Decomposing the Relationship Between Contiguity and Militarized Conflict

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It is well known that the majority of militarized conflicts and wars have been fought by neighbors. Yet, much remains to be learned about the relationship between shared borders and militarized conflict. This article decomposes the effects of territorial contiguity into ex ante *"observable" and "behavioral" effects. It provides powerful empirical evidence for the claim that although neighbors are more likely to experience conflict because of* ex ante *differences in observable variables such as economic interdependence, alliance membership, joint democracy, and the balance of military capabilities, most conflicts between neighbors occur because of differences in how neighbors and nonneighbors respond to the observable variables.*

Why are most wars and militarized disputes fought by neighboring states? Is it because neighbors are more likely to form alliances, trade, and have a balanced distribution of military capabilities? Or even after controlling for *ex ante* observable differences, do neighbors respond differently than do nonneighbors to these same observable variables?

This article offers a new way to conceptualize the difference in the conflict probability between neighbors and nonneighbors by decomposing the difference into two distinct quantities: differences in observables and differences in behavior. First, neighbors may differ from nonneighbors on observable characteristics associated with a higher conflict probability. Neighboring states may have a higher conflict probability because they differ from nonneighbors on observable characteristics such as economic interdependence, alliance membership, joint democracy, and the balance of military capabilities. Second, neighbors may respond differently than nonneighbors to the same observable variables. Neighbors may pay closer attention to changes in strategic variables such as economic interdependence, alliance formation, and the balance of military capabilities and be more likely to respond to changes in these than are nonneighbors. Although this argument is consistent with the literature explaining the difference in the conflict probability between neighbors and nonneighbors, this article provides a precise mathematical definition of these different effects on the probability of militarized conflict (i.e., differences in *ex ante* observables and in behavior attributable to differing responses to the same variables). This allows an assessment of the relative merits of two prominent explanations for territorial conflict. The results are then related to current debates about the causes of militarized conflict. Specifically, the explicatory success of territorial explanations (Vasquez 1995) and bargaining explanations (Fearon 1995; Powell 1999) are evaluated for the difference in the conflict rate between neighbors and nonneighbors.

To illustrate this article's argument, cases in which two dyads do not differ significantly on values of observable variables that have been shown to correlate with militarized conflict, other than one dyad sharing a border and the other being noncontiguous, are examined. The observed difference in the conflict probability between such a pair of dyads, since they have the same observable variables, can be attributed to a difference in responses to the observables. If such a difference exists, this suggests that neighbors may react differently to the same values of observable variables than do nonneighbors. In such cases the *ex ante* observable characteristics

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cannot explain the differing rates of conflict. Rather, the explanation is found in the difference in how neighbors and nonneighbors respond to a given set of variables. All the data is analyzed using a standard empirical microeconometrics technique to decompose the observable and behavioral effects of territorial contiguity on militarized conflict and to determine the relative empirical power of each explanation (Blinder 1973; Fairlie 2005; Oaxaca 1971, 1973). Such an assessment is an important step forward for researchers studying the relationship between interstate borders and militarized conflict. In addition, since there is such a strong correlation between contiguity and militarized conflict, it is important for the field of world politics to better understand the relationship between borders and conflict. Although the aggregate (i.e., undecomposed) relationship between borders and conflict is well established, this study is the first to decompose the total effect of contiguity into these two distinct quantities of interest. Perhaps having benchmarked results on this topic will stimulate more research on this important question and provide an evidence-based assessment of territorial and bargaining explanations for militarized conflict.

Facts and Theory

Militarized conflict most likely involves neighbors (Huth 1996). By some accounts, war is 300 times more likely between contiguous states than between noncontiguous states (Kocs 1995). Since 1816, over half of all militarized disputes began between neighbors. Further, two-thirds of all full-scale wars since 1816, and nearly all full-scale wars since 1945, have begun between neighbors (Hensel 2000). Moreover, disputes over territory seem to be especially violent. Over one-fourth of all militarized disputes involve explicit claims over territory—a proportion that has not declined over time. Territorial issues are also particularly escalatory (Diehl 1985; Senese 2005), with over half of all full-scale wars involving territorial claims (Hensel 2000).[1] One of the primary explanations for why contiguous states go to war is that they are fighting over territory (Vasquez 1995). Other explanations suggest that proximity itself is to blame. Contiguous states are better able to reach one another militarily and thus are better able to engage one another (Bueno de Mesquita 1981; Vasquez 1995). They interact more with one another and thus potentially have more issues over which to conflict (Most and Starr 1980; Siverson and Starr 1990).

The most established explanation for why neighbors fight more than nonneighbors focuses on the tendency for neighbors to behave differently than do nonneighbors (Vasquez 1995).

> One possible deeper reason is territoriality, i.e., that human proclivity to territoriality lead neighboring states to use violence and aggressive displays to demark their territory, especially the areas contiguous to another state. (Vasquez 1993, 135)

This territorial explanation notes that neighbors are more likely to become rivals and become involved in a spiral of conflict. Neighbors tend to view the world in terms of a traditional realist security dilemma. The strongly observed correlation between contiguity and militarized conflict is cited as evidence for the territorial explanation, and data on territorial claims reinforce further the evidence (Huth 1996).

An alternative explanation for the difference in the rate of conflict between neighbors and nonneighbors can be derived from bargaining theory (Fearon 1995; Powell 1999). Bargaining theory assumes that neighbors and nonneighbors are behaviorally identical insomuch as they respond identically to observable factors such as the distribution of military capabilities.

> Even if both states are satisfied, each would still like to revise the territorial status quo in its favor. More territory is better than less. But neither state is willing to use force to do so, because the payoff to living with the status quo is at least as high as the expected payoff to attacking. (Powell 1999, 93)

According to bargaining theory, the difference in the conflict rate between neighbors and nonneighbors is entirely a function of differences in the distribution of observable variables. Neighbors fight more because their expected value for conflict relative to the status quo is greater than it is for nonneighbors. That is, neighbors fight more because, on average, they have more to gain from fighting than do nonneighbors.

[1] Note that territory is an important factor explaining civil conflict (Buhaug and Gates 2002). Arguably, all civil wars can be described as territorial. In most cases, insurgent groups seek to wrest power from the government to control all or a part of the territory currently under government control. However, some civil wars are more explicitly about territory. Fearon (2004) notes that civil wars between an ethnic minority and a state-supported dominant ethnic group over land or control of natural resources last significantly longer than other forms of civil war. Moreover, Lujala, Gleditsch, and Gilmore (2005) find that civil war onset can often be linked to specific types of resources in the territory.

TABLE 1 Variable Concepts and Measurements[a]

Variable Name	Concept	Measurement
Outcome Variable		
MID Onset	Dispute occurrence	Recorded as 1 if there was a militarized dispute between the members of the dyad in the year $t+1$; 0 otherwise (Jones, Bremer, and Singer 1996).
Explanatory Variables		
Contiguity	Direct contiguity	Recorded as 1 (contiguous) if the members of the dyad are either sharing a land or river border, or separated by less than 400 miles of water; 0 (noncontiguous) if they are separated by more than 400 miles of water.
Lower Democracy	Joint democracy	The lower of the dyad's `polity2` score (Democracy minus Autocracy score) from Polity IV data set.
Higher Democracy	Joint autocracy	The higher of the dyad's `polity2` score from Polity IV data set.
Trade Dependence	Dyadic trade dependence	The lower of the trade dependence scores for both members of the dyad. The dependence score of country i on trade with j is calculated as $(Export_{ij} + Import_{ij})/GDP_i$.
Alliance	Dyadic alliance tie	Recorded as 1 if the members of the dyad are formally allied or if both are allied with the United States; 0 otherwise.
Capability Ratio	Dyadic military balance	Natural logarithm of the ratio of the stronger state's COW military capability index to that of the weaker member of the dyad.
Major Power	Major power status	Recorded as 1 if at least one member of the dyad is a major power in the year t; 0 otherwise.
Distance	Capital to capital distance	Natural logarithm of the distance (measured in miles) between the capitals of countries in a dyad.
Peace Years	Peace years' duration	Years passed since last occurrence of an MID between a dyad.

[a]Data are from Oneal and Russett (2005).

Both the territorial argument and bargaining theory provide logically consistent explanations for the gap in the conflict rate between neighbors and nonneighbors. However, current research designs are limited in their ability to assess the relative power of these two approaches. The following section outlines a strategy for assessing the relative merits of these explanations, and the strengths and weaknesses of each.

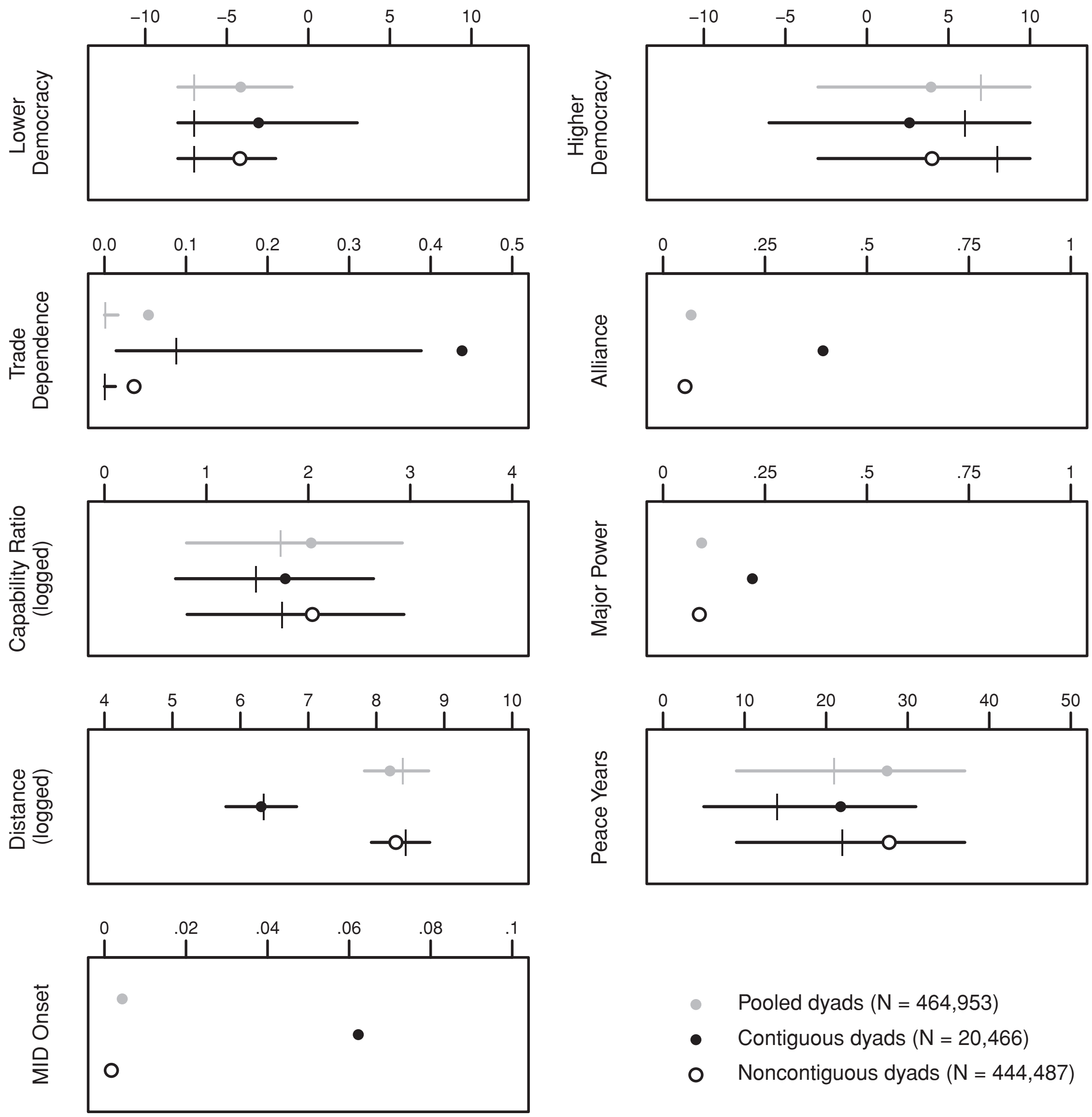
Empirical Strategy

To illustrate the strikingly higher conflict probability between neighbors relative to nonneighbors, some descriptive statistics are provided on pairs of states using data from the recent study by Oneal and Russett (2005) that span the time frame 1885–2000. Over this time period, data are available for 13,277 dyads, resulting in a sample size of 464,953 dyad-years. These data are used because they have been benchmarked in published studies that utilize them or a slightly modified version of them (Beck, Katz, and Tucker 1998; Oneal and Russett 1997; Reed 2000; Zorn 2001). Given the purpose of this article, it is important to be able to compare results with other published results, which using these data allows.

Table 1 describes the measurement of each observable variable. Of the 464,953 observations, 20,466 are neighbors and 444,487 are nonneighbors. The unconditional probability of militarized interstate dispute (MID) onset in the sample of neighbors is 0.063; in the sample of nonneighbors it is 0.0016. The difference in the conflict probability, 0.061, is statistically significant with a z-score of over 130. Although the absolute conflict rate for the two groups is small, the difference in the conflict rate is great. In these data neighbors are 97% more likely than nonneighbors to experience militarized conflict.

Neighbors and nonneighbors differ not only in conflict probability but also in many of the *ex ante* observable variables that have been shown to correlate with conflict. Figure 1 graphically displays sample statistics for each variable to highlight the difference in

FIGURE 1 Differences in Distributions of the Observable Variables

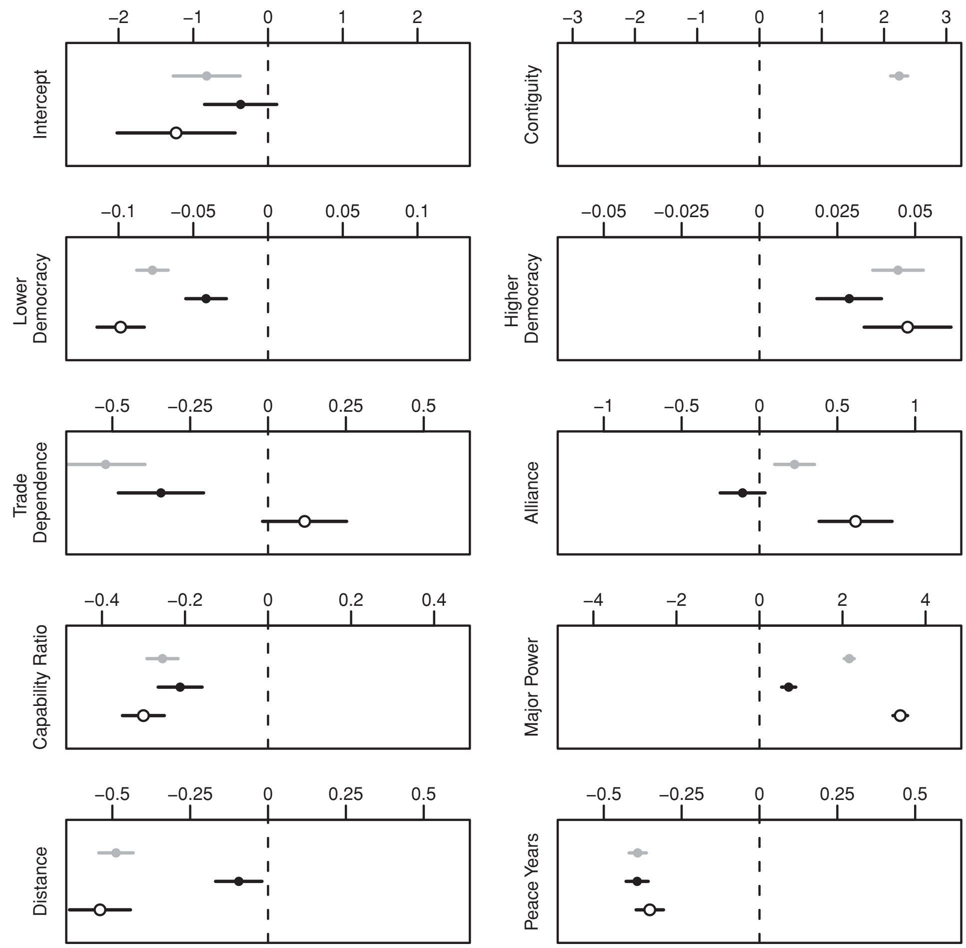


In each panel, mean values are shown for three samples: the sample of all dyads pooled (top row: gray circles), contiguous dyads (middle row: black circles), and noncontiguous dyads (bottom row: white circles). For nonbinary variables, horizontal lines associated with circles show upper and lower quartile values (25% and 75% quantile values), and vertical ticks on the horizontal lines show the median values.

distributions of observable characteristics between the samples. Circles in each panel show the mean values for the samples of all dyads (top row), contiguous dyads (middle row), and noncontiguous dyads (bottom row). For continuous or ordinal variables, horizontal lines associated with circles span the upper and lower quartile points, and vertical ticks on the lines indicate the median values. From these graphs, note that neighbors and nonneighbors differ in interesting ways. For example, the sample of neighbors tends to be more democratic on the lower Polity IV democracy scores (and equivalently, less autocratic on the higher Polity IV democracy scores), more economically dependent, more likely to be allied with one another, and more likely to have balanced capabilities and shorter spans of peace than nonneighbors. All the observable differences between neighbors and nonneighbors are statistically significant.

Although these descriptive statistics are consistent with the bargaining explanation for the differences in the conflict rate between neighbors and nonneighbors, the

FIGURE 2 Differences in Coefficients from Logit Regressions



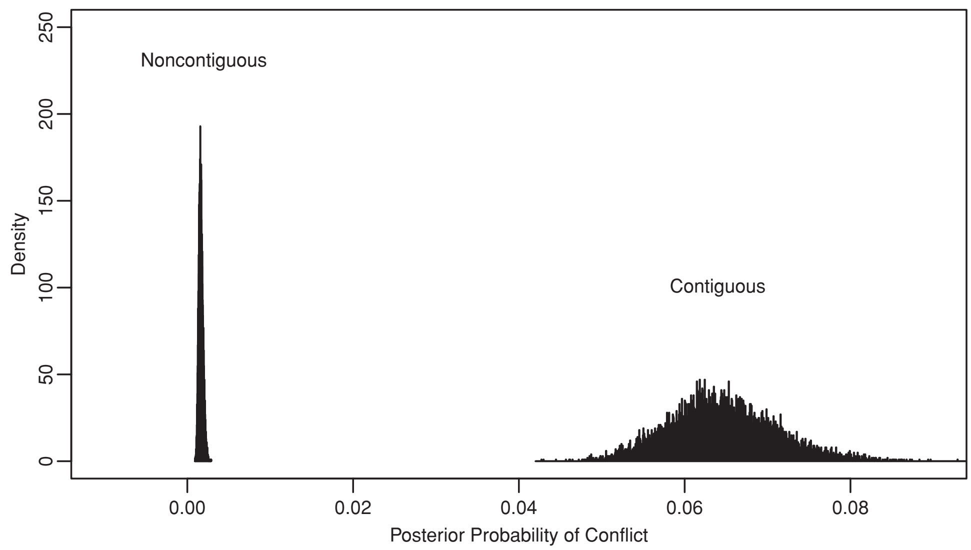
The graph shows the regression coefficients from separately estimated models using all samples pooled (top row in each panel), the sample of contiguous dyads (middle row in each panel), and noncontiguous dyads (bottom row in each panel). Circles show the point estimates, and horizontal line segments associated with circles show the 95% confidence intervals.

total effect of these differences in observable variables on the gap in the conflict probability between the two groups has not yet been estimated precisely. For example, while the tendency for neighbors to have more balanced military capabilities and shorter durations of previous peace periods might be expected to increase the gap in the conflict probability, the fact that democracies are located closer to each other might be expected to shrink the gap in the conflict probability between the two groups. The decomposition analysis that follows provides an empirical estimate of the contribution of the observables on the gap in the conflict probability.

To illustrate further the differences in conflict behavior between neighbors and nonneighbors, conditional on the *ex ante* observable factors, the outcome variable (MID Onset) on the explanatory variables summarized in the first figure is regressed. Allowance is made for the coefficients of explanatory variables to vary by contiguity and show how the effect of these variables differs between the two groups. Three separate regression equations are estimated for three samples (i.e., pooled, contiguous, and noncontiguous), which is equivalent to running one regression model for the pooled sample while interacting the contiguity variable with all the other explanatory variables.

Figure 2 displays the estimated coefficients along with standard errors from logit regressions for three samples. Circles show the point estimates of the coefficients for each explanatory variable, and associated horizontal line segments represent 95% confidence intervals. In

FIGURE 3 Posterior Densities for the Conflict Probability



These are the estimated posterior densities for the probability of conflict in the two samples. The average conflict rates for contiguous and noncontiguous samples are 0.063 and 0.0016, respectively. In estimating the posterior densities for these samples, a representative dyad is chosen from each sample so that the sample statistics of interest (i.e., mean rate of conflict) conform to those of the posterior densities. The coefficients reported in Figure 2 for contiguous and noncontiguous dyads are used. The difference between the means is 0.061, which is statistically significant, with a p-value of < 0.001.

each panel, estimates from pooled dyads are placed in the top row (in gray), contiguous dyads in the middle (in black), and noncontiguous dyads in the bottom (in white).

As there are differences in the observable factors, there are also important differences in the regression coefficients, depending on the sample. Note that two variables representing the strategic interaction between dyads (Trade Dependence and Alliance) have strikingly different effects on the conflict probability, depending on contiguity. Among neighbors, these two variables decrease the likelihood of militarized conflict. Among noncontiguous dyads, on the other hand, allied dyads are significantly more likely to experience militarized conflict, and dyads that are economically dependent are marginally more likely to experience a militarized dispute. The pacifying effects of economic dependence and alliance commitment are more likely to be felt among contiguous dyads, although such effects could still be at work among nonneighbors. After all, on the one hand, those nonallied, less economically dependent, noncontiguous countries will most likely have little to fight over. On the other hand, the existence of certain types of alliance agreements (nonaggression pacts, among others) between a noncontiguous dyad suggests that these countries at least perceive that some chance of conflict exists. The differences in the two samples coefficients are consistent with the territorial explanation, which expects neighbors to respond differently to the same variables when compared to nonneighbors.

All the other coefficients have the same signs in three samples, but there are substantial differences in their substantive effect on the conflict probability. As there are differences in the unconditional conflict probability in the samples, there is also evidence for significant differences in the conflict probability that is conditional on the observable variables. To illustrate these differences between the groups, posterior densities for the conflict probability for each group are estimated (King, Tomz, and Wittenberg 2000). These densities are plotted in Figure 3.

The densities reinforce the statistically and substantively significant gap between the conflict probability depending on the sample examined. The mean of the posterior density of the conflict probability for neighbors is 0.063. For nonneighbors, the mean is 0.0016. This provides some descriptive evidence to motivate the study. However, it is important to understand why these two groups show such a dramatic difference in the conflict probability between them. The statistically significant differences between the groups in observable factors such as low and high democracy, trade, alliances, and the power distribution certainly suggest that some variation between neighbors and nonneighbors in the conflict probability can be attributed to those differences. Yet, the substantial differences in the signs and magnitudes of the coefficients presented in Figure 2 suggest that neighbors and nonneighbors also behave differently (i.e., respond differently to the same variables). It is impossible to assess these relative effects of either the differences in observable variables or the differences in coefficients on the gap in the conflict probability from the results presented thus far. Neither can the territorial and bargaining explanations' abilities to explain the gap in the rate of conflict be assessed. In the next section, a method to directly assess these relative effects is outlined.

Econometric Model

To decompose the effect of contiguity on militarized conflict, it must be determined how much of the difference in conflict probability between neighbors and nonneighbors is due to differences in the models' coefficients of separately estimated models of conflict onset for neighbors and nonneighbors. In addition, the difference in the conflict probability that is due to differences in observable characteristics between neighbors and nonneighbors must be determined. In order to decompose these two effects, more precision about the quantities of interest is needed.

The microeconometrics literature on wage discrimination (Blinder 1973; Oaxaca 1971, 1973) is useful to decompose these effects. This literature attempts to decompose the wage gap between males and females into differences in observable characteristics between the two samples, such as education and experience, from behavioral differences between the two groups. This research seeks to answer the following counterfactual question: how would the distribution of wages look for women if they were operating under the behavioral regime of males? That is, is the difference in wages caused by differences in coefficients between the two groups or by differences in the values of observable variables between the two groups?

This article poses a similar question: how would the distribution of conflict look for noncontiguous states if they were interacting under the behavioral regime of the more conflict-prone sample of neighbors? Standard analyses of the effect of contiguity on conflict assume that the effects of other variables such as low and high democracy, trade, and the balance of military capabilities are the same for neighbors and nonneighbors. The decomposition model to be described allows the effects of these other variables to differ across the two groups. To answer the counterfactual question and to study the differences between neighbors and nonneighbors in a more flexible framework, the generalized decomposition specification detailed in Fairlie (2005) is followed.

Start with the standard regression model, where for neighbors, $j = \text{neigh}$, and for nonneighbors, $j = \text{nonneigh}$:

$$Y_j = X_j\beta_j + \epsilon_j,\; E(\epsilon_j) = 0. \tag{1}$$

The mean outcome difference between the two groups is:

$$\begin{aligned} R &= \bar{Y}_{\text{neigh}} - \bar{Y}_{\text{nonneigh}} \\ &= \bar{X}_{\text{neigh}}\hat{\beta}_{\text{neigh}} - \bar{X}_{\text{nonneigh}}\hat{\beta}_{\text{nonneigh}}. \end{aligned} \tag{2}$$

This mean difference can be rewritten by adding and subtracting $\bar{X}_{\text{neigh}}\hat{\beta}_{\text{nonneigh}}$ from the right-hand side and gathering the relevant terms together. As a result, the coefficients from the sample of neighbors, $\hat{\beta}_{\text{neigh}}$, can be compared to the estimates for the sample of nonneighbors, $\hat{\beta}_{\text{nonneigh}}$.

$$\begin{aligned} R = {} & \Big[\underbrace{(\bar{X}_{\text{neigh}} - \bar{X}_{\text{nonneigh}})\hat{\beta}_{\text{nonneigh}}}_{\text{Observables}}\Big] \\ & + \Big[\underbrace{\bar{X}_{\text{neigh}}(\hat{\beta}_{\text{neigh}} - \hat{\beta}_{\text{nonneigh}})}_{\text{Behavior}}\Big]. \end{aligned} \tag{3}$$

The first part of equation (3), "Observables," is the difference in the conflict probability between contiguous and noncontiguous states that can be explained by differences in measurable variables. This is the difference between neighbors and nonneighbors illustrated in Figure 1. If no *ex ante* differences existed between neighbors and nonneighbors, $\bar{X}_{\text{neigh}} = \bar{X}_{\text{nonneigh}}$, all of the difference in the conflict probability between contiguous and noncontiguous states would be attributed to behavioral differences. However, from the descriptive statistics in Figure 1 it is not the case. Some of the difference in the conflict probability is explained by differences in the Xs from each group, and the decomposition will allow a specific statement to be provided about the magnitude of this effect on the whole and for each observable variable.

The second part of equation (3) represents the difference in the conflict probability that can be explained by behavioral differences between the two groups (i.e., differences in how neighbors and nonneighbors respond to values of the observable variables). This is simply the difference in the logit coefficients plotted in Figure 2. The coefficients from the sample of nonneighbors are used for the vector of benchmark coefficients drawn from the group not expected to behave more conflictually. The convention in labor economics is to use the sample of males as the benchmark because this group is not expected to experience wage discrimination. The coefficients from the noncontiguous states are used based on an expectation that their conflict behavior will be unaffected by the behavioral effect of contiguity.

When $\hat{\beta}_{neigh} = \hat{\beta}_{nonneigh}$, all of the difference in the conflict probability between neighbors and nonneighbors is a function of differences in *ex ante* observable variables. Again, Figure 2 shows that $\hat{\beta}_{neigh} \neq \hat{\beta}_{nonneigh}$; the decomposition will enable a precise statement to be made about how differences in the coefficients between the two groups affect the difference in the conflict probability. This method enables an assessment of the relative merit of both explanations regarding the difference in the conflict probability between the two groups.

Finally, note that this decomposition is not the same as interacting the contiguity variable with all the other explanatory variables, as was done in the previous section. Such an interactive model does allow for the effects of the explanatory variables to vary by contiguity. The coefficients from an interactive model can be obtained from the three sets of coefficients shown in Figure 2. The results in the second figure show that neighbors respond differently to the same variables. An interaction model would show the same. Thus, although an interaction model can show how the coefficients vary across the two groups, it cannot show how much of the gap in the conflict rate is attributable to different coefficients relative to differences in observable variables.

This decomposition is relatively straightforward in the context of least squares. However, a slight modification is necessary to study these different quantities of interest in the context of maximum likelihood estimation (Fairlie 2005; Jann 2006). Setting the subscripts for neighbors to 1 and for nonneighbors to 2, the nonlinear transformation is (Fairlie 2005):

$$R = \left[\sum_{i=1}^{N_1} \frac{F\left(X_{i1}\hat{\beta}_2\right)}{N_1} - \sum_{i=1}^{N_2} \frac{F\left(X_{i2}\hat{\beta}_2\right)}{N_2} \right] + \left[\sum_{i=1}^{N_1} \frac{F\left(X_{i1}\hat{\beta}_1\right)}{N_1} - \sum_{i=1}^{N_1} \frac{F\left(X_{i1}\hat{\beta}_2\right)}{N_1} \right]. \quad (4)$$

In this case, $F(\cdot)$ is the logit link function and N_j is the number of observations in each sample. Following Oaxaca and Ransom (1998) and Fairlie (2005), the delta method is used to approximate the standard errors.

Decomposition Analysis

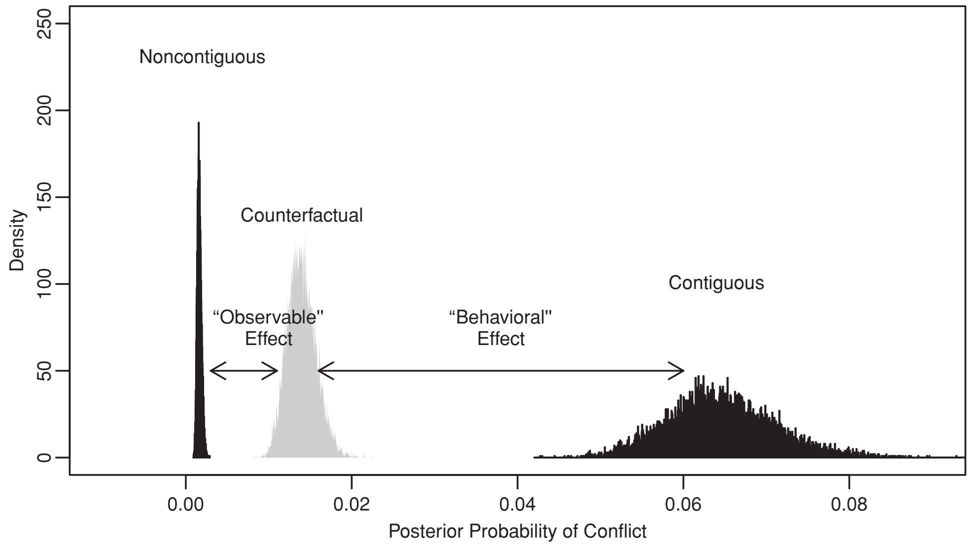
This nonlinear decomposition technique is applied to the data from Oneal and Russett (2005). First, the total contribution of observable differences in the explanatory variables defined in Table 1 and summarized in Figure 1 is quantified. Next, the separate contributions of these individual explanatory variables to the gap in the probability of conflict between neighbors and nonneighbors are estimated.

The difference between the conflict probability between contiguous and noncontiguous states is approximately 0.061, and the decomposition provides some important evidence for the behavioral explanation. Figure 4 illustrates the results from decomposition. As in Figure 3, the densities located on the left and right sides show the predicted probabilities of conflict for average nonneighbors and average neighbors, respectively. Note that the predicted probability for the average noncontiguous dyad corresponds to the $\bar{X}_{nonneigh}\hat{\beta}_{nonneigh}$ term in equation (2), whereas the posterior probability for the average contiguous dyad corresponds to the $\bar{X}_{neigh}\hat{\beta}_{neigh}$. The gray density located in the middle shows a predicted conflict probability for a counterfactual dyad with the observable characteristics of the average contiguous dyad and the coefficients of the average noncontiguous dyad (DiNardo, Fortin, and Lemieux 1996; Machado and Mata 2005). This counterfactual dyad looks like a dyad that shares a border but responds to the observable variables the way a noncontiguous dyad responds. That is, this counterfactual corresponds to the $\bar{X}_{neigh}\hat{\beta}_{nonneigh}$ term, which is added and subtracted in moving from equation (2) to (3).

Now, the "observable" and "behavioral" contributions are obtained by taking the difference between these probabilities. As shown in the first part of equation (3), the difference in posterior probabilities between the counterfactual ($\bar{X}_{neigh}\hat{\beta}_{nonneigh}$) and the noncontiguous dyad ($\bar{X}_{nonneigh}\hat{\beta}_{nonneigh}$) corresponds to the "observable" effect of contiguity. The estimated difference between these two is 0.0124, which amounts to about 20% of the gap in the conflict probability between the contiguous and noncontiguous dyads. Next, turn to the second part of equation (3), the difference in posterior probabilities between the contiguous dyad ($\bar{X}_{neigh}\hat{\beta}_{neigh}$) and the counterfactual ($\bar{X}_{neigh}\hat{\beta}_{nonneigh}$), the "behavioral" effect of sharing a border. The estimated difference between these two is 0.050, which amounts to about 80% of the 0.061 gap in the conflict probability between the contiguous and noncontiguous dyads.

Differing values of the observable variables across neighbors and nonneighbors are an important factor explaining their differing rates of conflict, as deduced from bargaining theory. However, a substantial portion of the difference in the conflict probability between neighbors and nonneighbors can be attributed to the neighbors responding differently than do nonneighbors to the same observable variables, as anticipated by the territorial explanation. Indeed, most of the gap is explained by behavioral differences, as anticipated by the territorial explanation.

FIGURE 4 Nonlinear Decomposition of Observable and Behavioral Effects



Counterfactual conflict probability is presented to illustrate the decomposition. The gray density, which has a mean value of 0.014, shows the counterfactual conflict probability for a dyad with observable characteristics of neighbors and behavioral characteristics of nonneighbors. The difference in posterior probabilities between the counterfactual and the noncontiguous sample is 0.0124, which corresponds to the observable effect (20% of the gap). The difference in posterior probabilities between the counterfactual and the contiguous sample is 0.050, which corresponds to the behavioral effect (80% of the gap).

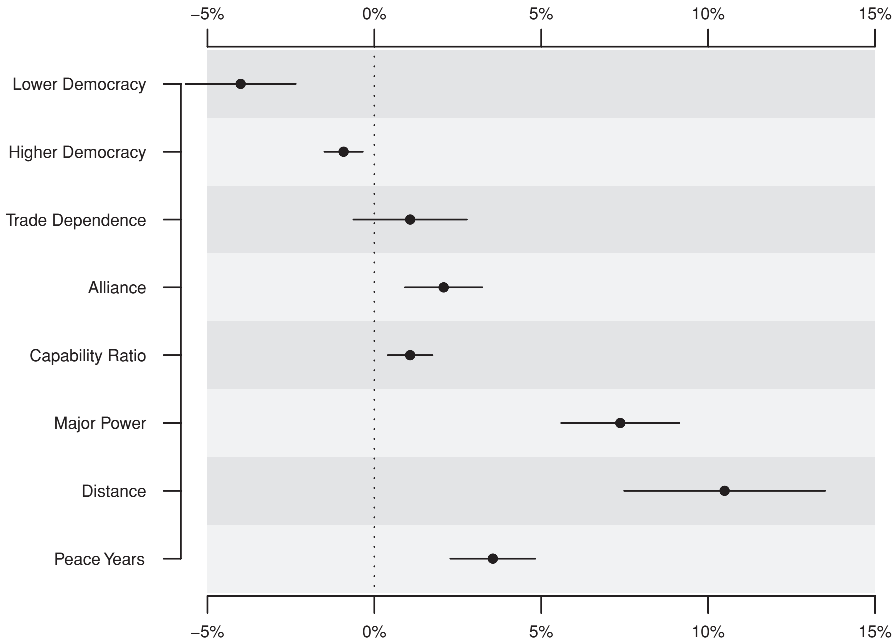
The effect of the individual variables on difference in the conflict probability attributed to the observable variables is studied, using equation (4). Figure 5 reports these results.[2] The contributions from the explanatory variables (expressed as percentage points) are shown with solid circles. Each point estimate represents the percentage of the gap in the conflict probability that can be attributed to each observable variable. Horizontal lines associated with circles show the 95% confidence intervals for the estimates. Positive estimates suggest that increases in the value of the observable variable increase the gap in the probability of conflict. Observable variables with negative estimates decrease the gap.[3] Note that if all the individual contributions are added up, the result is 20.70% (with a confidence interval of [17.18%, 24.22%]), which corresponds to the "observable" effect discussed above. The remaining difference in the outcome differential (79.30% of the gap) is attributed to the behavioral difference between neighbors and nonneighbors. The separate contributions differ in interesting ways depending on which explanatory variable is examined. The two regime type variables (lower and higher democracy) contribute negatively to the gap in the probability of conflict; that is, the level of democracy decreases the difference in the conflict probability between the two groups.

The confidence interval for the Trade Dependence variable contains zero, so differences in economic interdependence contribute little to the gap in the probability of conflict. All the other explanatory variables have a positive effect, contributing to an increase in the gap between neighbors and nonneighbors to differing degrees. It is useful to illustrate how these quantities of interest are calculated and to discuss the interpretation of variables with a positive contribution to the gap in the conflict probability compared with variables with a negative contribution (see the web appendix at http://koldekrig.com for exact calculations). To obtain the point estimates in Figure 5, the values of each variable in the noncontiguous sample are subtracted from the values in

[2]To calculate the decomposition by equation (4), it is necessary for the sample size of the contiguous and noncontiguous dyads to be the same. Because there are fewer neighbors than nonneighbors in our sample, a random sample is drawn from the nonneighbors equal to the number of observations in our sample of neighbors. The reported results are the mean results from 1,000 iterations of this process. For more details on the analytics, see Fairlie (2005).

[3]The estimates of the individual contributions can be sensitive to the ordering of these variables. Thus, the ordering is randomized in each of the 1,000 replications, approximating average results over all possible orderings.

FIGURE 5 Nonlinear Decomposition of Contiguous/ Noncontiguous Dyads



This graph presents the results of a nonlinear decomposition of the observable and behavioral effects of contiguity on militarized conflict. Individual contributions from explanatory variables are shown with circles (point estimates) and horizontal lines associated with them (95% confidence intervals). Total contributions from the observable variables are obtained by summing all the individual contributions, which yields 20.70% with a confidence interval [17.18%, 24.22%]. The remaining difference in the outcome differential (79.30% of the gap) is attributed to the behavioral effect. Standard errors are approximated with the delta method.

the contiguous sample. Then this difference is multiplied by the benchmark coefficient (i.e., coefficients from noncontiguous sample), $\hat{\beta}_{\text{nonneigh}}$.[4] Therefore, when a variable exhibits a positive contribution it is because the signs of $\hat{\beta}_{\text{nonneigh}}$ and $(\bar{x}_{\text{neigh}} - \bar{x}_{\text{nonneigh}})$ are the same (i.e., they are either both positive or both negative). If the variable exhibits a negative contribution, it is because the signs of $\hat{\beta}_{\text{nonneigh}}$ and $(\bar{x}_{\text{neigh}} - \bar{x}_{\text{nonneigh}})$ are different. Table 2 reports these point estimates and their standard errors for each explanatory variable.

For example, consider the estimate for the Lower Democracy score that measures joint democracy. This variable's average in the contiguous dyads is greater than the average score for nonneighbors. Since the sign on the coefficient from the benchmark sample for this variable is negative, multiplying the positive difference in the observables by the negative coefficient results in the negative net contribution. The percentage contribution reported in the figure is calculated by dividing this net contribution by the total gap in the conflict probability (e.g., $\frac{-0.0024}{0.061} = -0.039 \cong -4.0\%$). Substantively, this means that the difference in the Lower Democracy score between the two samples decreases the gap in the conflict probability. Similarly, the Higher Democracy score (measuring joint autocracy) also has negative contribution, in turn because positive coefficients (jointly autocratic dyads experience more conflict) are multiplied by negative difference (neighbors are less likely to be jointly autocratic).

Now consider the contribution of the Capability Ratio. Nonneighbors have a larger average Capability Ratio than do neighbors. In addition, the sign on the coefficient for Capability Ratio is negative. This results in a negative difference multiplied by a negative coefficient and a positive net contribution of the Capability Ratio variable to the gap in the conflict probability. This positive contribution of the Capability Ratio is anticipated

[4] It is also well known that the decomposition results can be sensitive to the benchmark group used to estimate to coefficients in equation (3). To check the robustness of our results, the pooled sample is also used as the benchmark. The results are generally robust with regard to the difference in benchmark.

TABLE 2 Nonlinear Decomposition of Contiguous/Noncontiguous Dyads[a]

Variable	Coefficient (Std. Error)	% Contribution
Lower Democracy	−0.0024*** (0.0005)	−4.0%
Higher Democracy	−0.0006** (0.0002)	−0.9%
Trade Dependence	0.0006 (0.0005)	1.1%
Alliance	0.0013*** (0.0004)	2.1%
Capability Ratio	0.0006** (0.0002)	1.1%
Major Power	0.0045*** (0.0005)	7.4%
Distance	0.0064*** (0.0009)	10.5%
Peace Years[b]	0.0021*** (0.0004)	3.5%
Difference in the Rate of MID	0.0606	
Difference Attributable to Observables	0.0125*** (0.0011)	20.70%
Difference Attributable to Behavior	0.0480	79.30%
Sample Size of the Reference Group (Noncontiguous Dyads)	444,487	

[a]This is a nonlinear decomposition of the observable and behavioral effects of contiguity on militarized conflict. Noncontiguous dyads are used as a reference group in decomposition. Standard errors are in parentheses.
[b]Three cubic splines are also included in the model. Reported coefficients are the total contribution from peace years and splines. Significance levels (two-tailed): *5%, **1%, ***0.1%.

by past research that has found power parity to be associated with conflict. Because neighbors are more likely to exhibit balanced Capability Ratios, which are conflict enhancing, and because contiguity is also conflict enhancing, the difference in the Capability Ratio between neighbors and nonneighbors explains much of the gap in the conflict probability that can be attributed to *ex ante* observable variables. The strong positive effect of the Capability Ratio, Major Power, and Distance variables supports the bargaining explanation insomuch as these variables are related to the likelihood that one side would prevail in a militarized clash. According to bargaining theory, the conflict probability relates to how states compare their value for a bargained outcome to their expected value for militarized conflict. Therefore, variables associated with states' expected value for conflict and their ability to project militarized force should contribute significantly to the observable portion of the difference in conflict rate.

Perhaps the most important point learned from these results is that not only do neighbors differ from nonneighbors in the observable variables, but also neighbors respond differently from nonneighbors to the same values of observable variables. Shifts in the relative capabilities toward parity are much more likely to result in neighbors responding with conflict. Likewise, neighbors respond to a history of conflict more aggressively than do nonneighbors. This decomposition shows that states watch their neighbors carefully and respond to changes in strategic dyadic variables locally while they are relatively unresponsive to changes in the same variables far from home.

In addition, these results offer some support for the steps-to-war arguments (Senese and Vasquez 2005; Vasquez 1987, 2001). For steps-to-war arguments, arms races and rivalry over a shared border are important factors for understanding the probability of militarized conflict. Consistent with this, the observable effects of a balance of power and a history of peaceful interaction are especially important for understanding the gap in the conflict probability between neighbors and nonneighbors. As shifts in the power balance are a function of arms races and as a history of conflictual relations is related to rivalry, these results offer important insights into the empirical credibility of steps-to-war claims. These results are also consistent with the more specific literature highlighting the conflict-enhancing effect of arms races by neighbors. As arms races bring neighbors closer to parity, they are an important determinant of the gap in the conflict probability (Gibler, Rider, and Hutchison 2005; Sample 1998, 2002). For example, in the sample of contiguous dyads, an average pair of states close to parity is approximately 100 times more likely to experience militarized conflict than is an average noncontiguous dyad that is also close to military parity. Finally, this same line of research finds that the tendency for neighbors to be more likely to have an alliance contributes significantly to the difference in the conflict rate. This pattern is consistent with the pattern that alliances between neighbors that are not related to territorial settlements are likely to lead to more conflict (Gibler and Vasquez 1998). This tendency for neighbors to respond differently to changes in these variables is as important as the tendency for neighbors to be exposed to different values of these variables. Differential response to the same variables is an important determinant of the gap in the conflict rate between neighbors and nonneighbors.

Conclusions

What has been learned about the difference in conflict probability for neighbors and noncontiguous states? This analysis has found that, while differences in observable factors do affect the likelihood of conflict, heterogeneity in responses to the same variables is an important determinant of the difference in the conflict rate between neighbors and nonneighbors. What might explain such heterogeneity in response? It may have something to do with a territorial claim (Huth and Allee 2003). States contending over territory may behave differently toward one another than do states not currently contending over territory. Also, territory is seen as a highly salient issue over which states are more willing to engage in conflict (Senese 2005; Senese and Vasquez 2003). Also, neighbors may pay closer attention to events close to home and are thus more likely to view such events as threatening, which could foster conflict (Diehl 1985).

Although hundreds of scholarly articles have been published on the relationship between territorial contiguity and conflict, this article provides the first empirical decomposition of the explanations for conflict between neighboring states. This is done by decomposing the effect of territorial contiguity that can be attributed to behavioral differences between contiguous dyads from the effect of contiguity that can be attributed to *ex ante* differences in observable characteristics of contiguous states. The results provide striking evidence for the claim that neighboring states respond differently than do nonneighboring states to the same observable variables and that these behavioral differences account for a significant portion of the gap in the conflict probability between contiguous and noncontiguous dyads. Moreover, through this decomposition, territorial and bargaining explanations for conflict between neighbors can be assessed. As anticipated by the territorial explanation, most of the difference in the conflict probability between neighbors and nonneighbors is explained by neighbors behaving differently than do nonneighbors. In addition, as anticipated by the bargaining explanation, a significant proportion of the difference in the conflict probability is explained by neighbors and nonneighbors having starkly different distributions of the observable variables related to militarized conflict.

An important next step in this line of research is to estimate the causal effect of territoriality by applying the potential outcomes framework of causation (Holland 1986; Rubin 1974; Splawa-Neyman 1923). Traditionally, estimating the causal effects of immutable characteristics is considered ill posed, because defining features such as territorial contiguity cannot be manipulated, and the counterfactual outcome is often not meaningful. However, if the focus is shifted from actual immutable features such as contiguity to perceived contiguity, then the potential outcomes frameworks can be usefully applied. Although beyond the scope of this article, the conceptions of contiguity (territoriality) might be fruitfully captured (for example, a territorial claim between the members of a dyad), and matching techniques can be applied to estimate the average causal effect of territoriality (Senese 2005; Senese and Vasquez 2003). Such an important analysis would add to this estimate of contiguity's behavioral effect. Given that the results confirm and point to the important behavioral difference between neighbors and nonneighbors, it would be useful for future work to build on and to refine this result.

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