Rich Neighbors
War, Peace, and Economic Development

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Abstract

Theories of economic development suggest variously that national income increases or decreases the propensity for states to fight, while systematic evidence of the impact of development on warfare is ambiguous or non-existent. The lack of empirical support for nominally opposing claims can be reconciled if elements of both sets of arguments are partially correct. We use a formal model to construct an explanation linking economic development and conflict that resolves contradictory theories and absent evidence. Development increases the ability of states to project power while decreasing the impetus to seize territory and related resources through force. High income states fight more often over disputed policies, but less often over tangible assets. We show that “rich neighbors” are much less likely to engage in militarized disputes.

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1 Introduction

Students of international relations have long discerned in economic processes forces capable of transforming the politics of nations. Thucydides blamed Athenian lust for empire on the city’s precipitous rise in economic fortunes. Over two thousand years later, Lenin argued forcefully that nineteenth century capitalism lead to imperialism. In contrast, scholars like Montesquieu, Smith, and Angell suggested ways that prosperity could bring peace. More recently, the increasing pace of economic development has ignited diverse speculation about how wealth influences interstate conflict. Countries are said to become more warlike as they get richer. Economic development increases the resources available to sovereigns, allowing for the accumulation and projection of military power. Development may even spur aggression through the drive to acquire raw materials and markets. Countries are also said to become more peaceful with prosperity. Economic development reduces the benefits (or increases the costs) of coercing populations, territory, and resources. Occupying armies are more expensive or less effective even as lootable assets can decline in value.

A conventional approach to resolving theoretical controversy is to let the data decide. Comparative testing relies on external validity to adjudicate the correctness of causal accounts where plausible explanations offer differing predictions.\(^1\) Unfortunately, the available evidence of a causal linkage between economic development and conflict is ambiguous or non-existent. Qualitative research offers anecdotal support for (Angell 1933; Rosecrance 1985, 1996; Brooks 1999) and against (Carr 1939; Schweller 1998; Waltz 1999, 2000) the assertion that development encourages peace. Quantitative studies of conflict have also largely failed to clarify the relationship between development and dispute propensity.\(^2\) The most common measure of economic development, average national income (GDP/population), has not produced a consistent systematic relationship between development and war or peace (Richardson 1960, East & Gregg 1967, Rummel 1967, Bremer 1992). Contrasting predictions combined with the lack of empirical support have led to the conclusion that economic development is largely inconsequential to interstate conflict (Maoz & Russett 1992).\(^3\)

\(^1\)Comparative tests are problematic when theories are vague, data are bad, and when no consensus exists about appropriate paradigm or baseline statistical model. Still, we muddle through (something may be better than nothing).

\(^2\)Development is one of the most robust determinants of intrastate conflict (Collier & Hoeffler 2004, Elbadawi & Hegre 2008, Fearon & Laitin 2003). The argument here reconciles discrepant results for intra- and inter-state conflict.

\(^3\)Lemke (2003) advocates research on development and conflict, while critiquing standard cross-sectional models.
We thus begin with two riddles. First, why do plausible arguments in the theoretical literature lead to contradictory conclusions about the effect of development on war and peace? Second, why is there so little evidence of a relationship between economic development and conflict, given that the theoretical arguments appear plausible? Using current claims and available evidence, it is possible to construct a more coherent and empirically grounded theory of development and war. In particular, we argue that contrasting explanations of the effects of development on dispute behavior are reconcilable. Prosperity does bring peace, but it also increases conflict. High income states are better equipped to project power abroad even as they are less inclined to seek to acquire resources and territory through conquest. Development makes states more likely to use force farther from home, but less likely to seek to subjugate neighbors. Resolving apparently contradictory claims also leads to better statistical evidence of the linkages between war, peace, and development. By itself, average national income is statistically insignificant, but even the crude effort to disaggregate the contrasting effects of development on disputes offered here leads to robustly significant findings.

Whether economic development brings peace or aggression (or neither or both) is far from trivial. The twentieth century witnessed both unprecedented increases in the prosperity of some of the earth’s citizens and warfare of unprecedented intensity and slaughter. To what degree these events foreshadow conditions in the twenty-first century will depend on our ability to unravel the tangled causal logic linking development to militarized violence. After reviewing the relevant literature, we identify elements of existing accounts that are most likely to prove empirically valid. Physical limitations on states preclude certain conflicts, either because opponents are distant, or because the cost of fighting exceeds any possible benefit for either party. Development increases the capacity of states to project power beyond their own borders, adding to the number of opponents a state may engage through violence. Conversely, development involves changes in the nature of economic production that discourage using force for certain ends. Agricultural or early industrialized economies are intensive users of productive factors that are relatively easily captured through war (land, labor, fixed capital). Post-industrial economies depend instead on factor inputs that are difficult to coerce (intellectual and financial capital), even as the cost of occupation increases. We show that development has contrasting effects, increasing policy conflicts while reducing fights over territory.
2 Studies of Economic Development and Interstate Conflict

It has long been argued that prosperity discourages conflict by making aggression unprofitable.\(^4\) One line of reasoning suggests that cultural/political factors such as nationalism make it difficult for states to occupy another country (Gilpin 1981).\(^5\) Identification with a large territory can serve as a commitment mechanism, stiffening resistance so that aggressors face an “all or nothing” decision (Goemans 2006). Another set of arguments claim that changes in the nature of modern economies create states that are disinclined to aggression (Rosecrance 1985). Still a third version suggests that modernization makes states unpalatable as targets of conquest (Brooks 1999). We focus on the last two forms of the argument, which appear at once more tractable and logically compelling.\(^6\)

It has also long been argued that modernity encourages conflict by making aggression necessary or practicable. Marxists argue that capitalist countries fight wars of expansion to capture markets and manage overproduction (Hobson 1938[1905], Lenin 1970[1916]). Other scholars see development combining with population growth to generate “lateral pressure” (Choucri and North 1975, 1989).\(^7\) Ashley argues that “war is mainly explicable in terms of differential growth...” (1980, page 3). Perhaps the most pervasive approach in international relations is to treat economic development as a permissive condition for conflict. Prosperity is an obvious source of military might.\(^8\) Development also increases state capacity and thus a state’s ability to project power (Kugler & Arbetman 1997).

Research on globalization paints a dynamic picture of two distinct worlds, one in which development and economic integration have taken hold and in which peace and political stability prevails, and a second world in which the forces of economic modernization are resisted and in which strife and instability persists (Barber 1992, 1996; Friedman 1999; Inglehart and Norris 2001). Globally integrated dyads are more peaceful (Gartzke, Li & Boehmer 2001, Gartzke & Li 2003). Yet, it has proven harder to assess the impact of the *fruits* of globalization, rather than economic ties, per se.

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\(^4\) Mueller (1989) claims that warfare has fallen out of fashion, that it is no longer acceptable behavior. Yet, other “unacceptable” behaviors such as gambling, drug use, and prostitution are also widely practiced (Kaysen 1990).

\(^5\) The argument is effectively the contradictory logic to the Huntington (1996) clash of civilizations thesis.

\(^6\) The recent literature has shown less interest in nationalist “quagmire” arguments (see, Brooks 1999). Whether this is appropriate or not, it does not appear that cultural or other local factors interfere with our statistical tests.

\(^7\) Zuk (1985) rejects the thesis that resource shortages lead to major power expansion. Tir & Diehl (1998) find “substantial limits to the validity of extending overcrowding arguments to ... interstate relations” (1998, page 336).

\(^8\) The notion that development causes war is widespread but under-theorized (Liberman 1996). “Very few existing analyses devote more than a page or two to the economic benefits of conquest” (Brooks 1999, page 648, fn. 1).
Liberman (1996) argues that military occupation of industrialized countries can prove more profitable than pillaging the poor, provided that occupiers are willing to be ruthless. Brooks (1999) takes issue with Liberman’s research design and challenges some of Liberman’s own evidence. By examining only cases in which aggression occurred, Liberman cannot say whether conquest is becoming less prevalent. At the same time, Soviet occupation of Eastern Europe, Liberman’s only post-World War II example, was ruinously expensive (Bunce 1985). The Soviet Union appears to have stayed in Eastern Europe largely for geo-strategic reasons (Gorbachev 1995, pages 368–375; Rice 1986). The relevant question for Liberman is not whether conquest can be made to pay, but whether the use of force is more lucrative than available alternatives, such as negotiation or trade.9

Does development promise the best or worst of times in world affairs? The impetus of prevailing wisdom has tended to shift with evolving social trends, intellectual prejudices, or contemporary events, rather than through improved logic or systematic evidence. Modelski notes that “Where Comte and Spencer were struck by the antagonism between war and the industrial regime, observers at the turn of the century reached almost the opposite conclusion” (1961, page 120). Cycles of optimism and pessimism about the effect of development on peace continue to the present day.

Theory evolves most rapidly in the presence of robust empirical evidence. Unfortunately, available evidence is weak or non-existent. Quantitative tests using a standard indicator of national income (Gross Domestic Product per capita) yield statistically insignificant results (Richardson 1960, East & Gregg 1967, Rummel 1967, Maoz & Russett 1992), while studies reporting a positive (Wright 1942) or negative (Bremer 1992) relationship appear to lack key control variables. Hegre (2000) finds that developed states are less dispute prone. However, use of Cox regression means that the identified relationship is relative to the baseline hazard of war in dyads. Because the argument put forward by development theorists is basically temporal, use of the Cox model is potentially suspect. Similarly, Peceny et al. (2002) find that developed dyads are less disputatious, but the use of a dummy variable for dyadic development omits much of the variation of interest while possibly capturing covariates of development, such as democracy, and intergovernmental organizations.

Little if any ambiguity exists concerning the relationship between development and intrastate

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9Liberman seems to acknowledge that this is not the case. “I leave aside external and noneconomic costs and benefits, such as the war costs of taking territory and defending it from outside powers” (Liberman 1996, page x).

Shifts in the propensity to fight are more readily demonstrable at the system level. The overall frequency of warfare has declined in recent years (c.f. Eriksson & Wallensteen 2004, Gleditsch et al. 2002). Great power wars in particular have become scarce. Goldstein (2002), Holsti (1991), and Huth & Allee (2003) all find that fighting over territory is declining over time. Several authors note that, among states that experience disputes, territory remains a prominent reason for conflict (Hensel 2000; Vasquez 1993, 2001). However, the proportion of actual wars that are associated with territory, and the probability that a potential territorial war occurs are two different things. Territorial disputes are much more likely to escalate to wars (Senese & Vasquez 2003; Vasquez 2004; Vasquez & Henehan 2001, 2004). Territory can remain a prominent cause of the wars that actually occur, while declining rates of warfare are attributable to the reduced tendency of territorial conflict.

Several studies report that the effect of democracy on conflict is conditioned by development (Hegre 2000, Mousseau 2000, Mousseau, Hegre & Oneal 2003). Development and an interaction term between development and democracy appear significant in statistical models of militarized interstate disputes (MIDs). Only developed democracies appear to benefit from democratic peace.

Boehmer & Sobek (2005) find a curvilinear relationship between development and militarized disputes in a statistical model of monad (state) years. Poor states cannot project power while the rich do not desire to make war. Middle income states are the most dispute prone. Their use of linear and squared terms helps to identify contrasting implications of development, but it also obscures an important conceptual distinction between opportunity and willingness. The former implies a hard constraint; poor states cannot fight, while the latter impinges only on some developed countries. We next outline which kinds of conflict developed states pursue, and which they avoid.
3 Theory: How Development Influences Interstate Conflict

Conflicts in Iraq, Afghanistan, Georgia and elsewhere emphasize to many the business-as-usual aspects of force in international affairs (Buchanan 1999; Chomsky 2003; Johnson 2001, 2004). Others point to differences in practice or objective as indications of some national brand of exceptionalism (Bacevich 2002, Ferguson 2004). The rise of “postmodern empire” can be characterized by states that are better equipped than ever before to wage war in distant corners of the globe, while perhaps less willing than their predecessors to administer the lands that they could potentially subdue.\textsuperscript{10} Rather than treat these images as contradictory, or as uniquely characteristic of the United States, we argue that both are consistent with changes brought about by economic development. At the same time that development increases nations’ ability to project power far from home, developed nations are ambivalent about doing so, fighting more to influence and less to capture territory.

Imagine that countries are concerned about two basic categories of assets, inputs to production, and gains from international interaction. The former is intuitive; resources (land, labor, minerals) are private goods generally associated with territory (Goertz & Diehl 1992, Vasquez 1993). States benefit from a given resource only by depriving others of access, often through physical control of the territory where the resource is located. Gains from interaction are multifaceted and more complex. Governments have substantial autonomy within their own borders, but nations must compete — and compromise or fight — in establishing policies whose impact extends beyond sovereign territory. International gains take many forms, including security, influence over third parties, and the distribution of the economic surplus from trade. Interaction generally increases in proximity, and in economic development. Nations that are geographically close create externalities or directly interfere with the domestic interests of their neighbors. Control over who gets to determine policies affecting the international space impacts who benefits and who bears the burdens of international relations. The value of controlling the gains from interaction increase as interaction increases.\textsuperscript{11}


\textsuperscript{11}Fearon (1998) shows that competition over the terms of cooperation increases as the value of cooperation increases.
If the acquisition of territory and other productive assets allows for the aggrandizement of one state’s prosperity or power, other states will be threatened (Thucydides 1985[ca. 411BC]). Conversely, policies that benefit one nation can still provide more or less benefit to other states, so that the affinity of interests among states will vary over policy issues in a way not possible over resources. The potential for overlap in state interests over policies but not over resources suggests a salient distinction between each set of motives for interstate conflict. While we do not explore the non-zero sum features of gains from international interaction theoretically, we need to keep them in mind when assessing empirical relationships. States’ policy goals will often be similar enough so that each prefers compromise to a violent confrontation. The implication is that conflicts over policies can be relatively less frequent and potentially less intense than conflicts over resources. There is substantial support in the literature for the notion that states fight more often and more intensely over territory than over policy differences (Goertz & Diehl 1992, Vasquez 1993). There are also reasons to believe that territory is less easily divisible than are policies (Toft 2003, Walter 2003).

### 4 Modeling Development and Conflict

We next present a formal model that solidifies the intuition that development decreases conflict over resources, while increasing policy competition. We follow the modeling tradition that emphasizes the decision to initiate war (c.f. Jackson & Morelli 2007), though it is also possible to interpret the process in terms of the rent-seeking tradition (c.f. Hirshleifer 2001), as shown in Appendix A.

#### 4.1 The Building Blocks of the Model

Two nations, unimaginatively labeled country 1 and country 2, compete over possession of inputs to production and over control of gains from international interaction. In the real world, countries resolve their differences diplomatically as well as through force. We focus on situations where bargaining has failed or is not possible. Without loss of generality, we assume that country 1

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12 Boix (2003) demonstrates that autocrats flourish in a world in which leaders can effectively capture the productive wealth of a society. Democracy occurs when mobile capital allows wealthy elites to overcome the commitment problem implied in redistributive politics. These societies are presumably also less appealing to foreign invaders.

13 While readily divisible in nominal terms, territory houses populations reluctant to be split up (Goemans 2006).

14 Diplomatic successes often reflect the “shadow of force,” an assessment that a state is willing to fight if necessary.
decides whether to initiate a contest with country 2. Country 1 chooses between maintaining the status quo ($R$), initiating conflict to acquire more territory ($T$), or fighting to influence country 2’s foreign or domestic policies or politics ($F$). Country 2 is not modeled as a strategic player.\footnote{The model’s predictions hold for more complicated frameworks. Obviously, the results are analogous if the roles are inverted (country 2 decides whether to initiate conflict). We could also focus on a dynamic setting where in each period with some probability one of the two countries can choose whether to initiate conflict. In a dynamic game with infinite horizon the Folk theorem applies and cooperation can be sustained through trigger strategies.}

Payoff functions are discussed below. The payoff from peace ($R$) is as follows for country 1.

\[
\pi^R_1 = y_1 + \varphi S
\] (1)

where $y_1 =$ production output of country 1, $S =$ the surplus available to country 1 and country 2, and where $\varphi =$ share of $S$ obtained by country 1.

Note that $\pi^R_2 = y_2 + (1 - \varphi)S$, where $y_2 =$ production output of country 2. Thus, the payoff each country receives in the peaceful status quo includes its economic production as well as its share of any gains from trade, security or influence over the policies of the other nation in the system.

The production functions are the widely used Cobb-Douglas: $y_1 = AK_1^aL_1^b$, $y_2 = BK_2^cL_2^d$. Following convention, economic output is assumed to be an increasing function of the total factor productivity ($A$, resp. $B$), physical capital and territory ($K_1$, resp. $K_2$) and labor ($L_1$, resp. $L_2$).

The gains available to states from interacting can be approximated by the gravity model commonly used in trade theory (Isard 1954, Bergstrand 1985). In particular, $S = \frac{ky_1 y_2 e}{e} = \frac{kAK_1^aL_1^bBK_2^cL_2^d}{e}$, where $e =$ distance, $k =$ parameter capturing other factors. Introducing $y_1$ and $S$ in $\pi^R_1$, we obtain:

\[
\pi^R_1 = AK_1^aL_1^b + \varphi \frac{kAK_1^aL_1^bBK_2^cL_2^d}{e}
\] (2)

In the event of conflict, we assume that some proportion $C$ of productivity is lost to fighting.\footnote{The predictions of the model are robust to alternative ways of characterizing war friction. In Appendix A we detail one such alternative in which $C$ is treated as the opportunity cost of foregone productive activities.}

Country 1 is assumed to appropriate in territorial conflict a share $s^T_1$ of country 2’s territory and capital, while country 2 is able to appropriate a share $s^T_2$ of country 1’s territory and capital.\footnote{We can set $s^T_1 = 1 - s^T_2$ and interpret $s^T_1$ as the probability that country 1 appropriates all of country 2’s capital.} For simplicity, the size of $s^T_1$ and $s^T_2$ (and also of $s^F_1$ below) are treated as exogenous in this baseline
framework. Respective shares are related to the fighting strength of the countries and we can think of them as depending on economic, social and geographical characteristics.\(^\text{18}\) The payoffs of conflict over territory are expressed as follows for country 1 (analogous payoffs exist for country 2):

\[
\pi^T_1 = s^T_1 K_2 + (1 - C^T_1) A \left[ (1 - s^T_2) K_1 \right]^a L_1^b + \frac{k(1 - C^T_1) AK_1^a L_1^b (1 - C^T_2) BK_2^c L_2^d}{e}
\]  

where \(C^T_1\) = portion of country 1’s productivity lost as friction (analogous definition for \(C^T_2\)).

Thus, country 1’s payoff is composed of its remaining GDP, of the territory and capital it acquires through conflict, and of its part of the gains from economic and political interaction.\(^\text{19}\)

We assume that territorial conflict involves appropriating territory and capital, \(K\), rather than stealing labor, \(L\), or total factor productivity (TFP), \(B\). While not critical for our results — the predictions of the model survive if we allow states to capture the whole of GDP — arguments in the literature claim that it is harder to appropriate TFP or labor, especially from economically developed countries. For example, while Swiss gold could have been stolen, Swiss banks would have lost much of their prestige and value if Hitler had attempted to conquer the country. Similarly, much of the value of labor \(L\) is lost to friction when appropriated. Coerced workers are less motivated, while forced labor lacks initiative and creativity. In addition to simplifying the model, we avoid conflating our theory with claims about the shifting effectiveness of appropriating other factors.

The payoffs for policy conflict are displayed below for country 1 (it is analogous for country 2).

\[
\pi^F_1 = (1 - C^F_1) AK_1^a L_1^b + s^F_1 k(1 - C^F_1) AK_1^a L_1^b (1 - C^F_2) BK_2^c L_2^d
\]  

where \(s^F_1\) = part of \(S\) captured by country 1, \(C^F_1\) = part of country 1’s productivity lost as friction from fighting over policy (an analogous definition applies to \(C^F_2\)).

Thus, the payoffs of country 1 under policy conflict are composed of its GDP and its revised share of the gains from economic and political interaction with country 2.

\(^\text{18}\) As discussed in Appendix A these parameters could be made endogenous and be regarded for example as dependent on fighting efforts. Such an interpretation would be consistent with rent-seeking models.

\(^\text{19}\) It is necessary to make assumptions about the timing of territorial conflict: First, war destroys a part \(C\) of a state’s productivity. The corresponding decimated output is the one relevant for \(S\). Second, capital is appropriated (as “victory” follows “onset”). The model’s predictions are robust to other assumptions about the timing of war.
4.2 Explaining Conflict Onset

We can start by discussing under what conditions country 1 prefers territorial conflict ($T$) to retaining the peaceful status quo ($R$). This condition can be expressed as follows:

$$\pi_1^T - \pi_1^R = s_1^T K_2 + AK_1^a L_1^b \left[ (1 - s_2^T)^a (1 - C_1^T) - 1 \right] + \varphi \frac{kAK_1^a L_1^b BK_2^2 L_2^d}{e} \left[ (1 - C_1^T)(1 - C_2^T) - 1 \right] > 0 \quad (5)$$

The inequalities \(\frac{\partial (\pi_1^T - \pi_1^R)}{\partial A} < 0\), \(\frac{\partial (\pi_1^T - \pi_1^R)}{\partial B} < 0\) and \(\frac{\partial (\pi_1^T - \pi_1^R)}{\partial K_1} < 0\), yield the following threshold.

$$A_T \equiv \frac{s_1^T K_2}{K_1^a L_1^b \left[ 1 - (1 - s_2^T)^a (1 - C_1^T) \right] + \varphi \frac{kAK_1^a L_1^b BK_2^2 L_2^d}{e} \left[ 1 - (1 - C_1^T)(1 - C_2^T) \right]} \quad (6)$$

\(A_T > 0\) always holds. If \(A < A_T\) country 1 prefers territorial conflict. If \(A > A_T\) it prefers peace.

We use total factor productivity to represent development. These concepts are strongly related, and all of today’s developed countries exhibit high total factor productivity. If country 1 is developed (implying \(A > A_T\)), initiating territorial conflict is not worthwhile. Rising factor productivity increases the cost of fighting over territory (higher opportunity costs from foregone production and lower gains from interaction). A similar threshold exists for country 2’s productivity level \(B\).

$$B_T \equiv e \left\{ s_1^T K_2 + AK_1^a L_1^b \left[ (1 - s_2^T)^a (1 - C_1^T) - 1 \right] \right\} \frac{\varphi kAK_1^a L_1^b BK_2^2 L_2^d}{e} \left[ 1 - (1 - C_1^T)(1 - C_2^T) \right] \quad (7)$$

If \(B > B_T\), territorial conflict is not appealing to country 1. If the gains from interaction with country 2 are large enough, it becomes too costly to fight over territory. Please note that, for similar levels of \(A\) and \(B\), the magnitude of this effect is smaller for \(B\) than for an equivalent increase in \(A\). Interestingly, increasing \(K_1\) would have a very similar effect as an increase in \(A\) and would also deter country 1 from initiating territorial conflict. An increase in \(K_2\) has ambiguous effects.

We can also analyze the condition under which policy conflict ($F$) is preferred to peace ($R$):

$$\pi_1^F - \pi_1^R = -AK_1^a L_1^b C_1^F + \frac{kAK_1^a L_1^b BK_2^2 L_2^d}{e} \left[ s_1^F (1 - C_1^F)(1 - C_2^F) - \varphi \right] > 0 \quad (8)$$
Note that when two countries are completely symmetrical they never have incentives to fight over policy. A necessary condition for country 1 to fight over policy is that it receives a small share \( \varphi \) of the gains of interaction, relative to the costs and benefits of fighting, i.e. \( s_F^1 (1 - C_F^1)(1 - C_F^2) - \varphi > 0 \).

In this case \( \frac{\partial (\pi_F^1 - \pi_R^1)}{\partial B} > 0 \) clearly always holds, while \( \frac{\partial (\pi_F^1 - \pi_R^1)}{\partial A} > 0 \) holds for large values of \( k \), \( B \) and \( K_2 \), and small values of \( e \) and \( \varphi \). Whether the left hand side of the expression (8) above is positive or negative does not depend on \( A \), but only on \( B \). It becomes worthwhile to start policy conflict rather than to remain at peace if \( B \) is above the following threshold, i.e. \( B > B^F \).

\[
B^F \equiv \frac{eC_F^1}{kK_2^2L_2^d} \left[ s_F^1 (1 - C_F^1)(1 - C_F^2) - \varphi \right]
\]  

To summarize, in a more developed world (larger \( A \) and \( B \)) the scope for policy conflict increases. For the sake of completeness, we also compare territorial conflict (\( T \)) and policy conflict (\( F \)).

\[
\pi_T^1 - \pi_F^1 = s_T^1 K_2 + AK_2^a L_1^b [(1 - s_T^2)^a(1 - C_T^2) - (1 - C_F^1)]
\]
\[
+ \frac{kAK_2^a L_1^b BK_2^c L_2^d}{e} \left[ \varphi (1 - C_T^1)(1 - C_T^2) - s_F^1 (1 - C_F^1)(1 - C_F^2) \right]
\]  

As mentioned earlier, policy conflict is only feasible if \( s_F^1 (1 - C_F^1)(1 - C_F^2) - \varphi > 0 \). If this condition does not hold, we can simply refer to the earlier comparison between \( T \) and \( R \). If this condition holds, then it must also be that \( \varphi (1 - C_T^1)(1 - C_T^2) - s_F^1 (1 - C_F^1)(1 - C_F^2) < 0 \). If \( C_T^1 \) and \( C_F^1 \) are of a similar magnitude, then \( (1 - s_T^2)^a(1 - C_T^2) - (1 - C_F^1) < 0 \) must also hold. Under these mild conditions, as expected \( \frac{\partial (\pi_T^1 - \pi_F^1)}{\partial A} < 0 \) and \( \frac{\partial (\pi_T^1 - \pi_F^1)}{\partial B} < 0 \). As our two-state world becomes more developed, territorial conflict tends to subside, and conflict over policy becomes more likely.

Figure 1 displays the three outcomes that result from country 1’s decision, given particular parameter values.\(^{20}\) Productivity/development (\( A \)) is on the x-axis, while the status quo share of the gains from interaction (\( \varphi \)) is on the y-axis. Territorial conflict dominates for low levels of development, while higher development moves country 1 towards either peace or policy conflict.

\(^{20}\) \( s_1^T = s_2^T = s_1^F = s_2^F = 0.5, C_1^T = C_2^T = C_1^F = C_2^F = 0.1, B = 1, K_1 = 1, K_2 = 3, L_1 = L_2 = 1, a = c = e = k = 1. \)
4.3 Hypotheses

We conclude this section by discussing links between the theory and the empirical world. Parameter values will vary for numerous exogenous reasons. Development in some states will not be sufficient to breach the thresholds, while elsewhere, initial values may already exceed the thresholds. Nevertheless, increasing development should tend to push productivity from below to above threshold levels $A^T$, $B^T$ and $B^F$. We can test these relationships using standard statistical techniques.

Development increases the ability of states to project power, and makes it worthwhile to attempt to obtain more influence over the increasingly valuable international policy space. While it is difficult to assess the effects of latent potential directly, we can use the relationship between territorial conflict and contiguity to construct an operational hypothesis. Since most territorial conflicts involve neighbors, the model suggests that development increases conflict in non-contiguous dyads.

**Hypothesis 1** *Non-contiguous dyads containing developed states are more likely to experience militarized disputes than non-contiguous dyads containing at least one developing state.*

Second, the peace-producing effects of development should tend to be dyadic. A lack of interest in territorial aggression by country 1 only avoids conflict if country 2 also harbors no territorial
ambitions. Since country 1’s probability of victory is the converse of that for country 2, both dyad members must see conquest as unappealing. Developed countries that share a border with developing countries are not expected to exhibit a reduction in violence attributable to development.\footnote{Gleditsch (2003) identifies neighborhood effects linking liberal variables to regions of relative interstate peace.}

**Hypothesis 2** Contiguous dyads containing two developed states are less likely to experience militarized disputes than contiguous dyads containing at least one developing state.

Claims about contiguity and development only indirectly test predictions of the model. We thus also hypothesize the more direct claim that developed states are less likely to fight over territory.

**Hypothesis 3** The more developed the least developed state in a dyad, the less likely that dyad is to experience a territorial dispute.

Finally, the complement to the territorial claim involves policy conflicts and other disputes not involving territory. Development makes policy conflict more attractive as the gains from interaction grow larger. Greater state capacity increases the number of partners with which a given developed state can effectively interact, and developed states are better equipped to focus on issues not directly related to territorial integrity and regime survival. The intensity of policy conflict is typically lower, suggesting a normatively appealing finding. Further, the overall propensity toward conflict behavior may decline, as policy disputes appear more amenable to negotiation and bargained solutions.

**Hypothesis 4** The more developed the least developed state in a dyad, the more likely that dyad is to experience a non-territorial dispute.

## 5 Research Design

To assess the relationship between development and militarized conflict, we examine data covering the post-World War II period. We also extend the analysis over the period 1816-2000 using a less direct indicator of economic development. As a baseline, we begin with a statistical model of conflict developed by Oneal & Russett (1999), thus limiting the need for detailed description of the
variables and allowing for a broader comparison of our results. There is potential bias in analysis of militarized conflict, given the large disparity between events (“1’s”) and non-events (“0’s”). For this reason, we estimate coefficients using rare events logit (King & Zeng 2001a, 2001b) using the Stata software package. Independent variables are lagged by one year to address endogeneity. We use the Beck, Katz and Tucker (1998) method of temporal splines to control duration dependence.\footnote{We omit the “peace year” variable, but results are unchanged. We also corroborate results for 1816–1992.}

5.1 Data

Many of the variables used in the study are generated using the EUGene software package (Bennett & Stam 2000). Additional variables are from other sources detailed below. A Stata “do” file is available from the authors that replicates all aspects of data construction and empirical analysis.

5.1.1 Dependent Variables

We examine three dependent variables from the militarized interstate disputes (MIDs) dataset (Gochman & Maoz 1984; Jones et al. 1996). First, we use a dummy for MID “onset” as defined by Maoz (1999), where (1) is a dispute, and (0) is no dispute.\footnote{The Maoz dataset omits dyads where states fight on opposite sides, but not against each other (e.g. Soviet Union and Thailand in the Vietnam conflict). Our results can also be generated using the standard “COW” dispute data.} Second, we use the two state-level revision type variables in the MID data ($mzrevt11$ and $mzrevt12$: 0=none, 1=territory, 2=policy, 3=regime, 4=other) to differentiate between disputes involving territory and those involving non-territorial conflict. Finally, we distinguish between casualty-producing, and non-casualty MIDs using the variable $mzfatald$ (0=no battle deaths, 1=1 to 25 deaths, 2=26 to 100 deaths, 3=101 to 250 deaths, 4=251 to 500 deaths, 5=501 to 999 deaths, 6=at least 1000 battle deaths). Additional discussion of these variables and related issues appears below in the results section.\footnote{We plan subsequent analysis on data on territorial conflict (Tir et al. 1998; Huth & Allee 2003; Hensel 2001).}

5.1.2 Key Independent Variables

Recall that development is expected to increase the ability of nations to fight distant adversaries. Power projection allows states to pursue policy interests regionally or even globally. Conversely, development is expected to decrease conflict over conquerable resources. Territory in particular
forms the basis for conflict among proximate states. We thus examine two variables, one for development, and the other for the interaction between development and distance or contiguity.

- **Economic development**: The consensus measure of development, GDP per capita, has yielded mixed or inconclusive results in other research (Boehmer 2001). Studies of the democratic peace initially included per capitated GDP, but the variable proved insignificant and was dropped in later studies (Maoz & Russett 1992). We surmise that the insignificance of per capita GDP is due to the contrasting effects of development on disputes. We attempt to parse out these contrasting effects on the ability to project power, and on the interest in using military force for resource/territorial conquest by including two variables in the analysis. Development (Low) measures the lower of the two per capitized GDP statistics for a given dyad. These data come from Gleditsch (2002). Dyadic analysis requires some method of aggregating unit variables. We adopt the “weak link” assumption Dixon (1993). Values for the least developed state in the dyad serve as a threshold, characterizing the dyad as a whole. The weak link assumption is appropriate, given our hypotheses (Dixon & Goertz 2005).

In addition to GDP, we measure development as per capita energy consumption using the Composite Indicators of National Capability (CINC) component energy, which indicates national energy consumption in thousands of coal-ton equivalents (Small & Singer 1982, Singer 1990). These data have been widely used elsewhere as a proxy for GDP (Lipset 1959; Burkhart & Lewis-Beck 1994; Hegre et al. 2001) and are available over a longer time period.

- **Development × Contiguity or Distance**: A second pair of variables isolates the effect of prosperity on likely subjects of territorial aggression. A decline in the value of conquest should most affect relations with neighbors, where territorial claims are most common and occupation most practical. The interaction term should be associated with a lower likelihood of a MID. Development/Distance (used to graph these relationships) divides GDP/pop. for the poorer state in a dyad by distance in kilometers, as distance is inversely related to contiguity.

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25 We take the natural log of GDP/population. Coefficient estimates using the unlogged variable are comparable.

26 Each linear term in an interaction matrix must be interpreted as if the other linear terms equal zero (Braumoeller 2004). This is not a problem here, as Contiguity is dichotomous. All of the interacted terms are also highly statistically significant. Finally, we also examine the effects of the key linear term (Development) in separate samples.

27 The simple correlation between distance logged (Logdist) and national and colonial contiguity (ctgy) is $-0.7268$. 

15
5.1.3 Additional Variables

- **Democracy**: We measure democracy using the Polity IV data (Jaggers & Gurr. 1995). Polity data provide two eleven-point indexes of regime type based on formal constraints on the executive and institutional support for democracy (Gurr et al. 1989; Marshall and Jaggers 2002). We prepare monadic values by combining Polity democracy (democ) and autocracy (autoc) scales as follows, \([(\text{democ}_i - \text{autoc}_i) + 10]/2\), (where \(i \in [A,B]\)).\(^{28}\)

- **Trade dependence**: Dependence is measured as the sum of bilateral imports and exports for a country, divided by gross domestic product (GDP) (Oneal & Russett 1997). We again use the Gleditsch (2002) data and adopt the weak link assumption to construct a dyadic measure.

- **Geographic Contiguity and Distance**: Neighbors are generally more likely to fight than states that are geographically distant. Contiguity is a dichotomous variable for dyadic partners with shared land borders or that are separated by less than 150 miles of water, either directly or through ongoing colonial possessions. Contiguity is expected to increase the likelihood of a MID. Distance is the natural logarithm of the great circle distance between national capitals, or of the closest major cities for large countries. Distance should diminish militarized disputes.

- **Major Power Status**: Major powers are more active internationally and fight more often. We include a dummy variable, Maj. Power, coded “1” if at least one state in a dyad is a major power according to the COW criteria. We also examine dummies for the United States and for the EU in additional tests in Appendix C (these results are substantially the same).

- **Allies**: Studies commonly include a measure for alliance ties (Oneal & Russett 1997, Russett & Oneal 2001). Alliance codes the presence of a defense pact, neutrality pact, or entente using COW Alliance codings (Singer & Small 1966, Small & Singer 1990, Gibler & Sarkees 2004).\(^{29}\)

- **Capabilities**: We assess the balance of capabilities in the dyad using the COW CINC score. CINC scores are computed as the weighted average of a state’s share of total system popu-

\(^{28}\)This construction differs from Oneal and Russett in that we add 10 and divide by 2 to yield the 0 to 10 range of the Polity data. We find equivalent results using interpolated values or replacing missing values with the mean.

\(^{29}\)A dummy variable that coded only the presence of defense pacts produced equivalent results.
lation, urban population, energy consumption, iron and steel production, military manpower and military expenditures. **Capability Ratio** measures capabilities as the CINC owned by the least powerful state, divided by the sum of CINC’s in the dyad \(\frac{CINC_{\text{low}}}{CINC_A + CINC_B}\). Higher ratios of CINC scores should negatively impact disputes (parity increases the risk of war).

- **Dyad Longevity**: A variety of factors associated with the duration of the dyadic relationship may mistakenly be attributed to a causal variable that changes over time (Daxecker 2007). Culture, politics, and the sampling problem in the MIDs data associated with “sovereignty,” while not modeled here directly, are addressed by a variable measuring the age of a dyad.

- **Temporal Dependence**: We control for temporal dependence using the Beck, Katz & Tucker (1998) technique. We construct four spline variables for each of the dependent variables by interpolating the splines from the Beck, Katz & Tucker dummy matrix Tucker (1999).

## 6 Results

We report results of the statistical tests in three stages, first showing the effect of an interaction between development and contiguity or metric distance, then examining the impact of development on territorial disputes, and finally reviewing the influence of development on non-territorial (policy) conflict. We offer a brief review of a detailed list of possible confounding factors in Appendix C.

### 6.1 The Relationship Between Territory and Contiguity

Most territorial disputes occur between neighbors.\(^{30}\) This relationship has been extensively documented in other studies (Vasquez 1993, 2001, 2004). Table 1 also provides a cross-tab of two dichotomous variables, contiguity and territorial MIDs. Figures are reported both for all MIDs and just for those MIDs involving fatalities. Values in parentheses (soft brackets) are column percentages. Of the 790 MIDs that the Correlates of War project identifies as territorial, 644 involve contiguous states (over 81%), while 248 of 280 fatal MIDs are among contiguous states (over 88%). The difference in samples between contiguous and non-contiguous dyads is statistically significant.

\(^{30}\)Even using a strict definition of contiguity (direct contiguity of sovereign states), Hensel finds that “both contiguity and territory are involved in over half of all full-scale wars” in the period 1816 to 1992 (Hensel 2000, page 70).
Table 1: Relationship between Contiguity and Territorial MIDs
(soft brackets = column percentages, hard brackets = fatal MIDs)

<table>
<thead>
<tr>
<th>Territorial MID [+ Fatalities]?</th>
<th>No</th>
<th>Yes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contiguous MID?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>845 [959]</td>
<td>146 [32]</td>
<td>991</td>
</tr>
<tr>
<td></td>
<td>(46.66 [41.32])</td>
<td>(18.48 [11.43])</td>
<td>(38.10)</td>
</tr>
<tr>
<td>Yes</td>
<td>966 [1,362]</td>
<td>644 [248]</td>
<td>1,610</td>
</tr>
<tr>
<td></td>
<td>(53.34 [58.68])</td>
<td>(81.52 [88.57])</td>
<td>(61.90)</td>
</tr>
<tr>
<td>Total</td>
<td>1,811 [2,321]</td>
<td>790 [280]</td>
<td>2,601</td>
</tr>
</tbody>
</table>

χ²(1) = 185.189 [94.650], Prob. = 0.0000

6.2 Interacting Proximity and Development

Table 2 lists coefficient estimates, standard errors, and other statistics for four regressions estimating the relationship between economic development and MID onset. Results for the spline variables and the intercept are omitted to save space. Model 1 serves as a baseline, including only the linear effect of economic development. Development is not statistically significant. The standard error of the estimate for development is actually larger than the estimated coefficient. Model 2 adds the interaction term between development and contiguity. Results with the combination of linear term and interaction are much different. Both development variables become statistically significant at the 0.1% level. Signs for each coefficient are also in the directions anticipated by the hypotheses.

The substantive effect of development on conflict can be seen in Figure 2. The vertical axis represents the probably of a dispute. The horizontal axis reports average national income. The effect of economic development alone appears as an upward-sloping thin dashed line. Income in non-contiguous dyads increases the propensity to engage in a MID. The effect of the interaction between development and contiguity appears as a thin dashed-and-dotted line. Developed states

31 We plot non-logged values of development and the interaction term to facilitate interpretation of the results.
Table 2: (Re)Logit Models of Economic Development and Militarized Interstate Disputes

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Development (Low)</strong></td>
<td>-0.103</td>
<td>0.422***</td>
<td>1.287**</td>
<td>0.531****</td>
</tr>
<tr>
<td></td>
<td>(0.118)</td>
<td>(0.130)</td>
<td>(0.471)</td>
<td>(0.109)</td>
</tr>
<tr>
<td><strong>Develop. × Contig.</strong></td>
<td>-0.695***</td>
<td></td>
<td>-0.662****</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.159)</td>
<td></td>
<td>(0.172)</td>
<td></td>
</tr>
<tr>
<td><strong>Development/Distance</strong></td>
<td></td>
<td>-9.227***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.320)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Democracy (Low)</strong></td>
<td>-0.102***</td>
<td>-0.098***</td>
<td>-0.150****</td>
<td>-0.091****</td>
</tr>
<tr>
<td></td>
<td>(0.033)</td>
<td>(0.030)</td>
<td>(0.029)</td>
<td>(0.019)</td>
</tr>
<tr>
<td><strong>Democracy (High)</strong></td>
<td>0.128****</td>
<td>0.133****</td>
<td>0.091****</td>
<td>0.106****</td>
</tr>
<tr>
<td></td>
<td>(0.027)</td>
<td>(0.028)</td>
<td>(0.028)</td>
<td>(0.020)</td>
</tr>
<tr>
<td><strong>Trade Dep. (Low)</strong></td>
<td>-0.792</td>
<td>1.924</td>
<td>11.299***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(10.880)</td>
<td>(8.609)</td>
<td>(2.779)</td>
<td></td>
</tr>
<tr>
<td><strong>Contiguity (dummy)</strong></td>
<td>3.153****</td>
<td>8.525****</td>
<td>2.329****</td>
<td>2.744****</td>
</tr>
<tr>
<td></td>
<td>(0.255)</td>
<td>(1.319)</td>
<td>(0.245)</td>
<td>(0.200)</td>
</tr>
<tr>
<td><strong>Distance (ln)</strong></td>
<td>-0.163****</td>
<td>-0.154****</td>
<td>-2.024****</td>
<td>-0.150****</td>
</tr>
<tr>
<td></td>
<td>(0.030)</td>
<td>(0.030)</td>
<td>(0.543)</td>
<td>(0.024)</td>
</tr>
<tr>
<td><strong>Maj. Power (dummy)</strong></td>
<td>1.357****</td>
<td>1.339****</td>
<td>2.692****</td>
<td>1.194****</td>
</tr>
<tr>
<td></td>
<td>(0.208)</td>
<td>(0.208)</td>
<td>(0.273)</td>
<td>(0.151)</td>
</tr>
<tr>
<td><strong>Alliance (dummy)</strong></td>
<td>-0.193</td>
<td>-0.139</td>
<td>-0.116</td>
<td>-0.093</td>
</tr>
<tr>
<td></td>
<td>(0.157)</td>
<td>(0.152)</td>
<td>(0.285)</td>
<td>(0.123)</td>
</tr>
<tr>
<td><strong>Capability Ratio</strong></td>
<td>1.391****</td>
<td>1.370****</td>
<td>2.377****</td>
<td>1.085****</td>
</tr>
<tr>
<td></td>
<td>(0.466)</td>
<td>(0.466)</td>
<td>(0.655)</td>
<td>(0.348)</td>
</tr>
</tbody>
</table>

| N                      | 370307                   | 370307                 | 360358               | 491581                   |

Significance:  * : 5%  ** : 1%  *** : 0.5%  **** : 0.1% Standard errors appear in parentheses. Intercept and temporal spline variables suppressed. Details and additional results available from the authors.

are significantly less likely to experience disputes with their neighbors. The combined effect of both terms (for contiguous states) is represented by a heavy continuous line. The decline in dispute propensity is considerable. States with an average national income of $20,000 in real 1996 dollars are less than half as likely to experience a dispute as states where GDP/pop. equals $10,000.

It is also informative to examine the relationship between development and conflict using a
metric measure of distance. Model 3 in Table 2 substitutes distance for contiguity in the interaction term with development. Results using distance are essentially the same as those using contiguity.

Figures 3 and 4 plot the effect of development and distance on disputes. In both figures, the vertical axis reports the probability of a militarized dispute in a given dyad year. In Figure 3, the axis running roughly diagonally from front and center on the page to the upper right represents increasing distance (logged). GDP decreases on the other diagonal from front to back, with "rich neighbors" in the foreground. The figure shows a "ridge" running roughly from "poor neighbors" to "rich strangers." The locus of conflict moves farther from home as states become richer.

Figure 4 illustrates why this relationship has confounded simple directional hypotheses. The Figure rotates the plot 90 degrees and elevates the perspective, so that we may see what "poor strangers" are doing. Developing states seldom fight far from home, while developed states tend to fight at greater distances from their capitals. Imagine that Figure 4 is divided down the middle, between "neighbors" and "strangers." The impact of GDP per capita among neighbors and strangers is just the opposite, declining in prosperity for neighbors, and increasing among non-neighbors.
The final regression in Table 2 substitutes COW energy consumption per capita for GDP per capita. Use of this energy variable makes it possible to examine a longer time series (1816 - 2000). We drop the trade variable due to data limitations. The results are equivalent to the second and third regressions in Table 2, suggesting that our findings are applicable to much of the modern era.

6.3 The Effect of Development on Territorial Disputes

Table 3 lists three regressions estimating the probability of territorial MIDs. Non-territorial MIDs are coded as non-disputes. We drop the interaction term with contiguity, since only territorial MIDs now appear in the sample, and add Development (High), so that development and democracy are represented by similar pairs of variables. If developed states are less likely to experience territorial conflict regardless of the characteristics of their partners, then high values of either variable should be associated with a reduction in territorial disputes. Development (Low) is consistently statistically significant and negative, indicating that development discourages territorial disputes. However, while Development (High) has a negative sign, the coefficient is consistently insignificant. Both states in a dyad must be developed in order for (relative) peace to ensue. Otherwise, the less developed state retains an interest in territory, forcing the developed state to protect itself, or cede

In Model 5, the dependent variable is coded as “1” if there is a MID in a given dyad year and either state revision type code reports that the dispute is territorial. In Model 6, we further restrict the sample of disputes to territorial MIDs involving battlefield fatalities.\footnote{Results when coding the dependent variable as “1” only if COW lists both states as having a territorial MID are weaker, but still significant for Development (Low), even though this very strict coding rule yields only 67 MIDs.} The argument about resource competition implies an intensity of conflict that may not include minor disputes. The MID coding of “territory” includes disputes that are only nominally over resources, such as conflicts involving posturing by rivals (# 608, “1958-1959 Berlin Deadline Crisis”), militarization of strategic geography (# 1135, “Occupation of Abu Musa and the Tunbs Islands”), or symbolic or identity-driven conflicts (# 2059, “Macedonian Question”). Reporting bias may also be a problem
Table 3: (Re)Logit Estimates of Economic Development and Territorial MIDs

<table>
<thead>
<tr>
<th>D.V.: MID Onset (Maoz)</th>
<th>5: Either State Rev. Type = 1</th>
<th>6: Fatal MID Rev. Type = 1</th>
<th>7: Energy Use Rev. Type = 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development (Low)</td>
<td>-0.499****</td>
<td>-0.730****</td>
<td>-0.574**</td>
</tr>
<tr>
<td></td>
<td>(0.155)</td>
<td>(0.208)</td>
<td>(0.216)</td>
</tr>
<tr>
<td>Development (High)</td>
<td>-0.021</td>
<td>-0.010</td>
<td>-0.034</td>
</tr>
<tr>
<td></td>
<td>(0.276)</td>
<td>(0.310)</td>
<td>(0.168)</td>
</tr>
<tr>
<td>Democracy (Low)</td>
<td>-0.042</td>
<td>-0.022</td>
<td>-0.072</td>
</tr>
<tr>
<td></td>
<td>(0.044)</td>
<td>(0.067)</td>
<td>(0.037)</td>
</tr>
<tr>
<td>Democracy (High)</td>
<td>0.169****</td>
<td>0.228****</td>
<td>0.150****</td>
</tr>
<tr>
<td></td>
<td>(0.047)</td>
<td>(0.056)</td>
<td>(0.041)</td>
</tr>
<tr>
<td>Trade Dep. (Low)</td>
<td>4.417</td>
<td>-8.719</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(9.071)</td>
<td>(36.732)</td>
<td></td>
</tr>
<tr>
<td>Contiguity (dummy)</td>
<td>4.332****</td>
<td>5.192****</td>
<td>3.630****</td>
</tr>
<tr>
<td></td>
<td>(0.468)</td>
<td>(0.776)</td>
<td>(0.310)</td>
</tr>
<tr>
<td>Distance (ln)</td>
<td>-0.206****</td>
<td>-0.304****</td>
<td>-0.199****</td>
</tr>
<tr>
<td></td>
<td>(0.045)</td>
<td>(0.067)</td>
<td>(0.036)</td>
</tr>
<tr>
<td>Maj. Power (dummy)</td>
<td>0.112</td>
<td>-0.444</td>
<td>0.256</td>
</tr>
<tr>
<td></td>
<td>(0.287)</td>
<td>(0.333)</td>
<td>(0.168)</td>
</tr>
<tr>
<td>Alliance (dummy)</td>
<td>-0.527</td>
<td>-0.609</td>
<td>-0.243</td>
</tr>
<tr>
<td></td>
<td>(0.291)</td>
<td>(0.338)</td>
<td>(0.186)</td>
</tr>
<tr>
<td>Capability Ratio</td>
<td>0.795</td>
<td>1.065</td>
<td>1.017</td>
</tr>
<tr>
<td></td>
<td>(0.851)</td>
<td>(0.972)</td>
<td>(0.640)</td>
</tr>
<tr>
<td>Dyad Duration</td>
<td>0.015****</td>
<td>0.017****</td>
<td>0.013****</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.004)</td>
<td>(0.002)</td>
</tr>
</tbody>
</table>

N | 370307 | 370307 | 491581

Significance:  * : 5%  ** : 1%  *** : 0.5%  **** : 0.1% Standard errors appear in parentheses. Intercept and temporal spline variables suppressed. Details and additional results available from the authors.

in the MIDs data. Denser media coverage of developed countries is more likely to document minor interstate disputes. Limiting analysis to casualty-producing MIDs reduces the sample of dispute onsets by 65%\(^{34}\), increasing standard errors, but this sample also addresses both potential problems. If the results for territorial MIDs with casualties are much weaker than for all territorial

\(^{34}\)There are 790 territorial dispute onsets and 280 fatal territorial onsets from a total of 2601 MIDs in the sample.
disputes, then there might be reason to question the study’s findings. In fact, estimating deadly territorial MIDs increases the size of the coefficient for Development (Low) by half.\textsuperscript{35} In other respects, results for the two regressions are largely the same. Model 7 uses energy consumption as the proxy for economic development, extending the temporal domain with largely the same results. Finally, it might be argued that these results reflect a lessening of tensions in Europe and other regions where borders have stabilized, and norms have been established to address territorial conflicts (Zacher 2001, Fazal 2007). For this reason, we include Dyad Duration, a variable coding the number of years a dyad has been in existence. Dyad Duration should account for any monotonic temporal process within the dyad. Surprisingly, the variable is positive and highly statistically significant; counter to norms and learning arguments, old dyads are more disputatious, not less.

6.4 The Effect of Development on Non-Territorial Disputes

We next assess a dependent variable based on the MID revision types for non-territorial disputes, with results reported in Table 4. Findings are again consistent across the three regressions in the table. Developed countries are more likely to experience non-territorial disputes. Boehmer & Sobek (2005) suggest that development should have a non-linear effect on dispute propensity. While the relationship does not hold for territorial conflict, adding the development quadratic variable does provide a better fit for the impact of development on non-territorial disputes.\textsuperscript{36} Democracy also differs in its impact between territorial and non-territorial disputes, with Democracy (Low) significantly reducing the probability of non-territorial disputes. Major power status, which has no effect on territorial disputes, significantly increases conflict over policy, regime status, and other non-territorial issues. Dyad Duration again increases the likelihood of militarized conflict.

Turning to additional details of the models in Table 4, Model 8 reports the impact of development and other variables on disputes in which either dyadic member was coded as having largely non-territorial aims. It is also possible to use only MIDs where both states in the dyad are listed in the COW revision type codes as engaging in non-territorial conflict, though the number of such

\textsuperscript{35}The standard error increases by about one third, reflecting a loss in information given the smaller sample of 1’s.\textsuperscript{36}With three development variables — linear, squared, and cubed — none of the variables is statistically significant. We also examined a dependent variable coded “1” only for revision type two (policy) MIDs. Using this stricter coding (724 MID cases), both the linear and squared development variables remain highly statistically significant ($p = 0.001$).
Table 4: (Re)Logit Estimates of Economic Development and Non-Territorial MIDs

<table>
<thead>
<tr>
<th>D.V.: MID Onset (Maoz)</th>
<th>8: Either State Rev. Type ≠ 1</th>
<th>9: Non-fatal MID Rev. Type ≠ 1</th>
<th>10: Energy Use Rev. Type ≠ 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Development (Low)</strong></td>
<td>4.334**** (1.217)</td>
<td>4.817**** (1.371)</td>
<td>0.269**** (0.089)</td>
</tr>
<tr>
<td><strong>Development (Low^2)</strong></td>
<td>-0.277**** (0.078)</td>
<td>-0.298**** (0.087)</td>
<td>-0.119**** (0.018)</td>
</tr>
<tr>
<td><strong>Democracy (Low)</strong></td>
<td>-0.117**** (0.025)</td>
<td>-0.103**** (0.026)</td>
<td>-0.119**** (0.018)</td>
</tr>
<tr>
<td><strong>Democracy (High)</strong></td>
<td>0.075**** (0.022)</td>
<td>0.081**** (0.023)</td>
<td>0.067**** (0.017)</td>
</tr>
<tr>
<td><strong>Trade Dep. (Low)</strong></td>
<td>9.316 (7.708)</td>
<td>3.975 (9.531)</td>
<td></td>
</tr>
<tr>
<td><strong>Contiguity (dummy)</strong></td>
<td>2.795**** (0.309)</td>
<td>2.788**** (0.321)</td>
<td>2.200**** (0.237)</td>
</tr>
<tr>
<td><strong>Distance (ln)</strong></td>
<td>-0.133**** (0.030)</td>
<td>-0.116**** (0.031)</td>
<td>-0.116**** (0.024)</td>
</tr>
<tr>
<td><strong>Maj. Power (dummy)</strong></td>
<td>1.399**** (0.197)</td>
<td>1.424**** (0.199)</td>
<td>1.184**** (0.156)</td>
</tr>
<tr>
<td><strong>Alliance (dummy)</strong></td>
<td>-0.246 (0.188)</td>
<td>-0.367 (0.205)</td>
<td>-0.186 (0.142)</td>
</tr>
<tr>
<td><strong>Capability Ratio</strong></td>
<td>0.800 (0.422)</td>
<td>0.970* (0.454)</td>
<td>0.662 (0.350)</td>
</tr>
<tr>
<td><strong>Dyad Duration</strong></td>
<td>0.009**** (0.002)</td>
<td>0.009**** (0.002)</td>
<td>0.011**** (0.002)</td>
</tr>
</tbody>
</table>

N: 370307 370307 491581

Significance: *: 5%  **: 1%  ***: 0.5%  ****: 0.1% Standard errors appear in parentheses. Intercept and temporal spline variables suppressed. Details and additional results available from the authors.

cases is relatively small. Results are also generally comparable, though statistical significance is lower. Model 9 restricts the sample to non-casualty producing non-territorial conflicts. The fact that the results are largely unchanged suggests that the distinction is not critical; the im-

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37 Roughly 65% of the dyadic MID onsets coded as “territorial” in this study have no fatalities. About 75% of non-territorial MIDs cases have no casualties (1029 of 1376), and over 83% of policy MIDs are not deadly (603 of 724). This is consistent with the theoretical distinction between policy (variable) and territorial (fixed) preferences.
The non-linear relationship between development and non-territorial conflict (but not territorial conflict) invites a refinement of the theory. Boehmer & Sobek (2005) argue that poor states seldom dispute non-neighbors because low income states are not able to project power beyond their own borders.\textsuperscript{38} Development initially increases the ability of states to impose their will on other nations, especially on countries that are geographically distant. However, the impact of development declines for the most developed states. Perhaps these states pass through a period of revision and are already relatively satisfied with conditions in the international system (Lemke & Reed 1996, Kacowicz 1995), or possibly the most developed countries have a broader “menu” of non-military means for obtaining preferred policy outcomes, including sanctions, intergovernmental organizations, and foreign aid (c.f., Baldwin 1985, Chan & Drury 2000, Alesina & Dollar 2000).

A more precise understanding of the impact of development on policy and regime conflicts awaits further research. For now, it appears that development may indeed have contrasting effects on the likelihood of territorial (resource) and non-territorial (policy) disputes. These results hold regardless of whether we measure development as average national income or energy consumption, whether we utilize strict or more general definitions of the appropriate sample (fatal or all territorial disputes, non-fatal or all non-territorial disputes), and how we operationalize the distinction between resource and policy competition (interacting contiguity and development, or splitting the sample of disputes).

7 Conclusion

We do not yet know whether the results reported here adequately characterize the consequences of economic development on interstate conflict. Economic, political, social, and military processes might depart from historical patterns. Alternately, these results could be the consequence of error. Better measurement may reveal other trends. More careful estimation might demonstrate that peace among rich neighbors is not all that special. Nevertheless, these results appear to be robust

\textsuperscript{38}We reproduce the findings of Boehmer & Sobek (2005) at the dyad level-of-analysis. The non-linear effect of development does not contradict, or account for, the interaction between development and proximity/territory.
to many of the most obvious alternative explanations. Similarly, extending the analysis to the nineteenth century by the energy variable does not appear to appreciably weaken the basic findings.

We are left with the possibility that economic development has two contrasting externalities; an increase in the tendency to fight for influence and a decrease in the motivation to fight over real estate. A stronger economy brings with it the potential to exercise force at greater distances from the homeland, broadening the number of possible targets for coercion. Yet, the general tendency is for developed countries to fight less often than they might. Capacity and inclination are operating in opposite directions, particularly with regard to territorial disputes. Contiguous neighbors are the most obvious target for revisionist warfare. Yet, at least one appeal of conquest is removed if the benefits of occupation fail to meet costs. A secular decline in commodity prices and an increase in the price of skilled labor throughout much of the last century ensured that the fruits of conquest were more equivocal for developed states. Indeed, the recent precipitous rise in commodity prices may be cause for concern. Alternately, it could be that developed countries are reluctant to engage in conquest because aggression disrupts markets at home. Further research is required to determine whether development acts more to inhibit initiators or to create “bitter pills” from former targets.

World peace is a long way off, but you may be able to see some of it from here. Results of this study suggest that previous reports stressing the essential irrelevance of economic development for interstate peace are greatly exaggerated. Development, while a mixed bag, seems on the whole to offer a means for reducing the intensity, if not always the frequency, of interstate disputes. Territory has historically formed the basis for the bloodiest and most intractable wars. We show that the intensity of interstate violence among developed countries is much lower than among developing countries. Further research is necessary, but it is more than speculation to note that warfare in modernity involves smaller, less protracted contests. If economic development broadens to include more of the world’s nations, one can hope that more peace (or at least fewer big wars) will follow.
Appendix A: Rent-Seeking Interpretation of the Model

In the main version of the model in the text, contest success and the losses from fighting are exogenous. In contrast, the rent-seeking literature (Hirshleifer 2001) treats these factors as endogenous. Success depends on fighting effort as well as how countries budget for production or appropriation.

A slightly modified version of our model can allow for these features of rent-seeking frameworks. Imagine as before that country 1 chooses between $R$, $T$ and $F$ in the first stage. In the second stage of the game, optimal levels of fighting effort are chosen. If $R$ is chosen the game finishes after the first stage. If $T$ is selected, in the second period both players have to decide what part of their time budget they want to use for territorial appropriation, $Q$, and what part for productive activities, $L$. Similarly, when $F$ is selected in the first stage, both players decide in stage two what time to allocate for fighting over policy, $G$, or for production, $L$. Thus, the time constraints $L_1 + Q_1 = 1$, and $L_1 + G_1 = 1$, respectively, must hold. For modeling the shares we can use the standard ratio form contest success functions (cf. Skaperdas 1996): $s^T_1 = \frac{Q_1}{Q_1 + Q_2}$, $s^T_2 = \frac{Q_2}{Q_1 + Q_2}$, $s^F_1 = \frac{G_1}{G_1 + G_2}$, $s^F_2 = \frac{G_2}{G_1 + G_2}$. The loss of fighting now corresponds to the foregone gains from production: $C^T_1 = Q_1$, $C^T_2 = Q_2$, $C^F_1 = G_1$, $C^F_2 = G_2$. This game can be solved through backward induction. In such a framework the previous result of the comparison between $T$ and $R$ would continue to hold: $\frac{\partial (\pi^T_1 - \pi^R_1)}{\partial A} < 0$ and $\frac{\partial (\pi^T_1 - \pi^R_1)}{\partial B} < 0$. The comparison between $F$ and $R$ would also have the same structure as in the main text, although now $s$ and $C$ would be endogenous. Under mild conditions our previous results continue when relaxing the assumption of exogenous success.

Appendix B: Allowing for Joint Territorial and Policy Conflict

We can also build a simplified “rent seeking”-style model that allows for both territorial and policy conflict to occur at the same time. This version of the model has the advantage that it predicts how fighting effort would be allocated across both types of conflict. Countries 1 and 2 have the option to choose between productive activities, $L$, fighting over policy and output, $G$, and appropriating
territory, $Q$. Formally, this can be expressed by the time (budget) constraint listed below (A1).

$$L_i + G_i + Q_i = 1$$  \hspace{1cm} (A1)

where $i = 1, 2$, refers to country 1 and country 2.

The payoff functions of country 1 and country 2 are as displayed below.

$$\pi_1 = s_1^F (y_1 + y_2) + s_1^T (T_1 + T_2)$$  \hspace{1cm} (A2)

$$\pi_2 = s_2^F (y_1 + y_2) + s_2^T (T_1 + T_2)$$  \hspace{1cm} (A3)

where $s_1^F = \text{share of output secured by country 1}$, $s_1^T = \text{share of territory secured by country 1}$, $s_2^F = \text{share of output secured by country 2}$, $s_2^T = \text{share of territory secured by country 2}$, $y_1 = \text{production output of country 1}$, $y_2 = \text{production output of country 2}$, $T_1 = \text{initial territory endowment of country 1}$, $T_2 = \text{initial territory endowment of country 2}$. $s_1^F = 1 - s_2^F$, $s_1^T = 1 - s_2^T$.

In this simplified framework territory does not enter the production functions, but has a value of its own, which could for example be related to prestige or to future gains from natural resources.

Outputs for the two countries are given by the simplified production functions $y_1 = AK_1L_1$ and $y_2 = BK_2L_2$, respectively, where $A$ and $B$ are the total factor productivities and $K_1$ and $K_2$ are the capital levels. The results also hold for more complex production functions and for the inclusion of territory. The same contest success functions are included for the shares $s$ as in Appendix A.

For simplicity we solve the model for symmetrical players, with $A = B$, $K_1 = K_2 = K$ and $T_1 = T_2 = T$ (for asymmetric parameter values only numerical solutions exist). Introducing the contest success functions, as well as the production functions and the time constraints into the equations (A2) and (A3), we obtain the following expressions for each country’s payoffs.

$$\pi_1 = \frac{G_1}{G_1 + G_2} (AK(1 - G_1 - Q_1) + AK(1 - G_2 - Q_2)) + \frac{Q_1}{Q_1 + Q_2} 2T$$  \hspace{1cm} (A4)

$$\pi_2 = \frac{G_2}{G_1 + G_2} (AK(1 - G_1 - Q_1) + AK(1 - G_2 - Q_2)) + \frac{Q_2}{Q_1 + Q_2} 2T$$  \hspace{1cm} (A5)
Taking the derivatives of (A4) with respect to $G_1$ and $Q_1$, and the derivatives of (A5) with respect to $G_2$ and $Q_2$, we obtain the first order conditions. Substituting and reformulating we can compute the Nash equilibrium levels of territorial and policy fighting efforts for interior solutions (symmetrical for each country).

$$Q^* = Q_1 = Q_2 = \frac{T}{AK}$$

$$G^* = G_1 = G_2 = \frac{1}{2} - \frac{T}{2AK}$$

For assessing the impact of development on the likelihood of conflict, we can refer to the signs of the partial derivatives

$$\frac{\partial Q^*}{\partial A} = -\frac{T}{AK} < 0, \quad \frac{\partial G^*}{\partial A} = \frac{T}{2AK} > 0, \quad \frac{\partial Q^*}{\partial K} = -\frac{T}{AK^2} < 0, \quad \frac{\partial G^*}{\partial K} = \frac{T}{2AK^2} > 0.$$

The more developed the countries of a dyad (higher $A$), the less resources they devote to territorial conflict (lower $Q^*$), and the more they focus on issue/output conflict (higher $G^*$).

**Appendix C: Tests of Possible Confounding Variables**

We conducted additional regression analysis with a variety of other controls in order to assess the possibility that the study’s findings are spurious. To save space, we provide only a brief summary here (details are available from the authors). Key findings of the study remained basically unaltered.

The controls can be organized into four categories: political, economic, demographic, and geographic. Table 5 lists the additional variables examined. It can be argued that the effect of development is really a proxy for other elements of prosperity or power. A dummy variable for major power status is already included in the analysis. We also coded a dummy variable for the United States (US). The US has been active internationally in the post-World War II period.\(^{39}\)

While positive and significant, the US dummy by itself and in combination with other variables does not alter the results reported in this study. In fact, estimates of the coefficients for Development and the interaction term with contiguity are slightly larger after including the US dummy.

Next, we examined the possibility that the observed relationship between economic development and proximity can be explained by a “neighborhood effect” among affluent, peaceful states. Security

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\(^{39}\)The US is only the second most active conflict participant. Between 1946 and 2000, there are 155 dyad years of disputes involving the US, while the Soviet Union/Russia is a member of 175 dispute dyad years in the same period.
communities, or political unions might account for the observed impact of development (Deutsch 1978). The European Union probably constitutes the strongest case for a neighborhood effect. We coded a dummy variable, $EU$, equal to one if both states in a dyad are EU members. The EU dummy is negative but not statistically significant and has no effect on $Development$ or its interaction variable. We also replaced the CINC ratio variable with the lower and higher dyadic values, much as when estimating democracy. This allows us to distinguish between the effect of the capability ratio (Kugler & Lemke 1996), and some threshold effect (Dixon & Goertz 2005). The United States and Venezuela, for example, are much more likely to experience a dispute than are Paraguay and Sao Tome Principe, even though the CINC ratios for the two dyads are virtually identical (0.03327 versus 0.03323 in 1990). Neither CINC variable is statistically significant.

Table 5: Additional Control Variables

<table>
<thead>
<tr>
<th>Category</th>
<th>Variable</th>
<th>Purpose</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political</td>
<td>USA</td>
<td>Superpower/Heg. in dyad</td>
<td>Sig. (+)</td>
</tr>
<tr>
<td>Political</td>
<td>EU</td>
<td>European Community dyad</td>
<td>Sig. (-)</td>
</tr>
<tr>
<td>Political</td>
<td>CINC</td>
<td>Capabilities (low)</td>
<td>Sig. (+)</td>
</tr>
<tr>
<td>Pol./Econ.</td>
<td>Dem. x Dev.</td>
<td>Mousseau (2000)</td>
<td>Sig. (-)</td>
</tr>
<tr>
<td>Economic</td>
<td>Dev. x Dev.</td>
<td>Boehmer &amp; Sobek (2005)</td>
<td>Sig. (-)</td>
</tr>
<tr>
<td>Economic</td>
<td>Openness</td>
<td>Overall trade (low)</td>
<td>None</td>
</tr>
<tr>
<td>Economic</td>
<td>GDP</td>
<td>Economic size (low)</td>
<td>None</td>
</tr>
<tr>
<td>Economic</td>
<td>Oil</td>
<td>Fearon &amp; Laitin (2003)</td>
<td>Sig. (+)</td>
</tr>
<tr>
<td>Demographic</td>
<td>Pop.</td>
<td>Population (low)</td>
<td>None</td>
</tr>
<tr>
<td>Demographic</td>
<td>Pop. Density</td>
<td># people/km$^2$ (low)</td>
<td>None</td>
</tr>
<tr>
<td>Demographic</td>
<td>Arable Pop.</td>
<td># arable acres/person (low)</td>
<td>None</td>
</tr>
<tr>
<td>Geographic</td>
<td>Area</td>
<td># km$^2$ total (low)</td>
<td>None</td>
</tr>
<tr>
<td>Geographic</td>
<td>Coast</td>
<td># km coastline (both)</td>
<td>Sig. (+)</td>
</tr>
<tr>
<td>Geographic</td>
<td>Boundary</td>
<td># km land border (both)</td>
<td>None</td>
</tr>
<tr>
<td>Geographic</td>
<td>Dyad Bndry.</td>
<td># km dyadic border</td>
<td>None</td>
</tr>
<tr>
<td>Geographic</td>
<td>Neighbors</td>
<td># contiguous states</td>
<td>None</td>
</tr>
</tbody>
</table>

Boehmer & Sobek (2005) identify a non-linear relationship between development and its square. We replicated their findings in dyadic analysis and also added their $Development^2$ term to Model 2.2 and Model 2.3. All three development variables (linear, square, and interaction term) remain highly statistically significant in the expected direction. We then explored these relationships on territorial and non-territorial disputes separately. $Development^2$ has no effect or appears to weakly
increase dispute propensity over territory, while not altering the effect of linear Development and the interaction with contiguity. The text details the effect of Development^2 on non-territorial disputes. Mousseau (2000) provides evidence that development conditions the effect of democracy on conflict. We replicated the interaction between democracy and development and add the interaction between development and contiguity. Dev. \times Dem. is statistically significant at the 5% level, while Development and its interaction with contiguity are both significant at the 0.1% level. The interaction between development and democracy is not statistically significant for territorial disputes alone, or for non-territorial disputes with the Boehmer & Sobek (2005) interaction variable.

It might be that the average income of individuals within the society is less important than total national income. Gross Domestic Product for the poorer state in the dyad proves statistically insignificant, and has no effect on the key results. The threshold size of a dyad’s overall trade openness (Oneal 2003) is negative but insignificant. Oil exporting nations can have high per capita GDP without possessing other attributes of development. Fearon & Laitin (2003) offer a dummy variable indicating whether more than a third of a country’s exports involve fossil fuels. Dyads containing petroleum exporters are more dispute prone (p = 0.017), but other results are unchanged.

Growing populations or “lateral pressure” in some countries could increase conflict. We examine three demographic variables, population, population density, and arable population (acres of arable land per adult). Data are from the World Factbook 2002. Much of the variation in these variables is cross-sectional, so using data from a single year is probably adequate for simple tests of robustness. Population, and arable population are not statistically significant. Population density significantly increases the probability of a MID (z score 2.71). Results for the key variables are unaltered.

A final set of controls involves geography. Area reports the total square kilometers within the borders of the smaller of two states in a dyad. Coast and Boundary measure, respectively, linear kilometers of shoreline and land border length. Area (low), Coast (low), Coast (high), and Boundary (low) are all statistically insignificant while key results are unchanged. Only Boundary (high) is statistically significant (5% threshold). Dyad Bndry. measures the portion of land border that is shared by dyad members. It is not statistically significant. Finally, a count variable for the number of states with contiguous borders with a given country (neighbors) is also statistically insignificant.
References


