i that are resolved enough to attack increasingly prefer to bargain as their ability to signal increases. Interdependent states that fight stand to lose their economic benefits in any case, so abandoning these benefits poses no additional cost. A high valuation for the issue space also makes economic losses more acceptable. The probability of fighting declines in the dependence of i on j, while incentives to bargain increase in the dependence of j on i.

Proposition 1 *Interdependent dyads are less likely to experience militarized conflict behavior.*

Asymmetric dependence reduces the pacific impact of interdependence. If j's dependence on i, b_j, is large relative to i's dependence on j, then i has more incentive to challenge j, but the challenge is not informative. In this situation, i can compel but not inform. The incentive to compel encourages a challenge while the inability to inform raises the risk of a contest.

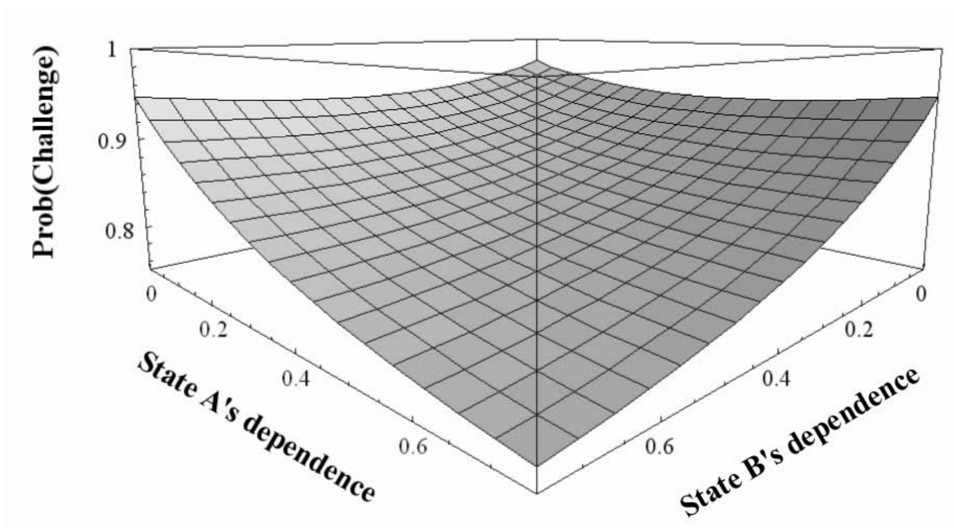

Figure 2: Probability that A or B Challenge as a Function of Dependence
($t_{\phi_{max}} = 1, t_{\phi_{min}} = 0.01, p_1 = 0.55, p_2 = 0.45, k_\phi = 0.5, x_j = 0.75$)

Using the random mapping of A and B onto i and j makes it possible to represent a symmetric game in which both states have grievances and each can potentially challenge the other. Figure 2 illustrates the probability of a challenge when A and B each have a 50% probability of being the challenger, and where parameter values are as indicated in the figure. The horizontal x an y axes report the level of dependence for state A and B, respectively. The vertical z axis represents the probability of a challenge to the status quo.[21] Notice that, while the effect of increasing interdependence is always negative, increasing dependence can actually increase the probability of a challenge. If, for example, B, as the potential challenger, is not much dependent on A (say 0.05 in the figure), then increasing A's dependence on B (say from 0.4 to 0.6 in the figure) marginally increases the probability that B challenges (in this case from 0.909 to 0.913 or about 0.4%). Further, since B has little ability to signal, the probability that a challenge leads to war must be higher than for interdependent states. Notice too that the most conflictual condition is autarky ($b_i = b_j = 0$).[22] Asymmetric dependence is more conflictual than interdependence, but less conflictual than autarky.

Proposition 2 *The probability of militarized conflict rises in the asymmetry of dyadic dependence*

The probability that i signals depends on the level of interdependence (b_i and b_j), i's valuation for the issue (t_i), and the divergence between players' ideal points (x_j). In general, signaling is informative to the extent that it is exclusive. If different types of player i differ in their willingness to damage economic ties, then j can distinguish types by observing i's choice. This implies that increasing the cost of signaling reduces the willingness of types to signal. Yet, the sample of types i that challenge, but do not attack, can also change. Given a large enough hazard of war, relatively modest differences deter a challenger. If instead i can compete through a cheaper method, then more types of player i are willing to signal. Similarly, while state i is less inclined to signal as its own costs increase, this disincentive is offset to the degree that signaling allows i to coerce state j. As interdependence increases, the portion of types i that signal increases where x_j is small.

For i to signal, i must first challenge ($c = 1$), then choose to bargain ($m = 1$), then finally jettison the benefit of interdependence ($s = 1$). Figure 3 represents the probability that i signals in the model for values of b_ϕ and x_j. Notice that, where i and j possess substantially different ideal points (x_j is large), the probability of signaling declines in the costliness to i of the signal. Here, most types of state i challenge regardless of whether they will be able to signal. As the difference

[21] Plotting the fight probability is complicated by the three fight subgames and by corner solutions.

[22] I assume a relatively high value for the difference in actors' ideal points ($x_j = 0.75$). This avoids complications resulting from substitution effects associated with signaling which I discuss below.

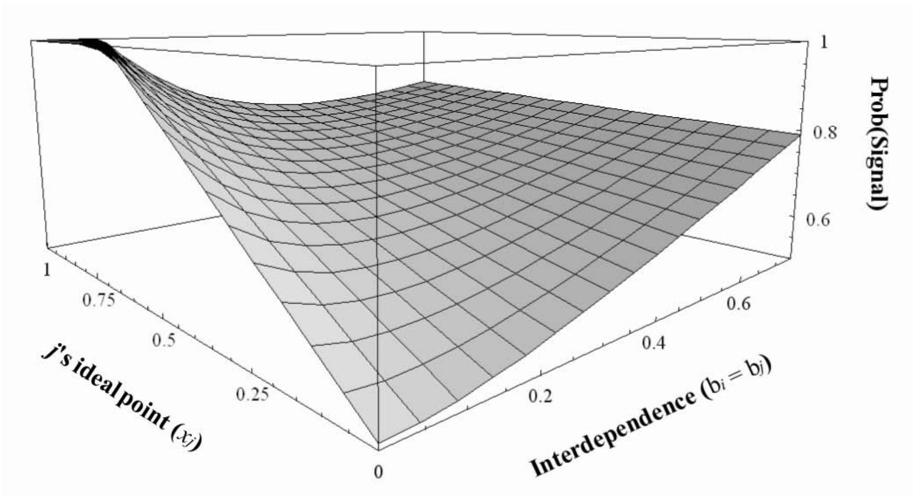

Figure 3: Probability that i Signals ($t_{\phi_{max}} = 1, t_{\phi_{min}} = 0.01, p_1 = 0.55, p_2 = 0.45, k_\phi = 0.5$)

between ideal points declines, however, the probability of signaling rises with the cost of the signal. In situations where the change in payoff for winning versus losing is relatively low, the ability to coerce through interdependence, rather than warfare, encourages more types of i to challenge.

Figure 4 contrasts the magnitude of the disagreement, the cost of the signal, and the probability of signaling. The x axis in Figure 4 represents the level of interdependence in the dyad, while the y axis measures the probability of a signal. Again, parameter and variable values are as reported in the Figure. Two horizontal lines appear in the Figure. Above, a solid downward-sloping line reflects a large difference in ideal points between i and j. The informational role of interdependence features prominently when there are substantial differences in ideal points. If i expects to fight, then to the extent that i's economy depends on j's economy, jettisoning interdependence ex ante signals j with no loss to i. Below, a dashed upward-sloping line shows the effect of a small difference in ideal points between the actors i and j. Relatively unresolved types of challenger find a military contest prohibitive if the difference in ideal points is modest. When states have relatively minor differences of interest, the coercive aspect of interdependence plays a more important role. Types of i that are willing to attack continue to find it useful to signal in pursuing a better settlement,

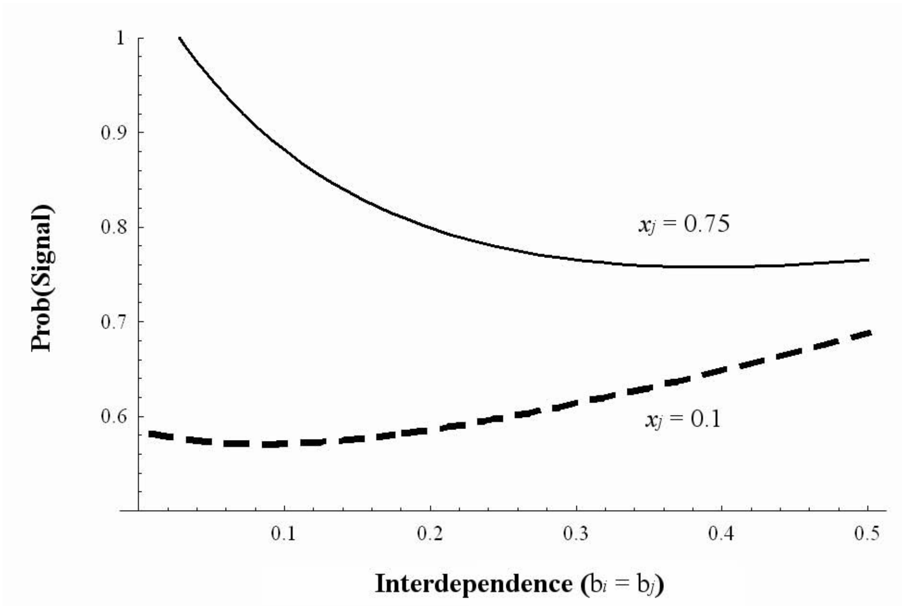

Figure 4: Probability that i Signals, $x_j = 0.1, = 0.75$
$(t_{\phi_{max}} = 1, t_{\phi_{min}} = 0.01, p_1 = 0.55, p_2 = 0.45, k_\phi = 0.5)$

but types that are unwilling to challenge under autarky may now have an incentive to seek to alter the status quo. For states with minor differences of interest, the inducement for i to challenge rises more steeply in j's dependence (b_j) than it falls in i's dependence. The results generalize to a symmetric dyad in which players are randomly selected to act as either the challenger or defender.

The probability that interdependent states engage in non-violent conflict thus depends on the distance between ideal points, and on the distribution of issues. The chances that states signal through economic linkages declines in the level of interdependence when the difference in ideal points is substantial, but *increases* in interdependence when differences are relatively minor. If in addition, there are more issues over which states have minor differences of interest than major differences, then the probability that a dyad experiences minor (non-militarized) conflict increases with interdependence. Differences over most issues are not sufficient to justify war. Paradoxically, introducing interdependence allows states to engage in conflict by lowering the cost of contests.

Proposition 3 *Interdependent dyads are more likely to experience non-militarized conflict.*

5 Research Design and Data

Testing propositions 1–3 involves estimating four different relationships.[23] I examine the effect of interdependence and asymmetric dependence on all types of conflict, and the effect of interdependence on non-militarized versus militarized conflict. To do this, I examine separate regressions for militarized conflict, non-militarized conflict, and all conflict behavior. Given comparative statics claims, the use of a maximum-likelihood estimator and a dichotomous dependent variable is appropriate. I assess each relationship using logit with econometric controls for spatial and temporal dependence. Each sample includes all dyad years for the period covered by the dependent variable including multiple conflict events in a given dyad year. I use conflict events because the hypotheses involve the frequency of incidents, rather than their presence or absence in a given time period.[24]

Quantitative analysis invariably involves a complex series of procedural steps and judgements about variable construction and model specification that are open to debate. Accidents at any point can lead to errors that are difficult to identify afterwards. While replication has been embraced in principle, existing standards seldom yield genuine reproducibility. Automating replication greatly simplifies the process, and encourages cumulative research.[25] Though I argue for certain variable constructions and model specifications, I have also examined numerous alternatives. Results generally appear robust to reasonable variations. Finally, I use two different events datasets, the Conflict and Peace Data Bank (COPDAB) and the World Event Interaction Survey (WEIS). Differences between these data reduce the risk that results are an artifact of the one particular dataset.[26]

5.1 Data

I use conflict events data in constructing the dependent variables, while measures of dependence and interdependence constitute the key independent variables. Other variables reflect state interests and material influences such as power, proximity, prosperity and alliance partnerships.

- *Conflict*: Testing the propositions requires measures of militarized and non-militarized con-

[23] Proposition 3 implies that interdependent dyads should experience fewer high cost militarized disputes.

[24] In a separate study, I evaluate the population of dyad years (selecting on high conflict, low conflict, or median conflict when there are multiple conflict events) and all dyad events. Results are equivalent to those reported here.

[25] *Stata* "do" files are available upon publication of the manuscript. Graphs appear in a *Mathematica* file.

[26] "Splicing" the two datasets would tend to bias in favor of statistically significant findings (Reuveny & Kang 1996).

flict. Standard data sources such as the Militarized Interstate Dispute datset (MIDs) only code for militarized disputes. The MID dataset and the International Conflict Behavior dataset (ICB) also sample on conflict intensity, reporting the most disputatious behavior in a given period or crisis (Smith 1999, Brecher & Wilkenfeld 1997). Conflict data thus omit or under represent the behavior needed to appropriately evaluate proposition 3, in particular.

Events data, which seek to code all observations of given behavior within a certain spatial-temporal domain, better serve the objectives of this study. The Conflict and Peace Data Bank (COPDAB, 1948-1978) are described by Azar (1993). The COPDAB conflict scale ranges from 8 ("neutral or non-significant acts") to 15 ("extensive war acts causing deaths, dislocation or high strategic costs"). The World Events Interaction Survey (WEIS, 1966-1992) also codes both cooperation and conflict. WEIS is non-parametric, with no explicit measure of conflict intensity (McClelland 1978, 1983). However, Goldstein (1992) and Vincent (1979, 1983) provide schemes for scaling WEIS events along a single ordinal dimension. Events data researchers debate the two scales, but results here using either scale appear comparable.

Tests of propositions 1 and 2 involve all conflict events. I also include observations for all dyad years in the temporal-spatial domain for which there are no conflict events (coded in the dependent variable as zero) so as not to select on the dependent variable. Testing proposition 3 requires two dependent variables that split the sample between militarized and non-militarized events. The appropriate division of conflict behavior between a militarized variable and a non-militarized variable can be debated. Results do not appear to depend on minor coding changes. In the COPDAB sample, I code scale 11 "Diplomatic-Economic Hostile Actions" and scale 12 "Political-Military Hostile Actions" as non-militarized conflict. I code scale 13 "Small-Scale Military Acts", scale 14 "Limited War Acts", and scale 15 "Extensive War Acts" as reflecting militarized conflict.[27] In the WEIS dataset, I code militarized conflict as beginning in the Goldstein scale at 8.7 "force" and in the Vincent scale at 4.7, also "force." Non-militarized conflict constitutes conflict behavior up to 5.8 "threat with non-military negative sanction" on the Goldstein scale and 3.5 "reduce relationship" on the Vincent scale.[28]

[27] I omit scale 9 "Mild Verbal Expressions", and 10 "Strong Verbal Expressions" as they seem to reflect cheap talk.

[28] I again omit events that defy easy categorization, including 3.8 "expel" and 4.5 "seize" (Vincent) and 6.9 "ulti-

- *Interdependence*: Gleditsch (2002) offers economic variables with fewer missing values than other sources, including observations for developing and socialist countries. I construct variables for the sum of trade dependence in the dyad and for the absolute difference between monadic values. This operationalization reflects the theoretical arguments. I also construct variables for the higher and lower monadic values in the dyad and the product of both dependence measures in the dyad. Dependence is measured as the sum of bilateral imports and exports for a country, divided by gross domestic product (GDP) (Oneal & Russett 1997).

- *Democracy*: Polity data provide two eleven-point scales of regime type based on formal constraints on the executive ($AUTOC$) and institutional support for democracy ($DEMOC$) (Gurr et al. 1989). I generate monadic scores by taking the difference between polity scores, adding ten, and dividing by two, yielding a statistic that ranges between (0 to 10). I combine monadic measures into a dyadic indicator in the same manner as for interdependence.

- *Interests*: Whether states fight is partly a function of whether they disagree. Indicators approximating preference affinity have proven useful in other studies (Bueno de Mesquita 1981, Bueno de Mesquita & Lalman 1992, Gartzke 1998, Gartzke 2000). Affinity has been measured either as the correlation between states' alliance portfolios, or as the similarity of United Nations roll-call votes. The former approach offers a longer time series (1816–1992) while the latter yields greater variance during the Cold War (Oneal & Russett 1999*a*). Given the coverage of the COPDAB and WEIS datasets, I adopt the latter approach here. "S" scores measuring preference affinity are calculated using UN roll-call data (Signorino & Ritter 2001).

  The theoretical model refers to preference similarity on specific issues while empirical measures reflect the overall affinity of nations. Since issues that are readily resolved, or that offer no likelihood of being resolved may not be expressed, specific issues over which leaders have preferences will often be omitted, causing bias. Linking preferences to the presence or absence of specific conflicts is also impractical. Given the limitations in operationalizing preferences, I assess whether interdependent dyads have more non-militarized conflicts and fewer militarized conflicts, rather than seeking to measure preference affinity on specific issues

matum," 7 "break diplomatic relations," 7.6 "demonstrate", and 8.3 "non-injury destructive act" (Goldstein).

and identify whether costly signaling ensued. Thus, testing the propositions does not require measuring preference similarity. I include the affinity variable as a control, and because it may influence the overall probability of conflict behavior. Since the theory suggests that the relationship between interdependence, preferences, and conflict is non-monotonic, I also include an interaction term between the interdependence and affinity in some regressions.

- *Distance*: Studies of the democratic peace use contiguity and/or politically relevant dyads as an indicator of distance (Maoz & Russett 1993). More recent research includes a measure of contiguity and a logged indicator of the distance between the capitals of states in the dyad.

- *Allies*: Previous studies include a measure for alliance ties within a dyad (Oneal & Russett 1997, Russett & Oneal 2001). While important, states also have alliances with partners *outside* the dyad. Ignoring extra-dyadic linkages violates the assumption of independence across units. I include variables measuring third-party and fourth-party alliances. Third-party alliances involve a commitment by one state (C) in dyad B–C to act on behalf of state (B) in the event that dyad A–B experiences conflict.[29] Similarly, fourth-party alliances are coded if in dyad C–D, state C is allied with A and D is allied with B and dyad A–B experiences conflict. The variables capture significant covariance across units (Gartzke & Gleditsch 2008).

- *Capabilities*: The impact of capabilities are measured using the Correlates of War (COW) Composite Indicators of National Capabilities (CINC). I use the CINC of the more powerful state divided by the sum of CINC's in the dyad ($\frac{CINC_{high}}{CINC_A+CINC_B}$). Systems theories argue that major powers play a special role internationally. I include a dummy variable for the presence of at least one major power in the dyad. Economic development is related to interdependence and might affect a state's willingness to fight or compete. I evaluate the influence of development with the lower of logged per-capita GDP in the dyad (Oneal, et al. 1996).

- *Temporal Dependence*: I control for temporal dependence using "peaceyears" and three spline variables, interpolated from a dummy matrix coding the lag between conflict dyad years in the dependent variable (Beck, et al. 1998), using a *Stata* batch file created by Tucker (1999).[30]

[29] Use of current and subsequent years of alliance contagion is somewhat arbitrary but seems to work.

[30] Results are similar with and without splines, and for splines using all conflict behavior and just military violence.

6 The Results

Table 1 lists the results of four logit regressions of interdependence, regime type, interests, and other variables on the three dependent variables based on COPDAB conflict events. Model 1 estimates the effect of the sum and difference of dependence on all COPDAB conflict behavior. Models 2 and 3 examine the relationship between interdependence and non-militarized conflict. Model 4 assesses the impact of interdependence on militarized conflict. The results appear to bear out all three of the theoretical propositions. As Model 1 demonstrates, conflict (militarized and non-militarized combined) tends to decrease in interdependence, but increase in asymmetry. Models 2 and 3 show that, for non-militarized conflict, the probability of a conflict event is increasing in interdependence. Model 3 also includes an interaction term between interdependence and interest similarity, though this proves not to be significant. Finally, in Model 4, the effect of interdependence on militarized conflict is shown to be statistically significant and negative. Interdependence appears to make non-militarized conflict more common while decreasing more intense interstate violence.

Figure 5 plots the results of Table 1, Model 1. As in Figure 2, conflict drops monotonically in interdependence (moving from the back of the graph to the front), but can increase with asymmetry. If we again examine an example where state B's dependence on state A is modest (0.05), but A's dependence on B increases from large (0.4) to very large (0.6), we find that the probability of a conflict, militarized or otherwise, increases by approximately 38.5% (from roughly 5.5% to 7.6%).[31]

Models 2, 3, and 4 in Table 1 evaluate proposition 3. Figure 6 plots the effect of interdependence (horizontal axis) on the probability of a COPDAB conflict event. Results from Model 3 appear as a dashed line sloping upwards from left to right, while the line generated using Model 4 slopes downward. Interdependence reduces militarized conflict while increasing non-militarized conflict.

Table 2 repeats the analysis of all conflict events, non-militarized events, and militarized conflict for the WEIS data. WEIS requires coding through either the Goldstein or Vincent scales. Model 5 reports estimates of interdependence, democracy, interests, and other variables on all WEIS conflict events using the Goldstein scale. Model 6 lists estimates of the same relationships using the Vincent scale. Model 7 examines precipitants of non-militarized conflict, while Model 8 shows the impact of

[31] Changes in the probability of a conflict are larger empirically than in the model, but relative changes are similar.

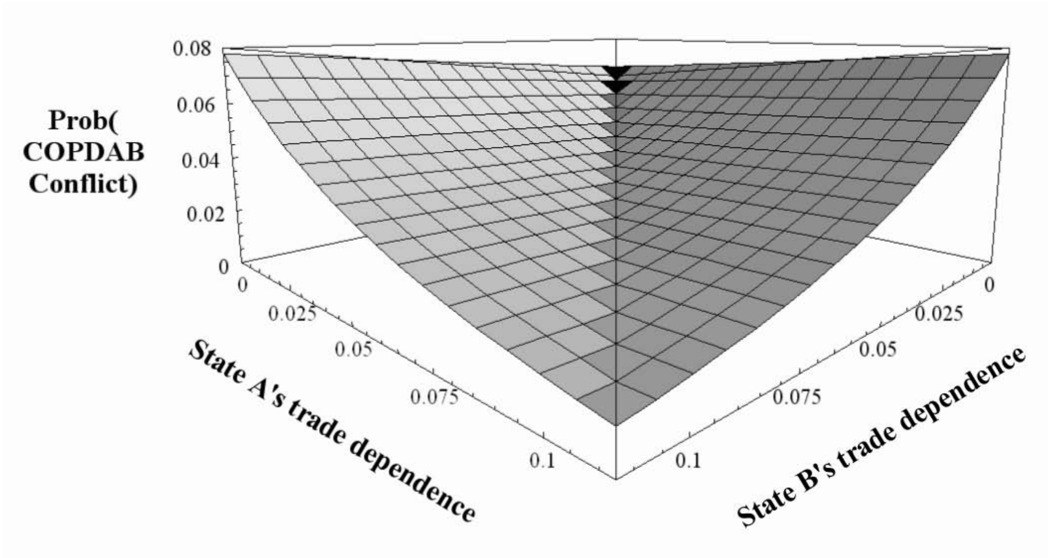

Figure 5: Estimated Probability of COPDAB Conflict from Model 1,Table 1

interdependence and the other independent variables on militarized WEIS events. As before, the effect of interdependence shifts depending on whether conflict is militarized or not. Symmetry in interdependence is associated with a decline in overall conflict while asymmetry increases conflict. The effect of interdependence as a mechanism for costly signaling appears to be reflected in the novel finding that states that share economic linkages are more likely to experience minor (non-violent) conflict behavior, while reducing the propensity toward militarized disputes and warfare.

7 Conclusion

Explanations for the impact of economic interdependence on political conflict have historically focused on factors that limited or constrained the ability of liberal dyads to aggressively pursue their goals. Cross-border trade was thought to make it difficult for liberal dyads to contemplate using force. It is paradoxical then that the liberal peace may actually be more associated with the constraints placed on *non*-liberal dyads in the form of limited alternatives to cheap talk and military violence. As we have seen, interdependent dyads appear to engage in more conflict at low intensities. The finding is consistent with signaling and inconsistent with classical arguments.

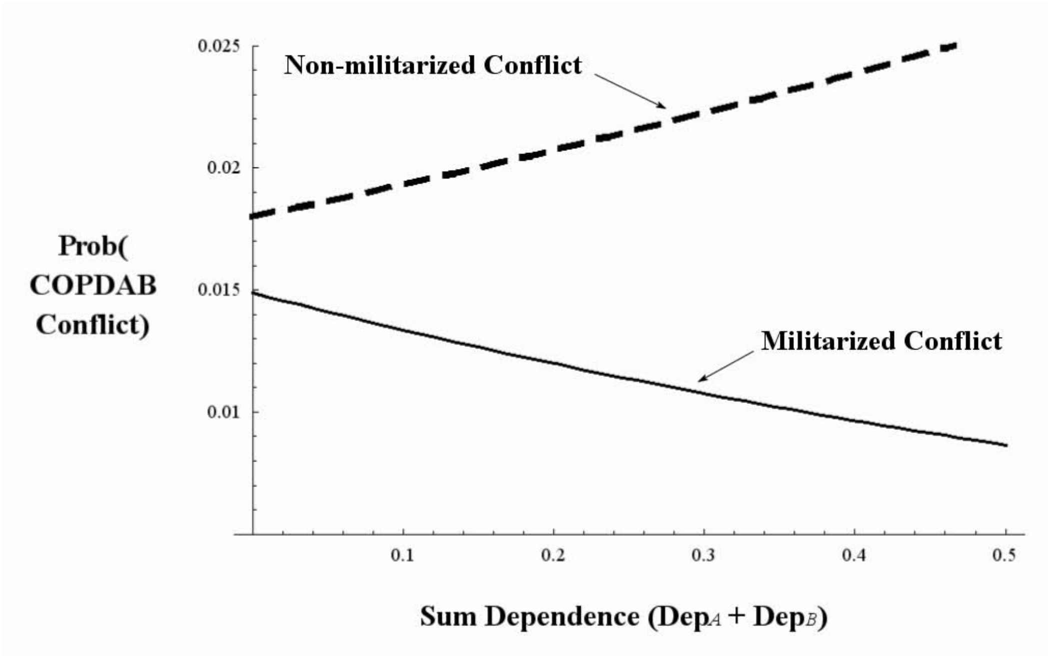

Figure 6: Estimated Probability of COPDAB Conflict from Models 3 & 4, Table 1

Policy implications of liberal signaling are substantial and counterintuitive. Classical theories of interdependence offer policy proscriptions that are largely consistent with Western ideals. Liberals promote international trade as pacifying. Signaling suggests that factors that enhance the credibility and variety of signals available to states encourage peace. This may result from an increase in interdependence, but it is also possible that asymmetric development will encourage greater coercion without promoting peace. Further, actions designed to facilitate international trade may actually interfere with some of the pacifying effects of economic ties. Facilitating signaling calls for an *increase* in the conflictual acts available to states, albeit at the low end of the conflict spectrum. Such a suggestion flies in the face of current popular, academic, and policy thinking about international affairs. Limitations imposed by the WTO, for example, make it more difficult for states to communicate resolve. The WTO may enhance free trade at some expense to an avenue for credible political discourse. Interdependence can promote peace when states are able to obstruct markets, revealing relative resolve and obviating the need to compete and signal through deadly force.

A The Interdependence Signaling Game

After summarizing play in the interdependence signaling game, I provide details of players' optimal strategies, beliefs, and the equilibria. I then derive the three propositions that appear in the text.

A.1 Sequence of Play

Backwards inducting from the final stage(s) of the game, player i must decide whether to fight. If i previously chose to challenge, bargain, and talk, then i is indifferent between fighting and $d_1' = t_i\left(b_i + k_i\right) + x_j\left(1 - p_2\right)$. Define $t_i^{f_1} \equiv \frac{d_1 - x_j(1-p_2)}{b_i + k_i}$ as the player i who is just indifferent between fighting and accepting d_1. Similarly, if i challenges, bargains, and signals, then i is indifferent between fighting and accepting $d_2' = t_i k_i + x_j\left(1 - p_2\right)$. $t_i^{f_2} \equiv \frac{d_2 - x_j(1-p_2)}{k_i}$ is the indifferent type.

State j uses its beliefs about i and $t_i^{f_1}$ and $t_i^{f_2}$ to calculate the probability that i will fight in each subgame. Beliefs are calculated using Bayes' Rule ($Pr\left(A \mid B\right) = \frac{[Pr(A)*Pr(B|A)]}{[Pr(A)*Pr(B|A)+Pr(\sim A)*Pr(B|\sim A)]}$), where $A = f_\upsilon$ and B is i's signaling decision. Define $t_i^{challenge} \equiv t_i \; s.t. \; U_i^{(c=1)} = U_i^{(c=0)}$, $t_i^{attack} \equiv t_i \; s.t. \; U_i^{(m=1)} = U_i^{(m=0)}$, and $t_i^{signal} \equiv t_i \; s.t. \; U_i^{(s=1)} = U_i^{(s=0)}$. If $s = 0$, j expects i to fight with probability $Pr\left(f_1\right) = \frac{t_i^{f_1} - t_i^{signal}}{t_i^{challenge} - t_i^{signal}}$. If $s = 1$, j's expected probability equals $Pr\left(f_2\right) = \frac{t_i^{f_2} - t_i^{attack}}{t_i^{signal} - t_i^{attack}}$. Substituting j's belief ($Pr\left(f_1\right)$) for f_1 in equation (2), j solves for $d_1^* = argmax\; U_j^{(c=1,m=1,s=0)}$. If $s = 1$, j uses its belief ($Pr\left(f_2\right)$) about f_2 in equation (2) to solve for $d_2^* = argmax\; U_j^{(c=1,m=1,s=1)}$.

State i must use its beliefs about j's type to estimate d_υ^*. Let t_j^{min} and t_j^{max} equal the lower and upper boundaries of j's type space, so that $d_\upsilon^{est} = \int_{t_j^{min}}^{t_j^{max}} d_\upsilon^* dt_j$. Solving for d_1^{est} and d_2^{est}:

$$d_1^{est} = \frac{1}{4}\left(t_j^{min} - t_j^{max}\right)\left(\left(t_j^{max} + t_j^{min}\right)\left(b_j + k_j\right) + 4x_j\left(p_2 - 1\right) - 2t_i^{challenge}\left(b_i + k_i\right)\right) \quad (3)$$

$$d_2^{est} = \frac{1}{4}\left(t_j^{min} - t_j^{max}\right)\left(\left(t_j^{max} + t_j^{min}\right)\left(b_j + k_j\right) + 4x_j\left(p_2 - 1\right) - 2t_i^{signal}\left(k_i\right)\right) \quad (4)$$

Player i decides whether to signal when $c = 1, m = 1$. Since $t_i^{signal} \Rightarrow \frac{\partial U_i^{(c=1,m=1)}}{\partial s} = 0$, substituting d_1^{est} and d_2^{est}, applying limiting conditions ($f_1 = f_2 = 0$) and solving:

$$t_i^{signal} = \frac{\left(b_i + k_i\right) t_i^{challenge}\left(t_j^{max} - t_j^{min}\right)}{2b_i + k_i\left(t_j^{max} - t_j^{min}\right)} \quad (5)$$

Next, i decides whether to strike without negotiating, given that i chooses to challenge, $t_i^{attack} \Rightarrow \frac{\partial U_i^{(c=1)}}{\partial m} = 0$, and substituting d_1^{est} and d_2^{est}, and limiting conditions $f_1 = f_2 = 0$, and $s = 1$:

$$\begin{aligned} t_i^{attack} \quad = \quad & \frac{1}{4k_i\left(2b_i + k_i\left(t_j^{max} - t_j^{min}\right)\right)}\left(\left(k_i\left(t_j^{max} - t_j^{min}\right) + 2b_i\right)\left(k_j\left(t_j^{min^2} - t_j^{max^2}\right)\right.\right. \\ & +b_j\left(t_j^{min^2} - t_j^{max^2}\right) + 4x_j\left(p_1 - 1 + \left(t_j^{max} - t_j^{min}\right)(1 - p_2)\right)\Big) + k_i\left(t_j^{max} - t_j^{min}\right) \\ & \left(2k_i t_i^{challenge}\left(t_j^{max} - t_j^{min}\right)\right) + 2b_i\left(k_i t_i^{challenge}\left(t_j^{max} - t_j^{min}\right)^2\right) \end{aligned} \tag{6}$$

The final (first) step is for i to determine whether to challenge. Given $t_i^{challenge} \Rightarrow \frac{\partial U_i}{\partial c} = 0$, substituting d_1^{est} and d_2^{est}, and adding the limiting conditions $f_1 = f_2 = s = 0$, and $m = 1$:

$$t_i^{challenge} = \frac{(b_j + k_j)\left(t_j^{max^2} - t_j^{min^2}\right) + 4x_j\left(1 + \left(t_j^{min} - t_j^{max}\right)(1 - p_2)\right)}{2(b_i + k_i)\left(t_j^{max} - t_j^{min}\right)} \tag{7}$$

With $t_i^{challenge}$, t_i^{attack}, t_i^{signal}, $t_i^{f_1}$, $t_i^{f_2}$, d_1^*, d_2^*, d_1^{est}, and d_2^{est} can be solved for explicitly.

$$\begin{aligned} t_i^{attack} \quad = \quad & \frac{1}{2k_i\left(2b_i + k_i\left(t_j^{max} - t_j^{min}\right)\right)}\left(2k_i p_1 x_j\left(t_j^{max} - t_j^{min}\right) + b_i\left((b_j + k_j)\left(t_j^{min^2}\right.\right.\right. \\ & \left.\left.\left. -t_j^{max^2}\right) + 4x_j\left(p_1 - 1 + \left(t_j^{max} - t_j^{min}\right)(1 - p_2)\right)\right)\right) \end{aligned} \tag{8}$$

$$t_i^{signal} \quad = \quad \frac{(b_j + k_j)\left(t_j^{max^2} - t_j^{min^2}\right) + 4x_j\left(1 + \left(t_j^{min} - t_j^{max}\right)(1 - p_2)\right)}{4b_i + 2k_i\left(t_j^{max} - t_j^{min}\right)} \tag{9}$$

$$d_1^* = \frac{4x_j + (b_j + k_j)\left(t_j^{max^2} - t_j^{min^2} - 2t_j t_j^{max} + 2t_j t_j^{min}\right)}{4\left(t_j^{max} - t_j^{min}\right)} \tag{10}$$

$$\begin{aligned} d_2^* \quad = \quad & \frac{1}{8b_i + 4k_i\left(t_j^{max} - t_j^{min}\right)}\left(4b_i\left(2x_j(1 - p_2) - t_j(b_j + k_j)\right)\right) \\ & +k_i\left((b_j + k_j)\left(2t_j\left(t_j^{min} - t_j^{max}\right) + t_j^{max2} - t_j^{min^2}\right) + 4x_j\right)\Big) \end{aligned} \tag{11}$$

$$d_1^{est} = x_j \tag{12}$$

$$d_2^{est} = \frac{\left(t_j^{min} - t_j^{max}\right)\left(-2k_i x_j + b_i\left((b_j + k_j)\left(t_j^{max} + t_j^{min}\right) + 4x_j\,(p_2 - 1)\right)\right)}{4b_i + 2k_i\left(t_j^{max} - t_j^{min}\right)} \tag{13}$$

$$t_i^{f_1} = \frac{x_j\,(p_2 - 1) + \frac{4x_j + (b_j + k_j)\left(2t_j\left(t_j^{min} - t_j^{max}\right) + t_j^{max^2} - t_j^{min^2}\right)}{4\left(t_j^{max} - t_j^{min}\right)}}{b_i + k_i} \tag{14}$$

$$\begin{aligned} t_i^{f_2} = \; & \frac{1}{4k_i\left(2b_i + k_i\left(t_j^{max} - t_j^{min}\right)\right)}\left(k_i\left((b_j + k_j)\left(2t_j\left(t_j^{min} - t_j^{max}\right) + t_j^{max^2} - t_j^{min^2}\right)\right.\right. \\ & \left.\left. + 4x_j\left(1 + \left(t_j^{min} - t_j^{max}\right)(1 - p_2)\right)\right) - 4t_j b_i\,(b_j + k_j)\right) \end{aligned} \tag{15}$$

I next present optimal strategies, players' equilibrium beliefs, and game equilibria.

A.2 Players' Optimal Strategies ($t_i^{min} < t_i^{max}$)

$$\begin{array}{llllll} i: & c & = 1 & [Challenge] & \text{if} & t_i^{min} \le t_i < t_i^{challenge} \\ & & = 0 & [Status\ Quo] & \text{if} & t_i^{challenge} \le t_i \le t_i^{max}. \\ & m & = 1 & [Bargain] & \text{if} & t_i^{attack} \le t_i < t_i^{challenge} \\ & & = 0 & [Attack] & \text{if} & t_i^{min} \le t_i < t_i^{attack}. \\ & s & = 1 & [Sanction] & \text{if} & t_i^{attack} \le t_i < t_i^{signal} \\ & & = 0 & [Talk] & \text{if} & t_i^{signal} \le t_i < t_i^{challenge}. \\ & f_1 & = 1 & [Fight_1] & \text{if} & d_1^* > d_1' \Rightarrow t_i^{signal} \le t_i < t_i^{f_1} \\ & & = 0 & [Accept_1] & \text{if} & d_1^* \le d_1' \Rightarrow t_i^{f_1} \le t_i < t_i^{challenge}. \\ & f_2 & = 1 & [Fight_2] & \text{if} & d_2^* > d_2' \Rightarrow t_i^{attack} \le t_i < t_i^{f_2} \\ & & = 0 & [Accept_2] & \text{if} & d_2^* \le d_2' \Rightarrow t_i^{f_2} \le t_i < t_i^{signal}. \\ j: & d_1^* & & \text{See equation (10)} & \text{if} & c = 1,\ m = 1,\ \text{and}\ s = 0. \\ & d_2^* & & \text{See equation (11)} & \text{if} & c = 1,\ m = 1,\ \text{and}\ s = 1. \end{array}$$

A.3 Players' Equilibrium Beliefs

i's belief about j prior to j's offer, d_v:	$t_j \sim \text{U}\left[t_j^{min}, t_j^{max}\right]$
j's belief about i prior to first stage:	$t_i \sim \text{U}\left[t_i^{min}, t_i^{max}\right]$
j's belief about i in the talk subgame:	$t_i \sim \text{U}\left[t_i^{sanction}, t_i^{challenge}\right)$
j's belief about i in the sanction subgame:	$t_i \sim \text{U}\left[t_i^{attack}, t_i^{sanction}\right)$
j's belief about i in the attack subgame:	$t_i \sim \text{U}\left[t_i^{min}, t_i^{attack}\right)$
j's belief about i if i does not challenge:	$t_i \sim \text{U}\left[t_i^{challenge}, t_j^{max}\right]$
i's belief about j if j offers d_v:	$t_j = t_j \ s.t. \ d_v \ argmax \ U_j\left(t_j\right)$

A.4 Equilibria

$$\begin{array}{rll}
[StatusQuo] & \text{if} & t_i^{challenge} \leq t_i < t_i^{max} \\
[Accept_1] & \text{if} & t_i^{f_1} \leq t_i < t_i^{challenge} \\
[Fight_1] & \text{if} & t_i^{signal} \leq t_i < t_i^{f_1} \\
[Accept_2] & \text{if} & t_i^{f_2} \leq t_i < t_i^{signal} \\
[Fight_2] & \text{if} & t_i^{attack} \leq t_i < t_i^{f_2} \\
[Attack] & \text{if} & t_i^{min} \leq t_i < t_i^{attack}
\end{array}$$

A.5 Propositions

Proposition 1 *The probability that states fight declines in their interdependence.*

Define the probability that i chooses $Fight_1$, $Fight_2$, or $Attack$ as $Pr\left(Attack\right) = \left(\frac{t_i^{attack} - t_i^{min}}{t_i^{max} - t_i^{min}}\right)$, $Pr\left(Fight_1\right) = \left(\frac{t_i^{f_1} - t_i^{signal}}{t_i^{max} - t_i^{min}}\right)$, and $Pr\left(Fight_2\right) = \left(\frac{t_i^{f_2} - t_i^{attack}}{t_i^{max} - t_i^{min}}\right)$. The probability of a contest, $Pr\left(Contest\right) = Pr\left(Attack\right) + Pr\left(Fight_1\right) + Pr\left(Fight_2\right)$. $\frac{\partial Pr(Contest)}{\partial b_i}$ and $\frac{\partial Pr(Contest)}{\partial b_j}$ are negative for most values, but the functions are complex and sometimes positive. Yet, given $t_i^{max} > t_i^{min}$, the joint influence of b_i and b_j, is negative, $\frac{\partial^2 Pr(Contest)}{\partial b_i \partial b_j} = \frac{\partial^2 Pr(Contest)}{\partial b_j \partial b_i} < 0$.

$$\begin{aligned}
\frac{\partial^2 Pr\left(Contest\right)}{\partial b_i \partial b_j} \quad = \quad & \frac{1}{4\left(b_i + k_i\right)^2 \left(t_i^{max} - t_i^{min}\right)\left(2b_i + k_i\left(t_j^{max} - t_j^{min}\right)\right)^2} \left(\left(8b_i k_i\left(t_j - t_j^{max} - t_j^{min}\right)\right.\right. \\
& \left. -k_i^2\right)\left(t_j^{max} - t_j^{min}\right)\left(2\left(1 - t_j\right)t_j^{max} + t_j^{max^2} + \left(2 + 2t_j - t_j^{min}\right)t_j^{min}\right) \\
& \left.+2b_i^2\left(4t_j - 2t_j^{max} - t_j^{max^2} + t_j^{min}\left(t_j^{min} - 2\right)\right)\right) \qquad (16)
\end{aligned}$$

Breaking down $Pr\left(Contest\right)$ into its component probabilities, $Pr\left(Attack\right)$ is always decreasing in dependence ($\frac{\partial Pr(Attack)}{\partial b_i} < 0$, $\frac{\partial Pr(Attack)}{\partial b_j} < 0$). Since i only signals if it does not expect a contest, $Pr\left(Fight_2\right)$ is not affected by b_i ($\frac{\partial Pr(Fight_2)}{\partial b_i} = 0$). Conversely, $\frac{\partial Pr(Fight_2)}{\partial b_j}$, $\frac{\partial Pr(Fight_1)}{\partial b_i}$, and $\frac{\partial Pr(Fight_1)}{\partial b_j}$ can be positive or negative, depending on j's type. $\frac{\partial Pr(Fight_2)}{\partial b_j}$ and $\frac{\partial Pr(Fight_1)}{\partial b_j}$ are decreasing in t_j while $\frac{\partial Pr(Fight_1)}{\partial b_i}$ is increasing in t_j, which operates through the size of the offer player j is willing to make to i in lieu of fighting $((t_j \downarrow) \rightarrow (d_1^* \uparrow) \rightarrow (P\left(Fight_1\right) \uparrow))$.

Proposition 2 *The probability that states fight rises in the asymmetry of their dependence*

Define $e = b_i - b_j$, (where $b_i > b_j$), so that $b_i = (b_j + e)$. Substituting $(b_j + e)$ for b_i into $Pr\left(Contest\right)$ and taking the second partial of $Pr\left(Contest\right)$ with respect to b_j and e, shows that $\frac{\partial^2 Pr(Contest)}{\partial b_j \partial e} > 0$. The probability of a contest is increasing in the asymmetry between b_i and b_j. Substituting $b_i - e$ for b_j shows that the result works for either asymmetry.

Proposition 3 *The probability that states experience minor (non-militarized) conflict behavior increases in interdependence.*

Let $Pr\left(Signal\right) = \left(P\left(c=1\right) \times P\left(m=1\right) \times P\left(s=1\right)\right)$ equal the probability of signaling:

$$\begin{aligned} Pr\left(Signal\right) &= \frac{1}{2k_i\left(t_i^{max} - t_i^{min}\right)\left(2b_i + k_i\left(t_j^{max} - t_j^{min}\right)\right)}\left(\left(b_i + k_i\right)\left(\left(b_j + k_j\right)\left(t_j^{max^2} - t_j^{min^2}\right)\right)\right. \\ &\quad \left. +4x_j\left(\left(\left(b_i + k_i\right)\left(1 - p_2\right) + \frac{k_i p_1}{2}\right)\left(t_j^{min} - t_j^{max}\right) + k_i + b_i\left(1 - p_1\right)\right)\right) \end{aligned} \tag{17}$$

Assuming $t_j^{max} > t_j^{min}$, then $\frac{\partial Pr(Signal)}{\partial b_i} < 0$ and $\frac{\partial Pr(Signal)}{\partial b_j} > 0$. The probability of signaling increases in j's dependence on i and decreases in i's dependence on j. The net effect on signaling of i and j's *inter*dependence depends on their relative dependence.[32] $\frac{\partial Pr(Signal)}{\partial x_j} > 0$, indicating that states with substantial differences are more likely to signal. At the same time, $\frac{\partial^2 Pr(Signal)}{\partial b_i \partial x_j} < 0$, while $\frac{\partial^2 Pr(Signal)}{\partial b_j \partial x_j} = 0$. As i is more likely to signal in x_j, and less likely to signal in b_i, the overall relationship between interdependence and signaling shifts downward. Figure 3 provides an graphical example. The consequence of this change in absolute terms depends on parameter values.

[32]The discriminant, $\left(\frac{\partial^2 Pr(Signal)}{\partial b_i^2}\right)\left(\frac{\partial^2 Pr(Signal)}{\partial b_j^2}\right) - \left(\frac{\partial^2 Pr(Signal)}{\partial b_i \partial b_j}\right)^2$ is negative (no local extrema).

References

Angell, Norman. 1933. *The Great Illusion.* New York: Putnam.

Angell, Norman. 1936. *Raw Materials, Population Pressure and War.* New York: World Peace Foundation.

Austen-Smith, David & Jeffrey S. Banks. 2000. "Cheap Talk and Burned Money." *Journal of Economic Theory* 91:1–16.

Azar, Edward E. 1993. "Conflict and Peace Data Bank (COPDAB), 1948–1978." ICPSR #7767. Inter-university Consortium for Political and Social Research.

Baldwin, David A., ed. 1993. *Neorealism and Neoliberalism: The Contemporary Debate.* New York: Columbia University Press.

Barbieri, Katherine. 1996. "Economic Interdependence: A Path to Peace or a Source of International Conflict?" *Journal of Peace Research* 33(1):29–49.

Barbieri, Katherine. 2003. *The Liberal Myth.* Ann Arbor, MI: University of Michigan Press.

Barbieri, Katherine & Richard Alan Peters. 2003. "Measure for Mis-measure: A Reply to Gartzke & Li." *Journal of Peace Research* 40(6):713–719.

Beck, Neal, Jonathan Katz & Richard Tucker. 1998. "Taking Time Seriously: Time-series–Cross-section Analysis with a Binary Dependent Variable." *American Journal of Political Science* 42(4):1260–1288.

Brecher, Michael & Jonathan Wilkenfeld. 1997. *A Study in Crisis.* Ann Arbor: University of Michigan.

Brodie, Bernard. 1959. *Strategy in the Missile Age.* Princeton: Princeton University Press.

Brodie, Bernard, ed. 1946. *The Absolute Weapon: Atomic Power and World Order.* New York: Harcourt, Brace & Co.

Brooks, Stephen. 1999. "The Globalization of Production and the Changing Benefits of Conquest." *Journal of Conflict Resolution* 43(5):646–670.

Brooks, Stephen. 2005. *Producing Security: Multinational Corporations, Globalization, and the Changing Calculus of Conflict.* Princeton, NJ: Princeton University Press.

Bueno de Mesquita, Bruce. 1981. *The War Trap.* New Haven: Yale University Press.

Bueno de Mesquita, Bruce & David Lalman. 1992. *War and Reason: Domestic and International Imperatives.* New Haven: Yale University Press.

Carr, E.H. 1939. *The Twenty Years' Crisis: 1919–1939.* London: Macmillan.

Cobden, Richard. 1903[1867]. *Political Writings of Richard Cobden.* Vol. I London: T. Fisher Unwin.

Cooper, Richard N. 1968. *The Economics of Interdependence.* New York: McGraw-Hill.

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

Copeland, Dale C. 1999. "Trade Expectations and the Outbreak of Peace: Detente 1970–1974 and the End of the Cold War 1985–91." *Security Studies* 93:15–58.

Crawford, Vincent P. & Joel Sobel. 1982. "Strategic Information Transmission." *Econometrica* 50(6):1431–1451.

Crescenzi, Mark. 2002. "Economic Exit, Interdependence, and Conflict." *Journal of Politics* 65(3):772–792.

Dos Santos, Theotonio. 1970. "The Structure of Dependence." *American Economic Review* 60(2):231–236.

Doyle, Michael. 1986. "Liberalism and World Politics." *American Political Science Review* 80(4):1151–1169.

Doyle, Michael. 1997. *Ways of War and Peace: Realism, Liberalism, and Socialism.* New York: Norton.

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

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

Gartzke, Erik. 1998. "Kant We All Just Get Along?: Motive, Opportunity, and the Origins of the Democratic Peace." *American Journal of Political Science* 42(1):1–27.

Gartzke, Erik. 2000. "Preferences and the Democratic Peace." *International Studies Quarterly* 44(2):191–210.

Gartzke, Erik & Kristian S. Gleditsch. 2008. "The Ties that Bias: Specifying and Identifying Sources of Dyadic Dependence." Typescript. University of California, San Diego and the University of Essex.

Gartzke, Erik & Quan Li. 2003*a*. "All's Well that Ends Well: A Reply to Oneal, Barbieri & Peters." *Journal of Peace Research* 40(6):727–732.

Gartzke, Erik & Quan Li. 2003*b*. "Measure for Measure: Concept Operationalization and the Trade Interdependence–Conflict Debate." *Journal of Peace Research* 40(5):553–571.

Gartzke, Erik & Quan Li. 2005. "Mistaken Identity: A Reply to Hegre." *Conflict Management and Peace Science* 22(3):225–233.

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

Garver, John W. 1997. *Face Off: China, the United States, and Taiwan's Democratization.* Seattle: University of Washington Press.

Gasiorowski, Mark J. 1986. "Economic Interdependence and International Conflict: Some Cross-National Evidence." *International Studies Quarterly* 30(1):23–38.

Gleditsch, Kristian S. 2002. "Expanded Trade and GDP Data." *Journal of Conflict Resolution* 46(5):712–724.

Goldstein, Joshua S. 1992. "A Conflict–Cooperation Scale for WEIS Events Data." *Journal of Conflict Resolution* 36(2):369–385.

Grieco, Joseph M. 1988. "Anarchy and the Limits of Cooperation: A Realist Critique of the Newest Liberal Institutionalism." *International Organization* 42(3):485–507.

Grieco, Joseph M. 1990. *Cooperation Among Nations: Europe, America, and Non-Tariff Barriers to Trade.* Ithaca, NY: Cornell University Press.

Gurr, Ted Robert, Keith Jaggers & Will H. Moore. 1989. "Polity II: Political Structures and Regime Change." Codebook. University of Maryland.

Hamilton, Alexander. 1792[1791]. *Report of the Secretary of the Treasury of the United States, on the Subject of Manufactures.* Dublin: P. Byrne.

Hegre, Håvard. 2005. "Gravitating Toward War?: The Gravity Model of Trade and the Liberal Peace." Center for the Study of Civil War, PRIO. Typescript.

Hirschman, Albert O. 1945. *National Power and the Structure of Foreign Trade.* Berkeley: University of California Press.

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

Hobson, John A. 1938[1905]. *Imperialism.* Ann Arbor, MI: University of Michigan Press.

Kahn, Herman. 1960. *On Thermonuclear War.* Princeton: Princeton University Press.

Kautsky, Karl. 1914. "Imperialism and the War." *International Socialist Review* 15(5):282–286.

Keohane, Robert O. & Joseph S. Nye. 1989. *Power and Interdependence.* New York: Harper Collins.

Krasner, Stephen D. 1976. "State Power and the Structure of International Trade." *World Politics* 28:317–343.

Kugler, Jacek & A.F.K. Organski. 1989. The Power Transition: A Retrospective and Prospective Evaluation. In *The Handbook of War Studies.*, ed. Manus Midlarsky. Boston: Unwin-Hyman pp. 171–194.

Kugler, Jacek & Douglas Lemke. 1996. *Parity and War: Evaluations and Extensions of 'The War Ledger'.* Ann Arbor, MI: University of Michigan Press.

Lenin, V.I. 1965. *Imperialism, the Highest Stage of Capitalism.* Beijing, PRC: Foreign Languages Press.

Levy, Jack S. 2003. Economic Interdependence, Opportunity Costs, and Peace. In *Economic Interdependence and International Conflict: New Perspectives on an Enduring Debate.*, ed. Edward D. Mansfield & Brian M. Pollins. Ann Arbor, MI: University of Michigan Press pp. 127–147.

Mansfield, Edward D. & Brian M. Pollins. 2003*a*. Interdependence and Conflict: An Introduction. In *Economic Interdependence and International Conflict: New Perspectives on an Enduring Debate.*, ed. Edward D. Mansfield & Brian M. Pollins. Ann Arbor: University of Michigan Press pp. 1–28.

Mansfield, Edward D. & Brian Pollins. 2001. "The Study of Interdependence and Conflict: Recent Advances, Open Questions, and Directions for Future Research." *Journal of Conflict Resolution* 45(6):834–859.

Mansfield, Edward D. & Brian Pollins. 2003*b*. *Economic Interdependence and International Conflict: New Perspectives on an Enduring Debate.* Ann Arbor, MI: University of Michigan Press.

Maoz, Zeev & Bruce Russett. 1993. "Normative and Structural Causes of the Democratic Peace, 1946-1986." *American Political Science Review* 87(3):624–638.

Mastanduno, Michael. 1991. "Do Relative Gains Matter?: America's Response to Japanese Industrial Policy." *International Security* 16(1):73–113.

Mastanduno, Michael. 1998. "Economics and Security in Statecraft and Scholarship." *International Organization* 52(4):825–854.

McClelland, Charles. 1978. "World Event Interaction Survey." Codebook, ICPSR #5211. Inter-university Consortium for Political and Social Research.

McClelland, Charles. 1983. "Let the User Beware." *International Studies Quarterly* 27(2):169–177.

McMillan, Susan. 1997. "Interdependence and Conflict." *Mershon International Studies Review* 41(1):33–58.

Montesquieu, Baron de. 1989[1748]. *Spirit of the Laws.* Cambridge: Cambridge University Press.

Morrow, James D. 1989. "Capabilities, Uncertainty, and Resolve: A Limited Information Model of Crisis Bargaining." *American Journal of Political Science* 33(2):941–972.

Morrow, James D. 1999. "How Could Trade Affect Conflict?" *Journal of Peace Research* 36(4):481–489.

Oneal, John R. 2003. "Measuring Interdependence and Its Pacific Benefits: A Reply to Gartzke & Li." *Journal of Peace Research* 40(6):721–725.

Oneal, John R. & Bruce Russett. 1997. "The Classical Liberals Were Right: Democracy, Interdependence, and Conflict, 1950-1985." *International Studies Quarterly* 41(2):267–293.

Oneal, John R. & Bruce Russett. 1999*a*. "Is the Liberal Peace Just an Artifact of Cold War Interests?: Assessing Recent Critiques." *International Interactions* 25(3):213–241.

Oneal, John R. & Bruce Russett. 1999*b*. "The Kantian Peace: The Pacific Benefits of Democracy, Interdependence, and International Organizations." *World Politics* 52(1):1–37.

Oneal, John R., Bruce Russett & Michael L. Berbaum. 2003. "Causes of Peace: Democracy, Interdependence, and International Organizations." *International Studies Quarterly* 47(3):371–393.

Oneal, John R., Frances H. Oneal, Zeev Maoz & Bruce Russett. 1996. "The Liberal Peace: Interdependence, Democracy, and International Conflict, 1950-1985." *Journal of Peace Research* 33(1):11–28.

Oneal, John R. & James Lee Ray. 1997. "New Tests of the Democratic Peace: Controlling for Economic Interdependence, 1950-85." *Political Research Quarterly* 50(4):751–775.

Organski, A.F.K. 1958. *World Politics.* New York: Knopf.

Organski, A.F.K. & Jacek Kugler. 1980. *The War Ledger.* Chicago: University of Chicago Press.

Papayoanou, Paul A. 1996. "Interdependence, Institutions, and the Balance of Power: Britain, Germany, and World War I." *International Security* 20(4):42–76.

Papayoanou, Paul A. 1999. *Power Ties: Economic Interdependence, Balancing, and War.* Ann Arbor: University of Michigan Press.

Pevehouse, Jon C. 2004. "Interdependence Theory and the Measurement of International Conflict." *Journal of Politics* 66(1):247–266.

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

Polachek, Solomon W. 1992. Conflict and Trade: An Economics Approach to Political Interactions. In *Economics of Arms Reduction and the Peace Process.*, ed. Walter Isard & C.H. Anderton. Amsterdam: North Holland Press pp. 89–120.

Polachek, Solomon W. 1997. "Why Democracies Cooperate More and Fight Less: The Relationship Between International Trade and Cooperation." *Review of International Economics* 5(3):295–309.

Powell, Robert. 1990. *Nuclear Deterrence Theory: The Search for Credibility.* Cambridge: Cambridge University Press.

Prebisch, Raul. 1959. "Commercial Policy in the Underdeveloped Countries." *American Economic Review* 49(2):251–273.

Prebisch, Raul. 1963. *Towards A Dynamic Development Policy for Latin America.* New York: United Nations Press.

Reed, William. 2003. "Information and Economic Interdependence." *Journal of Conflict Resolution* 47(1):54–71.

Reuveny, Rafael & Heejoon Kang. 1996. "International Conflict and Cooperation: Splicing COPDAB and WEIS Series." *International Studies Quarterly* 40(2):281–305.

Rosecrance, Richard. 1985. *The Rise of the Trading State: Commerce and Conquest in the Modern World.* New York: Basic Books.

Rosecrance, Richard. 1996. "The Rise of the Virtual State." *Foreign Affairs* 75(4):45–61.

Russett, Bruce & John R. Oneal. 2001. *Triangulating Peace: Democracy, Interdependence, and International Organizations.* New York: Norton.

Sartori, Anne. 2002. "The Might of the Pen: A Reputational Theory of Communication in International Disputes." *International Organization* 55(3):121–149.

Schelling, Thomas C. 1960. *The Strategy of Conflict.* Cambridge: Harvard University Press.

Schelling, Thomas C. 1966. *Arms and Influence.* New Haven: Yale University Press.

Schneider, Gerald, Katherine Barbieri & Nils Petter Gleditsch, eds. 2003. *Globalization and Armed Conflict.* Lanham, MD: Rowman & Littlefield.

Schultz, Kenneth A. 1998. "Domestic Opposition and Signaling in International Crises." *American Political Science Review* 94(4):829–844.

Signorino, Curtis S. & Jeffrey M. Ritter. 2001. "Tau-b or Not Tau-b: Measuring the Similarity of Foreign Policy Positions." *International Studies Quarterly* 43(1):115–144.

Smith, Alastair. 1998. "International Crises and Domestic Politics." *American Political Science Review* 92(3):623–638.

Smith, Alastair. 1999. "Testing Theories of Strategic Choice: The Example of Crisis Escalation." *American Journal of Political Science* 43(4):1254–1283.

Spence, Michael. 1973. "Job Market Signaling." *The Quarterly Journal of Economics* 87(3):355–374.

Tucker, Richard. 1999. "BTSCS: A Binary Time-Series–Cross-Section Data Analysis Utility, version 4.0.4." Computer Program. Vanderbilt University.

Vincent, Jack. 1979. *Project Theory.* Baltimore: University of Maryland Press.

Vincent, Jack. 1983. "WEIS vs. COPDAB: Correspondence Problems." *International Studies Quarterly* 26(1):87–126.

Wagner, R. Harrison. 1988. "Economic Interdependence, Bargaining Power, and Political Influence." *International Organization* 41(3):461–483.

Wagner, R. Harrison. 2000. "Bargaining and War." *American Journal of Political Science* 44(3):469–484.

Wallerstein, Immanuel. 1974. *The Modern World System I: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century.* New York: Academic Press.

Wallerstein, Immanuel. 1980. *The Modern World-System II: Mercantilism and the Consolidation of the European World-Economy, 1600–1750.* Academic Press.

Wallerstein, Immanuel. 1988. *The Modern World System III: The Modern World System.* Academic Press.

Waltz, Kenneth N. 1970. The Myth of National Interdependence. In *The International Corporation.*, ed. Charles P. Kindleberger. Cambridge, MA: MIT Press pp. 205–223.

Waltz, Kenneth N. 1979. *Theory of International Politics.* New York: McGraw-Hill.

Waltz, Kenneth N. 1999. "Globalization and Governance." *PS: Political Science and Politics* 32(4):693–700.

Wilson, Woodrow. 1918. "Bases of a General Peace: Fourteen Points." Address to a joint session of the United States Congress. 8 January.

Table 1: Logit Estimates, COPDAB (Robust S.E., Adjusted for Dyadic Clustering)

	All Conflicts (Model 1)	Non-militarized (Model 2)	Non-militarized (Model 3)	Militarized (Model 4)
INTERDEPENDENCE				
Sum Dependence [1]	– 7.915 **	0.732 **	0.721 **	– 1.096 **
	(3.910)	(0.286)	(0.353)	(0.469)
Diff. Dependence [1]	9.660 **			
	(4.733)			
DEMOCRACY				
Sum Regime Type [2]	0.020 *	– 0.011		
	(0.010)	(0.007)		
Diff. Regime Type [2]	0.029 **			
	(0.012)			
Regime Type Low [4]			– 0.020 *	1.669×10^{-3}
			(0.011)	(0.023)
Regime Type High [4]				0.066 **
				(0.027)
INTERESTS				
Preference Affinity	– 0.796 ***	– 0.485 ***	– 0.453 ***	0.063
	(0.134)	(0.107)	(0.110)	(0.230)
Pref. x Sum Dep. [3]			0.022	
			(0.322)	
DISTANCE				
Distance [4]	– 0.569 ***	– 0.215 ***	– 0.213 ***	– 0.470 ***
	(0.057)	(0.056)	(0.056)	(0.088)
Contiguity [5, 6]	1.503 ***	0.146	0.145	2.167 ***
	(0.160)	(0.131)	(0.132)	(0.249)
ALLIES				
Allied [5]	0.509 ***	0.456 ***	0.473 ***	– 0.721 ***
	(0.108)	(0.079)	(0.080)	(0.218)
3rd Party Allied [5]	0.059	0.251 ***	0.244 ***	0.563 ***
	(0.068)	(0.065)	(0.065)	(0.195)
4th Party Allied [5]	0.812 ***	0.228 ***	0.218 ***	0.714 ***
	(0.081)	(0.082)	(0.082)	(0.149)
CAPABILITIES				
CINC Ratio [4, 7]	– 0.180 ***	$– 1.164 \times 10^{-3}$	$– 1.422 \times 10^{-3}$	0.505
	(0.024)	(0.028)	(0.028)	(0.067)
Major Power [5]	2.299 ***	0.719 ***	0.716 ***	– 0.695 ***
	(0.109)	(0.114)	(0.114)	(0.267)
GDP/capita [4]	2.267×10^{-4} ***	0.034	0.033	– 0.436 ***
	(0.057)	(0.047)	(0.047)	(0.136)
CONSTANT	3.391 ***	– 1.243	– 1.317 **	1.367
	(0.625)	(0.549)	(0.558)	(1.179)
N	186,902	186,902	186,902	186,902
Wald χ^2	3250.78	1840.77	1892.41	1584.54
Prob > χ^2	0.000	0.000	0.000	0.000
Pseudo R^2	0.5255	0.1567	0.1567	0.4141
Log Likelihood	– 50737.177	– 29284.87	– 29283.767	– 11599.96

Coefficients for splines not reported. Values in parentheses are standard errors. All significance tests are two-tailed.

* $p < 0.1$
** $p < 0.05$
*** $p < 0.01$
[1] Dependence variables = $[(\text{import}_{ji} + \text{export}_{ij})/\text{GDP}_i]$
[2] Democracy variables = $[(\text{Dem}_i - \text{Aut}_i + 10)/2]$
[3] Interaction(Affinity x Sum Dependence)
[4] Logged variable
[5] Dummy variable
[6] Contiguity = touching or < 150 miles water
[7] Capability = $[(\text{CINC}_{high})/(\text{CINC}_A + \text{CINC}_B)]$

Table 2: Logit Estimates, WEIS (Robust S.E., Adjusted for Dyadic Clustering)

	All Goldstein (Model 5)	All Vincent (Model 6)	Non-mil. Goldstein (Model 7)	Mil. Vincent (Model 8)
INTERDEPENDENCE				
Sum Dependence [1]	– 27.169 ***	– 32.854 ***	1.405 **	
	(9.338)	(9.900)	(0.591)	
Diff. Dependence [1]	29.617 ***	34.605 ***		
	(9.627)	(9.954)		
Dependence Low [1]				– 110.785 ***
				(41.762)
DEMOCRACY				
Regime Type Low [2]	0.022	9.771×10^{-3}	0.011	0.027
	(0.021)	(0.019)	(0.584)	(0.030)
INTERESTS				
Preference Affinity	– 0.341	– 0.128	– 0.552 ***	1.479 ***
	(0.210)	(0.216)	(0.136)	(0.381)
Pref. x Sum Dep. [3]			– 1.414	
			(0.933)	
DISTANCE				
Distance [4]	– 0.704 ***	– 0.762 ***	– 0.406 ***	– 0.731 ***
	(0.095)	(0.076)	(0.060)	(0.139)
Contiguity [5, 6]	1.203 ***	0.926 ***	0.870 ***	1.898 ***
	(0.291)	(0.224)	(0.165)	(0.414)
ALLIES				
Allied [5]	– 0.151	– 0.225	0.220 *	– 0.962 ***
	(0.158)	(0.153)	(0.129)	(0.299)
3^{rd} Party Allied [5]	0.161	0.238 **	– 0.018	0.492
	(0.115)	(0.102)	(0.106)	(0.265)
4^{th} Party Allied [5]	0.734 ***	0.675 ***	0.317 ***	1.133 ***
	(0.147)	(0.150)	(0.103)	(0.263)
CAPABILITIES				
CINC Ratio [4, 7]	– 0.147 ***	– 0.088 **	– 0.129 ***	0.093
	(0.047)	(0.040)	(0.034)	(0.093)
Major Power [5]	2.570 ***	2.142 ***	2.604 ***	0.107
	(0.128)	(0.113)	(0.106)	(0.420)
GDP/capita [4]	0.156 *	0.091	0.162 **	– 0.101
	(0.093)	(0.088)	(0.070)	(0.172)
CONSTANT	2.429 **	3.040 ***	– 0.206	0.683
	(1.162)	(0.972)	(0.769)	(1.761)
N	268,187	268,187	268,187	268,187
Wald χ^2	2748.18	2919.31	3653.95	1049.59
Prob > χ^2	0.000	0.000	0.000	0.000
Pseudo R^2	0.5701	0.4936	0.5092	0.4626
Log Likelihood	– 47901.185	– 48901.062	– 48093.019	– 13284.964

Coefficients for splines not reported. Values in parentheses are standard errors. All significance tests are two-tailed.

* $p < 0.1$
** $p < 0.05$
*** $p < 0.01$

[1] Dependence variables = $[(\text{import}_{ji} + \text{export}_{ij})/\text{GDP}_i]$
[2] Democracy variables = $[(\text{Dem}_i - \text{Aut}_i + 10)/2]$
[3] Interaction(Affinity x Sum Dependence)
[4] Logged variable
[5] Dummy variable
[6] Contiguity = touching or < 150 miles water
[7] Capability = $[(\text{CINC}_{high})/(\text{CINC}_A + \text{CINC}_B)]$