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Dyadic Hostility and the Ties That Bind: State-to-State versus State-to-System Security and Economic Relationships*

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An important question in the conflict processes literature concerns what types of international relationships are more likely to lead to peaceful interactions. Both security and economic ties have been posited as powerful determinants of conflict, yet their effects are often examined independently from one another. Furthermore, a debate exists as to whether it is states' ties to the international order or to each other that are most important in determining conflict. A resolution of the competing perspectives would expect that two states that have a tight network of security and economic relationships, both to each other and to the international order, should be extremely unlikely to engage in hostile action against each other. Surprisingly, a series of multinomial logits using non-directed dyads from 1951 to 1985 suggests that dyads with tight economic and security ties at both the state-to-state and state-to-system levels are only slightly less likely to engage in dyadic disputes than those without such simultaneous ties. However, this study finds that both (1) tight security and economic ties to the international order and (2) tight intra-dyadic security and economic ties have important, independent effects in limiting dyadic hostility. This suggests that the states within a dyad have two separate paths to more peaceful interactions – the first lies in tightening ties between states, the second in strengthening dyadic security and economic ties to the international order.

Introduction

What types of ties lead states towards decreased dyadic conflict? There are two implicit points of debate in the literature: first, whether it is states' ties to the system leader or instead their ties to each other that are important in shaping conflict propensities; and second, whether it is economic or security ties that are paramount. Power transition theory suggests that states' ties to the international order are what determine dyadic peace (Organski, 1968; Organski & Kugler, 1980; Kugler & Lemke, 1996; Tammen et al., 2000). Recent research in this perspective has confirmed that two states with tight security ties to the system leader are less likely to go to war (Kim, 1989, 1991, 1996; Lemke & Reed, 1996, 2001). On the other hand, a large body of literature has focused on the importance of intra-dyadic, or state-to-state, relationships in reducing conflict. The interdependence and conflict literature, for example, suggests that states with strong bilateral trade ties will be less likely to engage in conflict (Polachek, 1980; Gasiorowski & Polachek, 1982;

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Gasiorowski, 1986; Pollins, 1989a,b; Mansfield & Pollins, 2001; Russett & Oneal, 2001). Likewise, pairs of states with strong security relationships have been shown to be less likely to engage in disputes (Bueno de Mesquita, 1975; Altfeld & Bueno de Mesquita, 1979; Gowa, 1994; Signorino & Ritter, 1999).

This article posits that multiple levels of connection (state-to-state and state-to-system) as well as multiple dimensions of interest (economic and security) have an interactive effect on the probability of two states engaging in conflictual behavior. However, thus far, recent work has focused exclusively on the causal relationships between state-to-system security ties on war or on the additive effect of state-to-state trade or security ties on dyadic conflict. This article suggests that it is reasonable to expect that both state-to-system and state-to-state ties in the security and economic dimensions would have a simultaneous impact on dyadic conflict propensities.

To test the above argument, it is necessary to operationalize the independent and interactive impact of four types of relationships: (1) state-to-state (i.e. intra-dyadic) economic ties, (2) state-to-state security ties, (3) state-to-system economic ties, and (4) state-to-system security ties. Using a series of multinomial logits on non-directed dyads from 1951 to 1985, I test whether hostility is related to the similarity of pairs of states' economic and security ties to the international system leader, to the strength of pairs of states' ties with one another, or to both of these.

The results corroborate previous work that suggests security ties to the leader of the international system decrease the likelihood of war (Organski & Kugler, 1980; Kugler & Lemke, 1996; Tammen et al., 2000; Lemke & Werner, 1996; Lemke, 2002). In addition, results presented here show that the moderated effect of the degree of economic and security ties to the system leader is associated with the likelihood of both the show of force and war. In short, the interaction of the strength of security and economic ties to the system leader significantly affects the likelihood of a state moving from no action to show of force, from no action to war, and from the use of force to war. The interactive effect of state-to-state security and economic ties likewise produces a strong impact on dyadic disputes. The dissimilarity of states' ties to one another is associated with an increase of all levels of dyadic disputes except for the threat and use of force.

The interaction of all these factors (i.e. the dissimilarity of state-to-state *and* state-to-system economic *and* security ties) is shown to somewhat increase the probability of the show of force and war, as well as the probability of moving from the threat of force to the show of force, from the threat of force to war, from the show of force to war, and from the use of force to war. Surprisingly, though, this finding is somewhat limited in the magnitude of its effect on dyadic disputes, suggesting that there are probably two separate paths to peace for each dyad – one down the road of similarly tight economic and security ties to the international system leader, another down the path of tight security and economic ties to one other.

Dissimilarity and Hostility

This article considers whether the relationships tying states together are most salient in determining conflict when assessed in regard to the international order, to states' ties to one another, or to both simultaneously. A large body of recent literature has focused on how the relationships or the lack of relationships between states can affect dyadic disputes. For example, states with similar alliance profiles have been shown to be less likely to engage in conflict (Altfeld & Bueno de Mesquita, 1979; Bueno de Mesquita,

1981; Gowa, 1994; Signorino & Ritter, 1999). Likewise, states with similarly high levels of bilateral trade dependence have been posited to be those most likely to remain at peace (Polachek, 1980; Gasiorowski & Polachek, 1982; Gasiorowski, 1986; Pollins, 1989a,b; Mansfield & Pollins, 2001; Russett & Oneal, 2001). For both of these perspectives, the implication is that the makings of peace are to be found within the dyad.

In contrast, power transition theory makes clear its proposition that dissimilar preferences for the international order, or the status quo, are a driving force behind war (Organski, 1968; Organski & Kugler, 1980; Kugler & Lemke, 1996; Tammen et al., 2000). The international order – the military, economic, and diplomatic rules and norms of engagement – is supported to a greater or lesser degree by all states in the international system. Those states that are satisfied with the international order appreciate the benefits accrued from the status quo. States that are dissatisfied with the international order, in contrast, 'view the international system as not conferring benefits equal to their expectations and long-term interests' (Tammen et al., 2000: 9).

The international order is put in place by the leader of the international system and maintained by the leader and its great-power allies. As Organski (1968: 366) notes, 'the dominant nation is necessarily more satisfied with the existing international order than any other since it is to a large extent *its* [emphasis added] international order'. A state that has established ties to the dominant power thus does so with the knowledge that its action is implicitly a form of support for the current international system. The degree of ties to the system leader also is a likely indication of the stake a state might have in the current international order. Accordingly, two states with similarly tight ties to the leader of the international system are more likely to be satisfied with the system and, consequently, less likely to be on opposite sides of salient international issues.

Additional empirical work has found that ties to the system leader matter in determining dyadic conflict. In such studies, τ_β correlations of states' alliance profiles are taken as a measure of states' ties to the leader of the international system (Kim, 1989, 1991, 1996; Lemke & Reed, 1996). States with a highly positive correlation of alliance profiles with the dominant power are seen as being satisfied with the international order and less likely to engage in war. In a study of great-power rivalry, Lemke & Reed (2001) employ Signorino & Ritter's (1999) much-improved *S* statistic to measure states' ties to the international leader. However, with the exception of the latter article, analyses are generally dichotomous – with states viewed as either dissatisfied or satisfied with the international order and the outcome of interest either war or no war.

It is important to note that the role of system-level preferences in determining international conflict has been shown to be independent of factors such as the level of democracy and power. Using states' correlations of the United Nations General Assembly roll call votes, Gartzke (1998) tests for endogeneity between democracy and preferences using Two Stage Least Squares regression. He concludes that 'from a statistical standpoint, the effect of preferences on disputes appears largely independent of regime type' (Gartzke, 1998: 12). In addition, using Granger causality tests of τ_β correlations of states' alliance profiles on the Correlates of War (CoW) power index, Lemke & Reed (1998: 515) find 'no reason to believe that status quo evaluations are caused by national power or by changes in national power'.

In short, the relationship between states' *security* ties to the international order and dyadic conflict has been extensively tested and supported. However, Organski (1968)

and Organski & Kugler (1980) suggest that joint satisfaction with *both* the economic and security components of the international order are important in determining war. Indeed, the belief that security and economic interests play a joint role in determining the likelihood of conflict short of and including war has become increasingly accepted in the literature (Kindleberger, 1973; Krasner, 1976; Pollins, 1989a,b; Gowa & Mansfield, 1993; Gowa, 1994). Nevertheless, no large-n empirical test has yet studied their impact on dyadic disputes.

Unfortunately, no variables are available in previously established datasets that allow for a parallel test of how economic and security ties at both the state-to-state and state-to-system levels impact conflict. Consequently, this article proposes the use of a technique specifically suited to measure the dissimilarity between states in terms of the totality of their relationships along a specific dimension. The multidimensional scaling (MDS) procedure employs such an algorithm and is able to provide Euclidian-distance coordinates of states' dissimilarity along security and trade dimensions.

These measures move beyond a simple dichotomous measure of satisfaction or dissatisfaction with the international system. Using the MDS procedure, four different continuous variables are constructed for each dyad. The first two of these examine the distance between states' economic ties based on bilateral trade dependence data and the distance between states' security ties based on alliance profile data. The last two variables examine the difference between states' economic and security ties to the leader of the international system based on the above data.

Using these variables, I am able to test three different models of the relationship between dyadic hostility and states' security and economic ties to the international order and to each other. Model 1 tests the relationships between hostility and separate security and economic ties of states to each other and to the international order; Model 2 examines joint security and economic ties of states to each other and also joint security and economic ties to the international order; and Model 3 considers the total joint effect of economic and security ties of states to each other and to the international order.

Each of the three models is estimated using data on 70 or more countries,[1] paired dyadically from 1951 to 1985, for a total of 189,214 non-directed dyad-years. This time period has been used extensively in recent publications and thus allows for the comparison of results across articles.[2]

Variables and Measurement

Dependent Variable: Hostility

Much of the recent literature on dyadic conflict has used the onset of militarized disputes as the dependent variable, with 1 for the onset of a dyadic dispute and 0 for no dispute. However, use of a dichotomous variable obviously precludes observation of the impact of a set of variables on discrete

[1] Owing to the time-intensive nature of variable construction with the MDS algorithm and SPSS scaling limitations, 70 to 89 countries are used in this sample. The initial 70 countries were selected purely on the basis of their inclusion in the Singer (1995) alliance dataset in 1951. For later years, greater data availability makes it possible to include up to 89 countries in the analysis. While Singer's dataset is not truly random in its selection of countries (i.e. larger countries with well-publicized alliances are probably more likely to be coded in initial years of the dataset), it does have a great deal of variation in terms of the regional location and is considered to be a sufficiently random sample for the purposes of most social scientists. I am confident that the control variables employed in this study mitigate any *potential* sampling bias in determining the onset of dyadic disputes.

[2] Examples of recent articles employing data from the 1951–85 period include Oneal et al. (1996), Oneal & Russett (1997), Russett, Oneal & Davis (1998), Beck, Katz & Tucker (1998), Gartzke (1998), Mansfield & Pevehouse (2000), Russett & Oneal (2001), and Crescenzi & Enterline (2001). This time period, however, does limit the applicability and interpretation of results to the Cold War period.

levels of dyadic conflict. This article suggests that both state-to-state and state-to-system ties should also affect dyadic conflict, short of and including war. Consequently, the level of dyadic hostility is measured on a five-point scale using the CoW Militarized Interstate Dispute (MID) data, where

0 = no MID between states *i* and *j*
1 = threat of force
2 = show of force
3 = use of force
4 = war.

For the sample used in this article, less than 1% of observations (734 of 189,214) show some level of conflict. The most sporadic of these categories is threat of force (38 cases) followed by war (42), show of force (202), and use of force (452). These disputes are not only rare, they are often temporally dependent upon one another. To help limit temporal dependencies on past episodes of dyadic conflict, a *peaceyears* control variable is employed. This variable is derived from the dependent variable *hostility* and counts the number of years of peace between any level of hostile action for states *i* and *j*. Longer spans of peace are expected to be associated with a reduced likelihood of hostility.

Independent Variables

States' Ties to One Another Using the MDS procedure, both alliance profile and dyadic trade dependence data are employed to obtain measures of both intra-dyadic ties and ties to the international order. This measurement technique has been well established in the fields of psychology and US politics (Jacoby, 1991) and has been used to model the world trading system (Blanton, 1999), as well as to examine politico-military, economic, and intergovernmental organizational interdependence between states (de Vries, 1990).

The distance between states on a particular policy dimension is obtained from the following algorithm:

$$d_{ij} = \sqrt{\sum_{a=1}^{A} \left(x_{ia} - x_{ja} \right)^2}$$

where
d_{ij} = the distance between states *i* and *j*
x = the coordinates of the location of the stimuli
a = the dimensions of interest.

The coordinates provided by the algorithm may be used to assess both distances between nations and distances from a specific reference point on the 'ruler' of coordinates. Security and economic relationships between states are, however, different in nature. Security agreements are more often than not symmetric, while economic relationships are often asymmetric (i.e. *j* trades a larger proportion of its GDP with *i* than *i* does with *j*). Consequently, two separate scaling procedures, one for security and one for economic relationships, are performed.

MDS is designed to measure dissimilarity data. Thus, for the security measure, the entire spectrum of the sample of states' alliances are reverse-coded and arrayed in matrix format, where 0 = the presence of defense pact between two states, 1 = neutrality pact, 2 = entente, and 3 = no agreement. The symmetric nature of the relationships and the ordinal scale of the alliance measure necessitate the use of classical, symmetric, non-metric MDS.

Bilateral trade dependence data (Russett & Oneal, 2001) are used as the basis of the measure of economic relationships. The level of bilateral dependence for each state is operationalized as the magnitude of state *i*'s imports and exports to state *j* as a proportion of its gross domestic product $\left(\frac{X_{ij} + M_{ij}}{GDP_i} \right)$. The variable thus considers the

importance of bilateral trade in the context of a state's entire economy. The asymmetric, ratio-level nature of these data requires the use of classical, asymmetric, metric MDS.[3] These data, which represent a state's level of trade with another state as a proportion of its gross domestic product, are likewise arrayed in matrix format and recoded into dissimilarities data, with lower scores representing those states with the highest levels of dyadic trade and the higher scores representing states with little or no trade with one another.

The ALSCAL procedure is employed to create the MDS dissimilarities data used as the basis of the state-to-state (and state-to-system) security and economic variables.[4] States are scaled in reference to every other state with the use of all available data.[5] The final products of the scaling procedure are two one-dimensional Euclidean distance 'rulers' for both the security and economic data. Each state is plotted along this ruler and distances between states are interpreted as dissimilarities for that dimension of interaction.

The security and trade matrices are scaled on one dimension for each year from 1951 to 1985. Goodness-of-fit statistics range from an S stress of 0.10 to 0.15 for alliance profiles and an S stress of 0.36 to 0.53 for bilateral trade profiles. The R^2s for alliances range from 0.95 to 0.98 (depending on the year of estimation), while those for trade range from 0.34 to 0.67.[6]

Differences in states' ties to the security and economic order can be assessed by taking the absolute value of the difference between state *i*'s and state *j*'s MDS scores on the security (*intra-dyadic security dissim*) and economic (*intra-dyadic econ dissim*) dimensions. Greater differences are associated with greater dissimilarities between states. Positive relationships are expected between these two dissimilarity variables and dyadic disputes.

In addition, the total dissimilarity of the network of two states' ties (*intra-dyadic total dissim*) is captured by creating the interactive term, *intra-dyadic total dissim = intra-dyadic security dissim*intra-dyadic econ dissim*. Higher values are associated with higher dissimilarity on both dimensions, leading to the expectation of a positive relationship with hostility level.

States' Ties to the International Order As the dominant power in the international system since World War II, the USA has had an overwhelming impact on international security and economic regimes (Tammen et al., 2000). For this reason, many studies (e.g.

[3] The asymmetry of trade is especially apparent between countries of different levels of development. For example, in 1955 the USA traded only .0002 % of its GDP with Honduras, while Honduras traded 21% of its GDP with the USA, suggesting that Honduras has stronger economic ties with the USA than vice versa.

[4] The ALSCAL procedure is available through SPSS 10.1.

[5] MDS discovers structures underlying the observed relations among 'stimuli, concepts, traits, persons, cultures, species or nations' (Shepard, Romney & Nerlove, 1972: xiii) and uses all available information to place states on the scale. Thus, even if no data are available for trade between two states, information from each state's entire trade profile is used to obtain the relative location of each state vis-à-vis the other.

[6] Note that, in much the same way as R^2 values for OLS will increase when new independent variables are added to the model, the goodness-of-fit measures for trade relationships would automatically increase if the estimated number of dimensions were increased. However, just as researchers do not add independent variables without theoretical reason (despite the fact that it would improve a goodness-of-fit measure), it would not be valid to increase the number of dimensions in the MDS algorithm without clear justification. In this article, states are assumed to be primarily interested only in the bilateral trade dissimilarities between themselves and other states as regards their likelihood of conflict (whether they be dissimilarities between state *i* and state *j* or between state *i* and the USA) and not in the underlying structure of trade (e.g. dissimilarities between East–West ideologies, as well as developed–non-developed states, as well as cultural differences, etc.). Because this article assumes that the relevant trade and security relationships are relatively simple and dyadic in nature, I employ a unidimensional model. While the many nuances of interdependence and trade relationships between states are certainly an area of interest (see Blanton, 1999 and deVries, 1990), they are outside the scope of this article.

Kim, 1989, 1991, 1996; Lemke & Reed, 1996, 2001) as well as the coding rules used in EUgene (Bennett & Stam, 2000) consider the United States to be the leader of the international order for the entire time period of this study, 1951 to 1985. The USA is thus assumed to be the most representative state of the international order and is coded as the point of reference for states' preferences for the international order.

Dyads in which both states are close to the USA in the MDS measure are assumed to have a stake in and be at least in implicit support of the international order. Dyads further away from the USA either have dissimilar ties to the international order or are jointly not integrated into this order. The dyadic distance from the system leader is measured as the absolute distance of the sum of state *i* and state *j* from the USA on either the security (*int order sec dist*) or economic dimension (*int order econ dist*). A positive relationship between dyadic dispute hostility level and the dyadic distance from the international order is expected on both dimensions.

The two preceding variables are also employed as the basis for the measure of the total dyadic relationship distance from the international order.[7] This variable, *intl order total dist*, is the interactive product of *int order sec dist* and *int order econ dist*. It is expected that lower dyadic dissimilarity values for *int order total dist* will be associated with lower probabilities of hostilities.

[7] I would like to thank an anonymous reviewer for suggesting that these measures could also be used to test formal models where there is a first-move advantage for the challenger (e.g. Wagner, 1991). For example, a researcher could assume that states with below-average ties to the international order (or for, that matter, to one another) are more likely to challenge the status quo. In addition, such a variable could be used to identify which states should be more credible defenders of the status quo (e.g. Jervis, 1977; Snyder & Diesing, 1977) or to assess the likely extent of a challenger's demands (e.g. Powell, 1996).

States' Joint Ties to One Another and the International Order The joint product of the four base variables (*intra-dyadic security dissim*intra-dyadic econ dissim*int order secdist*int order econ dist*) allows for an examination of the effect on dyadic hostility of total relationship similarity for the security and economic policy dimensions between states as well as total integration in the international order. This variable (*total dist*dissim*) serves as a combination of the power transition and similarity perspectives. That is, lower values on this variable suggest that states within a dyad have a very similar network of security and economic relationships and that both states have more positive preferences for the international order. Such dyads should be much less likely to engage in hostility than other states. One would further expect the results to be prominent for the use of force and war, where the costs of terminating tightly integrated relationships would be greatest.

Control Variables

Level of Democracy When addressing states' intra-dyadic similarity and their economic and security preferences for the international order, one must consider whether these international-level factors may be related to domestic politics. Consequently, the level of democracy is an important control for ensuring that dyads' international-level preferences are significant above and beyond institutional similarity.

The indicator for level of democracy was obtained from the Polity III dataset (Jaggers & Gurr, 1995). To measure the level of political competition and participation, the level of autocracy was subtracted from the level of democracy for each state to obtain its total level of democracy. Scores range from highly autocratic (–10) to highly democratic (10). The lowest level of total democracy of state *i* versus state *j* is taken as the level of dyadic democracy and is considered to be the

lowest level of institutional constraint for the dyad. As in the majority of the literature, a negative relationship between the dyadic level of democracy and hostility is expected.

Contiguity Geographic proximity is a well-established condition that, *ceteris paribus*, increases the likelihood of conflict (Choucri & North, 1975, 1989; Starr & Most, 1976; Siverson & Starr, 1991; Bremer, 1992). Contiguity is coded on a six-point scale, with 1 representing the highest level and 6 the lowest level of contiguity.

Geographical Distance In addition to contiguity, it is important to control for the geographical distance between a dyad's capital cities. Even if two countries are contiguous by water, the core areas of the states in question are not necessarily within easily attainable distances. This is not nearly such an important constraint for more powerful nations. However, small- and middle-sized states find it much more difficult to engage in hostile action against adversaries that are distant.

Capability Ratio Power transition theory suggests that the presence of power parity is a key determinant of war (Organski, 1968; Organski & Kugler, 1980; Houweling & Siccama, 1988; Bueno de Mesquita & Lalman, 1992; Kugler & Lemke, 1996). The capability ratio of the dyad is thus an important control for determining the likelihood of conflict. The variable employed in this article takes the ratio of two states' CoW composite national capabilities index (Singer, Bremer & Stuckey, 1972). The basis of the ratio is an index of a state's proportion of total system capabilities in iron and steel production, urban population, total population, total military expenditures, total military personnel, and total amount of energy production. The higher capability score is divided by the lower for each dyad. Thus, the lower the capability ratio, the closer a dyad is to power parity. The capability ratio should consequently have a negative relationship with dyadic hostility.

Alliance A control for alliance type is necessary to ensure that the presence of a security relationship does not subsume the impact of dyadic dissimilarity on conflict. When both members of a dyad are members of a defense pact, the alliance variable equals 1. The variable is coded as 2 for the presence of a neutrality pact, 3 for an entente, and 4 for no agreement. The relationship between dyadic conflict and alliances has proven to be mixed (Siverson & King, 1980; Bueno de Mesquita, 1981). Nonetheless, a positive relationship between alliance and hostility level is expected.[8]

Estimation Procedure and Results

One would expect more hostile actions to be pursued less frequently than less hostile actions. However, as coded in the MID data, actions higher on the scale often have higher frequencies than those with lower values. This might be due to the fact that states might skip some of the steps to war (Vasquez, 2000) or to the simple fact that these categories cannot be easily ranked on an ordinal scale (for example, a threat to use force might be perceived as more hostile than certain displays of force). Consequently, the dependent variable is treated as a nominal-level variable in this study. The nominal, rather than ordinal, nature of the dependent variable is empirically confirmed with an approximate Likelihood Ratio test

[8] An additional possible control variable would be the lowest level of dyadic trade dependence. This variable was included in test runs (see note 15). However, the inclusion of the raw dyadic trade data forces the number of observations to drop from 189,214 to 13,131 (see note 5 for an explanation of the different observations) and is consequently not included as a control in the main analyses presented below.

($\chi^2 = 163.53$, $p < .001$), which suggests that the parallel regression assumption necessary for ordered logit is violated.[9] Accordingly, a multinomial logit estimation procedure is used to estimate the following three models. All models are estimated with Huber–White robust standard errors clustered on the dyad.

Multinomial logit analysis estimates the effects of a model's independent variables on the odds of one value of the dependent variable compared to another value. Therefore, one may estimate the effects of independent variables on moving from a base category to subsequent categories (e.g. from level 0 to 1, 0 to 2, 0 to 3, etc.) and also from each category to the other (e.g. from 1 to 2, 2 to 3, 3 to 4, etc.). In essence, this procedure provides the odds of participation in hostility from a base of non-hostile action and the progression of hostility between states in a dyad.

The multiplicative logit coefficients reported in Table I indicate the factor by which the odds of a dyad at one level of hostility versus another level will change for each one-unit increase in the independent variable, holding all other variables constant. Hence, coefficients greater than 1 signify an increased likelihood of that outcome, while coefficients less than 1 indicate a decreased likelihood of hostile action.[10] The odds ratio can be transformed into percentages by simply subtracting 1 and multiplying by 100.

Owing to the multiple combinations of dependent variable outcomes, the presentation of multinomial logit results can be overwhelming. Thus, only the variables of key theoretical interest are presented in Table I. Appendix A provides the multinomial logit estimation results for all variables when the base category is no action. The first four columns in Table I show the results for a dyad moving from no action to either the threat of force, the show of force, the use of force, or war. The last six columns provide estimation results for moving from one level of hostility to another.

Model 1

Model 1 provides a base model of the dyadic distance and intra-dyadic dissimilarity variables for the separate security and economic dimensions. The expectation for each of these dissimilarity variables is a positive relationship with hostility, or a multiplicative logit coefficient above 1.0. The control variables used in this and the following two models (presented in Appendix A) generally hold the anticipated signs (if not significance levels) with different levels of *hostility*.[11] In addition, the effects of all the control variables are extremely consistent across all three models. As expected, higher levels of *democracy* are significantly associated with lower levels of dyadic hostility. *Capratio* has no significant effect on the threat or show of force, and has a significant but non-discernible effect on the use of force; however, as posited by power transition theory (Organski & Kugler, 1980), greater parity levels are shown to increase the probability of dyadic war. With the exception of war, greater geographic distances (*geodistance*) significantly decrease the likelihood of all other levels of *hostility*. The level of formal alliance (*alliance*), in turn, does not significantly decrease the threat or show of force for the first or second models and is only significantly related to the show of force for the third model. For all three models, lower levels of formal alliances significantly increase the likelihood of the use of force and war.

[9] As Long (1997) notes, in those cases where the ordinality of a categorical dependent variable is untested, or where the effects of the independent variables on the dependent variable are not uniform, ordered logit analyses are inappropriate.

[10] The odds ratios are a transformation of the β parameters where 'for a unit change in x_k, the odds are expected to change by a factor of $\exp(\beta_k)$ holding all other variables constant' (Long, 1997: 80).

[11] Two-tailed z tests are used in all tables.

Table I. Factor Change in the Odds of Dyadic Hostility, 1951–85 (n = 189,214)

	0→threat	*0→show*	*0→use*	*0→war*	*threat→show*	*threat→use*	*threat→war*	*show→use*	*show→war*	*use→war*
*Model 1: Log likelihood = –4,307.94, Wald χ^2 = 1,499.04****										
Int order	0.922	0.847	0.793***	1.203	0.918	0.860	1.304	0.936	1.420*	1.517**
sec dist	(–0.366)	(–1.293)	(–2.764)	(1.333)	(–0.323)	(–0.629)	(1.011)	(–0.525)	(1.792)	(2.444)
Int order	1.168	0.755***	0.863***	0.803	0.646***	0.793**	0.688**	1.144	1.064	0.931
econ dist	(1.333)	(–2.818)	(–2.862)	(–1.581)	(–2.810)	(–2.388)	(–2.020)	(1.484)	(0.366)	(–0.489)
Intra-dyadic	2.161***	1.439***	1.165	0.574**	0.666	0.539**	0.266***	0.810	0.399***	0.493***
security dissim	(3.078)	(3.279)	(1.561)	(–2.135)	(–1.549)	(–2.431)	(–3.603)	(–1.605)	(–3.317)	(–2.632)
Intra-dyadic	0.771	1.646***	1.295***	1.241	2.137***	1.682**	1.611*	0.787**	0.754	0.958
econ dissim	(–1.191)	(4.019)	(3.132)	(1.458)	(3.112)	(2.211)	(1.761)	(–2.289)	(–1.461)	(–0.246)
*Model 2: Log likelihood = –4,287.85, Wald χ^2 = 1,802.42****										
Int order	1.083	1.197**	1.044	1.416***	1.106	0.964	1.308	0.872*	1.184	1.357***
total distance	(0.641)	(2.201)	(0.877)	(2.965)	(0.683)	(–0.281)	(1.571)	(–1.768)	(1.128)	(2.362)
Intra-dyadic	0.547***	1.198*	0.872**	1.624***	2.192***	1.596**	2.971***	0.728***	1.355*	1.862***
total dissim	(–3.055)	(1.914)	(–2.119)	(3.014)	(3.708)	(2.263)	(4.304)	(–2.955)	(1.710)	(3.628)
Int order	0.673	0.474**	0.686*	0.359**	0.705	1.019	0.534	1.447	0.758	0.524
sec dist	(–0.644)	(–2.489)	(–1.778)	(–2.054)	(–0.505)	(0.030)	(–0.788)	(1.290)	(–0.453)	(–1.162)
Int order	1.013	0.543***	0.808**	0.395***	0.537*	0.798	0.390***	1.487**	0.727	0.489***
econ dist	(0.044)	(–3.101)	(–2.008)	(–4.332)	(–1.815)	(–0.764)	(–2.632)	(2.338)	(–1.040)	(–2.985)
Intra-dyadic	3.491***	1.138	1.365*	0.287***	0.326***	0.391***	0.082***	1.199	0.252***	0.210***
security dissim	(4.686)	(0.744)	(2.446)	(–3.672)	(–3.653)	(–3.266)	(–5.705)	(0.925)	(–3.757)	(–4.424)
Intra-dyadic	1.550*	1.401**	1.431***	0.914	0.904	0.923	0.590	1.021	0.653	0.639*
econ dissim	(1.653)	(2.053)	(3.526)	(–0.426)	(–0.335)	(–0.281)	(–1.561)	(0.151)	(–1.593)	(–1.838)
*Model 3: Log likelihood = –4,295.58, Wald χ^2 = 1,584.18****										
Total	0.967*	1.020**	0.981**	1.040***	1.054**	1.014	1.075***	0.962***	1.020**	1.060***
dist*dissim	(–1.678)	(2.496)	(–2.371)	(5.794)	(2.515)	(0.655)	(3.401)	(–3.785)	(2.012)	(5.521)
Int order	0.982	0.807*	0.817**	1.136	0.822	0.832	1.157	1.012	1.408*	1.390**
sec dist	(–0.084)	(–1.652)	(–2.537)	(0.921)	(–0.751)	(–0.778)	(0.562)	(0.093)	(1.751)	(1.974)
Int order	1.242	0.729***	0.881**	0.721**	0.587***	0.710**	0.581**	1.208**	0.989	0.818
econ dist	(1.566)	(–3.093)	(–2.576)	(–2.363)	(–3.014)	(–2.336)	(–2.706)	(1.992)	(–0.067)	(–1.377)
Intra-dyadic	2.766***	1.155	1.357***	0.353***	0.418***	0.491**	0.128***	1.175	0.306***	0.260***
security dissim	(3.448)	(1.045)	(2.670)	(–3.722)	(–2.756)	(–2.307)	(–4.923)	(0.999)	(–3.891)	(–4.531)
Intra-dyadic	1.071	1.466***	1.418***	0.974	1.372	1.326	0.909	0.966	0.663*	0.686**
econ dissim	(0.255)	(2.572)	(3.684)	(–0.176)	(1.057)	(0.993)	(–0.308)	(–0.285)	(–1.943)	(–2.025)

*$p < 0.10$; **$p \leq 0.05$; ***$p \leq 0.01$.

Finally, greater previous periods of peace (*peaceyears*) are significantly associated with a lower likelihood of dyadic hostility in all three models.

For the dyadic distance from the USA in terms of security (*int order sec dist*), the odds of moving from the show of force to war increase by approximately 40% (odds ratio 1.420) and by approximately 50% for the use of force to war. However, *int order sec dist* has no significant, positive effect on any other category of hostility. In addition, no significant, positive relationships are obtained for the dyadic economic distance from the USA (*int order eco dist*). Security and trade dissimilarity (*intra-dyadic security dissim* and *intra-dyadic eco dissim*) have significant positive relationships for several different categories of the dependent variable, but generally those short of war. In sum, for the first three variables, more negative than positive relationships with hostility level are attained. Only for intra-dyadic trade dissimilarity does one find that significant positive relationships with hostility level largely outweigh significant negative relationships. On the whole, the separate security and economic dimensions do not present a clear relationship with hostility. These results are not unexpected, however. If, as theorized above, states consider their *total* relationships with potential adversaries, then one would not expect the separate security and economic measures of relationship and preference dissimilarities to exhibit a consistent effect on dyadic hostility. For that reason, the joint effect of intra-dyadic economic and security dissimilarity and dyadic distance from the international order are examined in Model 2.

Model 2

The interactive security and economic variables for dyadic distance from the international order and for dyadic dissimilarity exhibit a substantial jump in predictive power over Model 1. The dyadic distance from the security and economic order (*int order total distance*) has a positive relationship with conflict for eight of ten possible outcomes and a significant positive coefficient for three possible outcomes: no action to show of force, no action to war, and use of force to war. Thus, when two states are relatively close to the international order (i.e. when the dyadic distance score is low), they will be significantly less likely to participate in the show of force and war (the threat and use of force have positive, but non-significant, relationships) and significantly less likely to escalate from the use of force to war. In sum, the similarity of positive ties to the international order is shown to be associated with decreased hostility.

For the dissimilarity of state-to-state economic and security ties (*intra-dyadic total dissim*), the effects are mixed for the onset of hostility from no action. Joint security and economic dissimilarity reduces the likelihood of conflict from no action to threat and no action to the use of force. However, it is shown to increase the likelihood of moving from no action to the show of force and from no action to war. In addition, intra-dyadic dissimilarity has an overwhelmingly positive effect on moving dyads up the ladder of hostility.

In sum, the results from Model 2 imply that the dyadic distance from the international order and intra-dyadic distance variables have important independent effects on conflict.[12] Model 2 further illustrates that the moderated impact of the separate security and economic variables on conflict (*intra-dyadic security dissim*, *intra-dyadic econ dissim, int order sec dist*, and *int order econ dist*) are reduced as compared to the non-moderated effects shown in Model 1. Indeed, when the interactive variables are included in the

[12] *Int order total distance* and *intra-dyadic total dissim* have a Pearson correlation coefficient of only 0.20 ($p \leq 0.001$). Consequently, states with similar ties to one another are not overwhelmingly also those with similar ties to the international order.

model, the conditional effects of the four separate security and economic variables cease to have any significant positive effect on the highest level of hostility, dyadic war.[13]

Model 3

Model 2 illustrates that the *joint* economic and security dissimilarity of two states' ties to each other and to the international order have a much larger impact in determining dyadic hostility than do the independent security and economic ties found in Model 1. The question remains whether the reference point for dissimilarity is interactive, as the security and economic interactions have been shown to be in Model 2.

Consequently, Model 3 examines the interactive effect of the dissimilarity of the network of states' ties to each other as well as to the international order, along both the security and economic policy dimensions. The interaction of all four variables (*intra-dyadic security dissim*intra-dyadic econ dissim*int order sec dist*int order econ dist*) tests for this effect of the total relationship distance of states from each other and jointly from the international order (*total dist*dissim*).[14] Dyads with lower values on this variable are those that are similar both in terms of their network of ties and in terms of their degree of integration into the international order. One would expect such states to be extremely unlikely to engage in hostile action at any level. Higher scores on this variable should be associated with elevated probabilities of hostile action and the escalation of hostility.

The results of the estimation of Model 3 do suggest that the interactive effect of distance from the international order and intra-dyadic dissimilarity (*total dist*dissim*) has a generally positive effect on the escalation of hostility level and a mixed effect on the onset of hostility. That is, states that are similar both in terms of their preferences for the international order and in terms of their intra-dyadic security and economic relationships are, on the whole, less likely to engage in hostile action from any level of previous action than those states that do not exhibit such similarity.

The direction of the effects for *total dist*dissim* are similar to those for *intra-dyadic total dissim* found in Model 2. However, the magnitude of the effects are much reduced in Model 3 as compared to those found in Model 2. Indeed, the highest change in the odds of conflict is an increase of approximately 8% for moving from threat to war. On the other hand, in Model 2, the odds of moving from threat of force to war increase by 42% and 197%, respectively, for a one-unit increase in dyadic distance from the international order (*int order total distance*) and intra-dyadic dissimilarity (*intra-dyadic total dissim*). Moreover, a comparison of both the log likelihoods as well as the Wald χ^2 statistics suggest that Model 2 is superior to Model 3.[15]

[13] In addition, each model was run without control variables. Owing to space constraints, only results for Models 2 and 3 are presented here. For Model 2, without controls, coefficients for the key variables *int order total distance* and *intra-dyadic total dissim* have improved significance levels, *intra-dyadic security* and *intra-dyadic eco dissim* switch signs for the show of force, and *intra-dyadic security* does so for the use of force. For Model 3, the same changes are seen for *intra-dyadic security*. The key theoretical variable for this model, *total dist*dissim,* drops in significance for the use of force (but retains its unexpected negative sign). In sum, the results are very similar when the three models are run without controls.

[14] The correlation of *total dist*dissim* is 0.36 with *int order sec dist*, 0.09 with *int order econ dist*, 0.63 with *intra-dyadic security dissim*, and 0.53 with *intra-dyadic econ dissim*. All are significant at the $p \leq 0.001$ level.

[15] Model 2 (the most promising model) was also estimated with an additional control for bilateral trade dependence ($\text{Imports}_{ij}+\text{Exports}_{ij}/\text{GDP}_i$). As mentioned in note 8, the inclusion of this variable dramatically reduces the number of observations. A comparison of estimation results with and without the trade dependence variable confirms the robustness of the primary estimation results. The inclusion of the trade dependence variable had no appreciable effect on *int order total distance*, *intra-dyadic security dissim*, or *int order sec dist*. The inclusion of the dependence variable does affect 4 (of 60 possible) coefficients for the primary theoretical variables presented in Model 2 (Table I). However, its inclusion never affects the sign of relationships, though it does decrease the significance for the following variables: the significance of *intra-dyadic total dissim* drops from p = 0.09 to 0.11 for no action to the threat of force, *intra-dyadic econ dissim* drops from p = 0.09 to 0.13 for the use of force to war, *int order econ dist* drops from p = 0.05 to p = 0.10 for the use of force to war and from p = 0.10 to p = 0.19 for no action to war.

Predicted Probabilities

The predicted probabilities of participating in each level of hostility (rather than the factor change in odds of moving from one category of hostility to the next) are presented in Table II. These probabilities are derived from the multinomial logits presented in Appendix A and represent the change in predicted probabilities of participating in a particular hostility level when the variables of theoretical interest are increased by one standard deviation and all other variables are fixed at their mean value. These results show that increasing the dyadic distance from the international order (*int order total dist*) has a consistently positive, and generally large, effect on dyadic hostility. However, both intra-dyadic dissimilarity (*intra-dyadic total dissim*) and the fully interactive variable (*total dist*dissim*) have negative effects on the threat and the use of force. Thus, for some hostile actions, increasing intra-dyadic similarity is shown to lead to higher probabilities of involvement. In addition, these results for the most part confirm that decreasing states' *total* ties to one another (*total dist*dissim*) has a more limited impact on conflict propensities than either increasing the dissimilarity of states' ties to one another (*intra-dyadic total dissim*) or the distance of dyad's ties to the international order (*int order total dist*). Indeed, the effects of this variable on the show of force (+32%) and war (+74%), while positive, are always smaller than the effects of intra-dyadic dissimilarity (+37% and +125%) and the dyadic distance from the international order (+99% and +275%).

It is also important to note that the negative effect of intra-dyadic dissimilarity on the threat and use of force is not, as one would expect, entirely responsible for the negative effects of *total dist*dissim* on hostility. Indeed, when dyads' levels of intra-dyadic dissimilarity *and* distance from the international order on both security and the economic dimensions (*total dist*dissim*) are increased by one standard deviation, they become the least likely of all dyads to engage in the use of force (–24% as compared to –21% and +18%). In summary, Table II illustrates that dyadic distance from the international order is the only variable shown to have a uniform effect in increasing the risk of participation in hostile action.

Conclusions

The above results suggest that states consider the aggregate of their security and economic relationships with one another and also the aggregate of their security and economic relationships with the international order when assessing whether or not to take hostile action. In fact, the odds ratios for the separate security and economic variables presented in Model 1 provide a much less consistent picture of how dissimilarity affects conflict than can be seen via the effects of the

Table II. Percentage Change in Risk of Involvement in Hostility Level for a One Standard-Deviation Increase*

	Threat	*Show*	*Use*	*War*
Model 2				
Int order total dist	+36%	+99%	+18%	+275%
Intra-dyadic total dissim	–64%	+37%	–21%	+125%
Model 3				
Total dist*dissim	–39%	+32%	–24%	+74%

* All other variables set at mean values.

interactive security and economic variables estimated in Model 2.

The results of Table II combined with those presented in Table I further suggest that states' ties to one another and to the system leader have an additive rather than a multiplicative effect on dyadic conflict. These results were unexpected, as it was posited that those states that are both tightly tied to the international order and to each other should experience less conflict. This proposition received only limited support as evidenced by the non-uniform and limited effects of *total dist*dissim* on hostility levels presented in Tables I and II.

Nonetheless, the lack of tight ties to the international system leader has a predominantly positive and generally significant effect in moving dyads to hostile action from peace and from the use of force to war. This finding both supports and extends previous work that suggests ties to the dominant power are vital determinants of war between great and regional powers (Organski & Kugler, 1980; Lemke & Werner, 1996; Tammen et al., 2000; Lemke, 2002). Indeed, decreasing dyadic ties to the system leader has a greater effect in increasing the absolute probability of participating in a given level of hostility than does decreasing the similarity of relationship networks between states in a dyad.

However, Table I illustrates that the tightness of intra-dyadic ties is more important for moving dyads from one level of hostility to the next (e.g. from threat to the show of force, from threat to the use of force, etc.). This suggests that the two different approaches to similarity are complementary and that one approach does not overwhelmingly subsume the other.[16] In sum, while intra-dyadic dissimilarity has a more pronounced effect in moving dyads up the ladder of hostility, the probability of the average dyad participating in any level of hostility is greater for those that do not have a tight network of ties to the international order.

Another unexpected finding presented in Table II is that states with more dissimilar economic and security intra-dyadic ties are *less* likely to participate in the threat of force and the use of force against one another. A possible explanation is that states do not feel that their intra-dyadic networks of ties will be disrupted by participating in less costly types of hostile action.[17] These results imply that a dyad's network of ties to the international order may be less elastic, and possibly more important, than the network of ties between individual states. In other words, states may be more flexible in dealing with states that are dissimilar to them than in dealing with states that have different goals for the international order.

This may be interpreted as a promising result for states that have not established strong ties with one another but have similar preferences for the international order. For example, these findings suggest that a Nicaraguan Minister of Foreign Affairs attempting to ensure a more peaceful environment for the Americas should be less interested in forging new trade agreements with Cuba than in attempting to convince the USA to lift embargoes on Cuba and thus tie the latter more tightly to the international economic and security system. This research would also suggest that a US strategy of improving its trade ties with China will probably, in and of itself, not ensure future peaceful relations between either China and the USA or China and other states that support the current international order.

[16] I would like to thank an anonymous reviewer for explicitly stating that these results confirm that much previously published work has been correct in separating the study of how state-to-state and state-to-system ties affect the probability of dyadic war and conflict. However, these results also suggest that, in the future, researchers should focus on how security and economic ties work *together* to impact dyadic hostility.

[17] The relative frequencies for the use of force and its associated odds ratios and predicted probabilities also seem to point to the possibility that the use of force is a relatively popular, and possibly inexpensive, hostile action.

Rather, in addition to improving Sino-US trade relations, the USA should work to strengthen its security relationship with China – an approach the last two administrations seem to have tentatively supported.

A summary of the above findings suggests that long-term strategies for peace can take two different paths. States may try to build strong networks of relationships with one another or they may try to integrate themselves into the international order, thereby forging implicit ties with other states. Each of these paths will lead to some pacific benefits, especially regarding the use of force and war. Nevertheless, it is important to recall that the ties that bind two states to peace are not necessarily only those that bind them directly to each other. Instead, to reduce the likelihood of participation in all levels of dyadic hostility, states should also work to bring themselves and all of their dyadic partners closer to the international order.

Appendix A. Multinomial Logit with Huber–White Robust Standard Errors, 1951–85 (n = 189,214)

	RRR	*Std. err.*	*RRR*	*Std. err.*	*RRR*	*Std. err.*
0 → Threat of force						
Dyadic econ dissim	0.770	0.169	1.550*	0.411	1.071	0.288
Int order econ dist	1.168	0.136	1.012	0.288	1.242	0.172
Dyadic sec dissim	2.160***	0.541	3.491***	0.932	2.766***	0.816
Int order sec dist	0.922	0.204	0.673	0.414	0.982	0.213
Int order total dist			1.082	0.134		
Dyadic total dissim			0.547***	0.108		
Total dist*dissim					0.967*	0.019
Democ	0.887***	0.039	0.880***	0.040	0.883***	0.039
Capratio	1.000	0.000	1.000	0.000	1.000	0.000
Geo-distance	0.999***	0.000	0.999***	0.000	0.999***	0.000
Contiguity	0.820***	0.063	0.811***	0.062	0.819***	0.063
Alliance	1.114	0.210	1.106	0.214	1.082	0.204
Peaceyears	0.850***	0.027	0.845***	0.028	0.846***	0.028
0 → Show of force						
Dyadic econ dissim	1.646***	0.204	1.401**	0.230	1.469***	0.220
Int order econ dist	0.755***	0.075	0.543***	0.107	0.729***	0.074
Dyadic sec dissim	1.439***	0.160	1.139	0.199	1.155	0.159
Int order sec dist	0.847	0.109	0.474**	0.142	0.807*	0.105
Int order total dist			1.197**	0.098		
Dyadic total dissim			1.198*	0.113		
Total dist*dissim					1.019**	0.008
Democ	0.933***	0.013	0.932***	0.013	0.932***	0.014
Capratio	0.999	0.000	0.999	0.001	0.999	0.000
Geo-distance	0.999***	0.000	0.999***	0.000	0.999***	0.000
Contiguity	0.665***	0.036	0.662***	0.036	0.666***	0.036
Alliance	1.147	0.105	1.156	0.108	1.167*	0.109
Peaceyears	0.880***	0.016	0.881***	0.017	0.881***	0.017

Appendix A, continued

	RRR	*Std. err.*	*RRR*	*Std. err.*	*RRR*	*Std. err.*
0 → Use of force						
Dyadic econ dissim	1.295***	0.107	1.431***	0.145	1.420***	0.135
Int order econ dist	0.863***	0.044	0.808**	0.086	0.881***	0.043
Dyadic sec dissim	1.165	0.114	1.365**	0.173	1.357***	0.155
Int order sec dist	0.793***	0.067	0.686*	0.145	0.817**	0.065
Int order total dist			1.044	0.051		
Dyadic total dissim			0.872**	0.056		
Total dist*dissim					0.981**	0.008
Democ	0.953***	0.013	0.952***	0.013	0.953***	0.013
Capratio	1.000**	0.000	1.000**	0.000	1.000***	0.000
Geo-distance	0.999***	0.000	0.999***	0.000	0.999***	0.000
Contiguity	0.608***	0.027	0.607***	0.028	0.607***	0.028
Alliance	1.271***	0.102	1.259***	0.102	1.263***	0.102
Peaceyears	0.893***	0.011	0.893***	0.011	0.892***	0.011
0 → War						
Dyadic econ dissim	1.241	0.183	0.914	0.192	0.974	0.148
Int order econ dist	0.803	0.111	0.395***	0.085	0.721**	0.100
Dyadic sec dissim	0.574**	0.149	0.287***	0.098	0.353***	0.099
Int order sec dist	1.203	0.167	0.359**	0.179	1.136	0.157
Int order total dist			1.416***	0.166		
Dyadic total dissim			1.624***	0.261		
Total dist*dissim					1.040***	0.007
Democ	0.837	0.038	0.839***	0.037	0.833***	0.038
Capratio	0.991**	0.005	0.990**	0.005	0.991***	0.005
Geo-distance	0.999	0.000	0.999	0.000	0.999	0.000
Contiguity	0.758***	0.075	0.767***	0.079	0.770***	0.078
Alliance	2.609***	0.850	2.559***	0.749	2.797***	0.912
Peaceyears	0.654***	0.084	0.650***	0.088	0.653***	0.086
Log likelihood:	–4,307.93		–4,287.85		–4,295.58	
Chi^2:	1,499.04***		1,802.42***		1,584.18***	
Pseudo R^2:	0.2196		0.2233		0.2219	

* $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$.

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