Does the Dependent Variable Matter in Peace-Conflict Models? A Comparison of the Conflict Index between the Interstate Dyadic Events Data and Militarized Interstate Disputes Data

Scott Y. Lin
Rutgers University
email: scottyichunlin@gmail.com

Carlos Seiglie
Rutgers University, USA
email: seiglie@andromeda.rutgers.edu

Does the Dependent Variable Matter in Peace-Conflict Models?

A Comparison of the Conflict Index between the Interstate Dyadic Events Data and Militarized Interstate Disputes Data

Abstract

Studying the determinants of international conflict, researchers have found a series of influential variables, but few have addressed the robustness of the results to changes in the definition of the dependent variable, conflict. The two main sources for operationalizing conflict in empirical work are data on militarized interstate disputes (MIDs) and events data. In this paper, we find that a chi-square test indicates a correlation between events data and MIDs data. However, detailed regression analysis indicates that there are some contradictory findings depending on whether we use events data as opposed to MIDs data to measure conflict.

Key words: militarized interstate disputes, events data, interdependence, conflict.

I. Introduction

There is a considerable amount of research exploring the determinants of conflict. In particular, as a result of advancements in the collection of data pioneered by Singer in 1963 with the Correlates of War Project and in events data by McClelland (1978) and Azar (1980) and the complementary development in statistical techniques much of these studies are empirical in nature. The quantitative research in peace and conflict studies over the last two decades have explored many testable hypothesis with well-known results. The main purpose of these studies is to determine and explain why some countries go to war and others remain at peace. This research has posited dyadic democratic peace (Bueno de Mesquita and Lalman 1992; Maoz and Russett 1993; Ellis, Mitchell, and Prins 2010), shared norms of political system and culture (Dixon 1993, 1994; Mitchell 2002; Charron 2010), regime similarity (Peceny, Beer, and Sanchez-Terry 2002; Bennett 2006; Gelpi and Grieco 2008; Lektzian and Souva 2009), institutional constraints (Morgan and Schwebach 1992; Bueno de Mesquita et al. 1999; Huth and Allee 2003; Bueno de Mesquita et al. 2003; Anderson and Souva 2010), liberalist market prosperity (Hegre 2000; Mousseau 2000, 2005; Mousseau, Hegre, and Oneal 2003; Boehmer and Sobek 2005), economic interdependence (Polachek 1980, Gasiorowski and Polachek 1982, Barbieri 1996; Oneal and Russett 1997, 1999; Russett and Oneal 2001), third party mediation (Souva

2004; Chang 2005; Frazier 2006), power and capability condition (Lemke and Reed 1996; Xiang, Xu, and Keteku 2007; Hegre 2008), historic hostility experiences (Gartzke 1998; Werner 2000), and geographic proximity (Robst, Polachek, and Chang 2007; Lektzian, Prins, and Souva, 2010) as possible determinants.

After introducing their hypothesis, scholars then collect data to measure the related variables and test their associations with interstate peace or conflict through statistical modeling. Some of these variables include Joint Democracy, Alliance, Regime Types, Economic Development, Trade Interdependence, Foreign Direct Investment (FDI) Interdependence, International Institutional Similarity, Mediation, Power Preponderance, Major Power Dyad, Contiguity, Distance between Capitals, Prior Disputes, and Peace Years.

For peace-conflict modeling, most research generally uses measures of conflict for the dependent variables taken from the Militarized Interstate Dispute or MIDs data set, which was compiled by the Correlates of War (COW) project (Jones, Bremer, and Singer 1996). According to the COW project, MIDs are "united historical cases of conflicts in which the threat, display or use of military force short of war by one member state is explicitly directed towards the government, official representatives, official forces, property, or territory of another state." A MID occurs when a state threatens, displays, or uses military force against another state; a war is a MID that has

escalated to the point at which more than 1,000 soldiers have died in battle (Gochman and Maoz 1984; Jones, Bremer, and Singer 1996). Prior research has generally used two different modeling approaches in using MIDs data as outcome variables: using all MIDs (MID hostility levels two to five) or using only those MIDs involving use of force (MID hostility levels four and five).[1] Regardless of the approach, the dependent variable is generally measured dichotomously, i.e., if a measured MID occurs between the source country and the target country in a particular year, the dependent variable has a value of *1*; otherwise, a value of *0* is coded.

Meanwhile, other researchers have used data collected from various news sources which are categorized into whether a particular interaction or event between two nations was a cooperative, neutral or conflictual one. The compilation of data on these world events has enjoyed significant advances in both their quantitative and qualitative nature. In addition, the collection of world events data is spurred by the need for an accurate and timely conflict-early-warning system (OECD 2009). The earliest studies that used events data in peace-conflict modeling include Polachek (1980), Gasiorowski and Polachek (1982) and Gasiorowski (1982) who used the Conflict and Peace Data Bank (COPDAB) to define their dependent variable. Others such as Robst, Polachek, and Chang (2007) use another events data set, the World Event Interaction

[1] Hostility levels of MIDs include 1-no militarized action, 2-threat to use force, 3-display of force, 4-use of force, and 5-war.

Survey (WEIS) to examine the interactive effect of distance and trade on interstate conflict and cooperation. Finally, Polachek, Seiglie, and Xiang (2007, 2011) used another events data set, the Virtual Research Associates (VRA) to analyze the impact of FDI on interstate conflicts.

However, whether events data can reflect the reality of peace and conflict and, if so, to what extent has not been fully explored with notable exceptions such as Pevehouse (2003) and Reuveny (2003). We argue in this paper that using events data might result in a vivid and different picture in the quantitative model of peace and conflict studies but could, however, result in different explanations from those of MIDs data. The structure of this paper is as follows. The next section explores from a normative economic point of view what a dependent variable should measure and presents a comparative discussion of events data and MIDs data. Section III explains the methodology of this study, including the variables and data used. Finally, Section IV presents the empirical results of the association between the events data and the MIDs data and is followed by a conclusion.

II. The Social Costs of International Interactions

In modeling international interactions, including the decision to engage in war, it is generally assumed that individuals are rational and therefore, their preferences can be represented by a utility function. They are assumed to maximize this function

subject to economic, political and institutional constraints. If this is the case, then this implies that they weigh the cost of their actions against the potential benefits. If we assume that a country's foreign policy is responsive to their citizen's preferences and there are no externalities involved, then from a social point of view we should care about the net benefits of any policy to a state and adopt those policies which maximize social welfare. Assuming that there is some degree of policy substitution for political leader, decisions such as going to war should be evaluated in terms of their net social cost to a nation as compared to any other policy that may be used to achieve a stated objective.

More specifically, let A_1 be any given objective, where $A_1 \in \Omega$, and Ω is the set of objectives for a country over some time horizon. Let these objectives be separable in the utility function and $c_i(A_1)$, denote the net social cost of achieving objective or outcome, A_1, by enacting policy *i*, with *i=1,2,…,J*. For simplicity, assume that each objective can be achieved using a unique policy which has some social cost and that these costs are monotonically increasing across policies. Then there exists a unique policy that minimizes cost, where $c^*_{A_1} = \min\{c_1(A_1), c_2(A_1), ..., c_J(A_1)\}$ for objective A_1. In this case, from a normative perspective the total social cost of enacting the socially optimal policy set for *N* independent objectives is

$$C^* = c^*_{A_1}(A_1) + c^*_{A_2}(A_2) + ... + c^*_{A_N}(A_N) = \sum_{i=1}^{N} c^*_{A_i}(A_i).$$

In this simple case, given that resources are scarce what should our objective from a positive viewpoint be? More specifically, suppose that $c^*_{A_1}(A_1) \geq c^*_{A_2}(A_2) \geq ... \geq c^*_{A_N}(A_N)$. What policies or outcomes should we choose to dedicate our research to understand? Presumably, we would start with the policy enacted to achieve objective A_1 since it has the highest social cost and proceed upwards from there. More generally, suppose that because of either complementarity in policies required to achieve a given objective, e.g., a government must use several policies to achieve A_1, or because of interdependence in national objectives (if we have peace we must also have prosperity, otherwise peace is not desirable) or because of other objectives that may arise other than the maximization of social welfare that several policies are pursued simultaneously. Using the notation above, suppose that there are several policies that are used to achieve A_1, and let $P_{A_1} = \{c_1(A_1), c_2(A_1), ..., c_J(A_1)\}$ denote this set where there is some ordering to the cost of each policy. If our effort at understanding the determinants of each policy allows us to determine factors that can reduce or mitigate the cost by some given percentage, then again to have the greatest social benefit we should start with understanding the determinants of the most costly policy to achieve this objective, A_1.

How does this relate to the study of conflict? Well suppose that a country wants to establish trade with another and it can do so by investing resources into diplomatic efforts or into military ones. More specifically, it can send ships to blockade the harbors of the country at some cost or spend some other amount in diplomacy or sending some costly signal to try to persuade the country to engage in trade. If pursuing the signaling or diplomatic option is more costly then the blockade, then using events data would provide a greater benefit then only MIDS data since it captures the more costly event. In other words, we cannot ignore that a militarized dispute can have a much lower cost than alternative international interactions between states and that focusing on factors that reduce the probability of these disputes occurring does not in itself meet the criteria of maximizing social welfare or some other criteria such as minimizing the cost to taxpayers. In fact, diplomacy is costly. The US Department of State's budget for FY 2010 was $16.4 billion much of which is earmarked for "strengthening capacity to pursue diplomatic solutions to national security issues." If we take into consideration all the expenditures on behalf of other government agencies aimed at addressing international "problems" we can see that other events besides war require an enormous expenditure of a nation's resources. For example, in the year 2000 President Bush raised tariffs on imported steel between 8 and 30 percent. Studies indicated that the failure of the President to find an

alternative resolution to this dispute reduced national income between 0.5 to 1.4 billion dollars a year. Policymakers are clearly aware of the possibility of substituting diplomacy for war as can be seen by President Obama's remarks in March of 2009 where he states " ….my budget includes indispensable investments in our State Department and foreign assistance programs. These investments relieve the burden on our troops. They contribute directly to security. They make the American people safer. And they save us an enormous amount of money in the long run. "

Another reason for using events data is that in the quantitative study of peace and conflict, annual observations of the conflicts among nations are mainly used. For example, when China conducted a series of missile tests, threatening Taiwan in 1995 and 1996, the Taiwanese government responded by staging the biggest display of its military might since the end of the World War II. As a result of this event, scholars in peace and conflict studies quantitatively marked this case as a MID between China and Taiwan in both 1995 and 1996. This indicator was generally considered by many to represent the relationship between China and Taiwan in those two years, although other peaceful events, including cooperation cases, occurred between these two countries during the same period and eventually offset the tension. This example shows how international interactions among countries might be misconstrued due to a total reliance on MIDs data and its coding and collection limitations.

Given the limited understanding of using MIDs data in explaining complicated international interactions among countries, bringing realism into quantitative peace and conflict studies has become the goal of data-collecting. Hence, the events data movement represents the marriage of quantitative and qualitative approaches in peace and conflict studies. Prior to the widespread use of computers, events data were coded by hand, creating many different individual variables for data sets. For example, Rummel's *The Dimensions of Nations* (1972) was the first systematic collection of national idiosyncrasies and international events. Other such projects began to emerge, including WEIS (McClelland 1978), COPDAB (Azar 1982), Behavioral Correlates of War (BCOW; Leng and Singer 1988), and the Global Event-Data System (GEDS; Davies and McDaniel 1994).

During the 1990s, when computing technology was widely adopted, an automated events data approach supported by computer software became feasible. This development ended the previous hand-coding efforts, which were replaced by projects in which computer programs read reports, collect information, and generate quantitative data from all qualitative events reported in newspapers. As a result, automated events collections started to appear in data sets, especially the KEDS (Gerner et al. 1994), Protocol for the Assessment of Nonviolent Direct Action (PANDA; Bond et al. 1997), Integrated Data for Events Analysis (IDEA; Bond et al.

2003; King and Lowe 2003), and the Virtual Research Associates (VRA; Bond, Bond, and Oh 2002; King and Lowe 2003).

Although these data sets might use different approaches to extract events from different sources and time series, the ontology remains similar across these collections; events codes and categories were extended from McClelland's (1978) WEIS foundations, enabling computer programs to map scales in different data sets. In addition, scales to weigh event types across these computerized events data systems were also integrated using Goldstein's conflict-cooperation scores based on the WEIS ontology (Goldstein 1992). Although, Goldstein's improved scale system was initially proposed to take account of the time series factor in quantitative international relations, its better conceptualization and greater correspondence to other main event scales, such as WEIS and COPDAB, provided concrete infrastructure for researchers to combine most event category typologies with the latter IDEA project (see King and Lowe 2003). As a result, not only can most events data sets be converted for comparison and analysis, but also the time series factor can be measured in quantitative peace and conflict studies.

For example, Table 1 shows further details of the Goldstein score in the IDEA ontology and how events data can be measured and analyzed. In this table, each event has its own IDEA code and Goldstein score so events can be converted, coded, and

calculated. Conflict events receive negative Goldstein scores, whereas cooperative events have positive scores. Natural disasters and neutral, social, or private activities have zero scores. In addition, the Goldstein score system determines that the score for extreme conflict cases is -10, which is the minimum negative value. In this measurement, the more severe a conflict case is, the greater the absolute value of the negative value. The same holds for cases of cooperation which are scored as positive numbers with the maximum score being 8.3.

Given that each event corresponds to a Goldstein score, the total weighted events scores for a specific time span in dyadic countries' interactions can be computed. In other words, the Goldstein scale explains the depth of international interactions by considering cooperation-conflict event types across a spatial-temporal continuum, enabling events data to be measured and analyzed in a statistical model. Consequently, the limitation of the MIDs data set that reflects only peace or war with a binary value can be resolved in an events data set through considering more comprehensive events across different durations of time, thereby contributing to quantitative research on interstate peace and conflict studies.

III. Research Design

The thesis of this paper is that an events data set documenting day-to-day event information among countries provides different empirical results than the MIDs

data. Because the MIDs data can be easily accessed through the EUGene (Expected Utility Generation and Data Management Program; Bennett and Stam 2000) software,[2] it will not be illustrated in detail. However, selecting and computing the events data are the major challenges to be addressed further.

i) Selecting the Events Data Set

As mentioned, the event category typologies have been integrated into the IDEA project that makes most events data sets compatible. Therefore, only accessibility and timeliness of the data source are of concern to this research. We believe that the 10 Million International Dyadic Events data set established by King and Lowe (2003) resolves these two problems. Since 2006, data from King and Lowe's 10 Million International Dyadic Events have been deposited at the Gary King Dataverse,[3] making the data set available for research. King and Lowe's data set is collected by the VRA Reader, which "is a software tool that processes data either directly from the Reuters Business Briefing (RBB) newswire, or from a precompiled database of RBB news stories" (King and Lowe 2003, 619).

These computer-driven formulas analyze the first sentence—the lead—of each RBB news report and then summarize it as a database record with columns for a

[2] See the EUGene program at http://www.eugenesoftware.org/.

[3] See Gary King and Will Lowe, 2003, "10 Million International Dyadic Events," http://hdl.handle.net/1902.1/FYXLAWZRIA

source country and a target country, as well as an IDEA code for the type of event that occurs between the two actors. King and Lowe's data set includes data from 1990 to 2004, with approximately 10 million individual events coded into an ontology of 157 types of actions. Another advantage of King and Lowe's data set is that the Goldstein scale system has been adapted for the VRA Reader, greatly facilitating this research's measurement. Benefiting from King and Lowe's accomplishment of making their data set easily accessible and current, this research will use the 10 Million International Dyadic Events data set for our analysis.

ii) Measuring the Event Degree

To assess the importance of interstate events between countries, it is necessary to posit a criteria by which one can calculate scales for different types of events. Since King and Lowe's data set provides this foundation by offering the Goldstein score for each type of event, the next step is to accumulate the weighted sum of all dyadic events among involved countries by year. Because scores of cooperative and conflictual events have different signs (positive or negative), it is possible to measure the direction and degree of two countries' relationship from year-to-year. For example, if the accumulated weighted sum is a positive value of +500, it can be concluded that the dyad has a net cooperation relationship in terms of 500 degrees for that year. The same holds for a negative value, which would identify a net conflict relationship

between the dyad. In other words, to indicate a net cooperation relationship, the total accumulated Goldstein score for cooperation events must dominate the total accumulated score for conflict events.

iii) Empirical Model and Comparison of the Events Data and the MIDs Data

To compare the results from the events data and the MIDs data, it is necessary to build and explore the differences between three models having different dependent variables drawn from the events and MIDs data sets but having the same independent variables. The following analytical model is suggested for measuring international interactions:

$$\text{International interactions} = f(\text{control variables}) \quad (1)$$

For comparative purposes, we use two different data sets to measure the dependent variable of international interactions in the three different models. The data sets include the events data from Gary King's Dataverse and the MIDs data from the EUGene program. In the events data set, we calculate the total Goldstein score for each dyad by year from 1990-2001 to correspond with the MIDs data (Version 3.0), which presents data annually by dyad until 2001. The purpose of the MIDs data is to identify whether a dyad experienced a MID in a particular year. Because a MID is a case in which "the threat, display or use of military force short of war by one member state is explicitly directed towards the government, official representatives, official

forces, property, or territory of another state" (Jones, Bremer, and Singer 1996, 168), the hostility level varies across MID cases. Accordingly, five different levels of hostility, from *1* implying no militarized action to *5* indicating war, are used as MID scale codes in this data set. In this study, we calculate the number of annual MIDs between dyads for all MID (scale codes 2-5) and again for only those MIDs that required use of force (scale codes 4-5). As a result, we collect and explore three different dependent variables in this study:

$$\text{Events score} = f(\text{control variables}) \tag{2}$$

$$\text{All MID occurrences} = f(\text{control variables}) \tag{3}$$

$$\text{High-level MID occurrences} = f(\text{control variables}) \tag{4}$$

In addition to the dyadic international interactions taken as dependent variables in the analytic models, we also explore common independent variables as control factors in the models. In previous research, the most common independent variables influencing peace-conflict outcomes include economic development (Gross Domestic Product, GDP), trade interdependence, capability ratio, major power dyads, joint democracy, contiguity, capitals' distance, and peace years.

The effect of economic development on interstate conflict is a reasonable control variable because an economically strong state generally feels satisfaction with its status quo, increasing the likelihood it will cooperate with other countries and

decreasing the likelihood it will initiate a dispute with other states. One index of economic development is the GDP of each country. These data are retrieved from the Penn World Tables[4] (Heston, Summers, and Aten 2011). Another economic index is trade interdependence. Like satisfaction with a countries' GDP performance, the volume of dyadic trade interdependence may also account for possible interstate disputes, as well as cooperation. Trade interdependence is calculated from each country's dyadic trade size divided by its own GDP, which was obtained from the COW project[5] (Barbieri, Keshk, and Pollins 2008).

In addition, the balance of power in a dyad might decrease the probability of a dispute to occur between involved states, suggesting a scenario in which conflict would not be likely to happen. For the factor of capability ratio, the most common measure of a country's capability is the Composite Index of National Capability (CINC) score, which is a series of annual values collected and measured by the COW project (Singer 1988). Capability encompasses a country's total population, urban population, iron and steel production, energy consumption, military personnel, and military expenditure. The capability ratio between dyads is the ratio of the smaller country's capability score to the larger country's score. Higher values on this index indicate more power parity. In addition, a control variable of major power dyads is

[4] See the Penn World Tables at http://pwt.econ.upenn.edu/.

[5] See the COW project at http://www.correlatesofwar.org/COW2%20Data/Trade/Trade.html.

also included because major powers are more likely to be engaged in severe disputes. In this study, we set a value of *1* for the variable of major power dyads to indicate at least one major power existing in a dyad; otherwise, the value is *0*. Seven countries are categorized as major powers by the COW project, including the United States, Russia, France, the United Kingdom, China, Germany, and Japan.

Variables measuring democratic peace have been tested by almost every peace-conflict paper; therefore, it is necessary to create a control variable of joint democracy to reconsider its effects in our models. The democracy data are available from the Polity IV project (Marshall 2010), in which the range of a state's democratic value is from *0* to *+10*. Both source and target countries' democratic scores are multiplied for values of joint democracy. As a result, the range of new final scores for joint democracy is 0 to 100.

Two important factors regarding geography that can influence interstate conflict are geographic contiguity and capitals' distance. When countries are contiguous or near to each other, not only are they more likely to conduct military operations against each other, but it is also easier to develop cooperative tasks with each other. Therefore, the effects of geography must be considered in any conflict model. We measure contiguity with a binary code, in which a value of *1* means two countries share a land border or are separated by water by less than 150 miles; we

give a value of *0* to dyads not meeting these criteria. In addition, we calculated the capitals' distance by the natural logarithm of the geographic distance between dyadic countries' capitals. We generate both variables using the EUGene program.

The last independent variable investigated in this study is peace years. Because a state recently experiencing a MID might have a higher tendency to revert to conflict than other similar states with peaceful recent pasts, occurrences of MIDs should be considered. Beck, Katz, and Tucker (1998) call this *serial correlation* or *duration dependence*. To capture the effect of time, we calculated the duration of peace years in each dyad while also calculating a squared peace year and a cubed peace year. These control variables of peace years were considered only in models with binary dependent variables; therefore, only the MIDs data models measured the peace years (Beck, Katz, and Tucker 1998).

IV. Empirical Results

Since the main purpose of this paper is to compare the results from using events and MIDs data in peace-conflict econometric models, we conduct three steps of statistical analyses. In the first step, we explore the relationship between the events data and the MIDs data via chi-square tests. In the second, we identify the differences in the results of using events data and MIDs data via three regression models. In the

final step, two more regression models from the events data are added to further explore the differences between events and MIDs data.

Results of the Chi-Square Tests

Tables 2 and 3 provide a cross-tabulation showing the relationship between events data and MIDs data. As illustrated in Table 2, most MIDs occurring from 1990 to 2001 have negative event scores between these dyads. Table 3 also shows the same trend in which high level MIDs tend to occur when dyads experience negative valued events. In fact, a Chi-square test with 2 degrees of freedom for the corresponding contingency tables rejects the null hypothesis that the two types of variables are independent at a one-percent level of significance. The results from these two tables support the following arguments. First, there is a statistically significant relationship between events and MIDs data. Second, any international interaction event, either negative or positive, increases the likelihood of conflicts between countries, even though negative event results generally indicate the most conflict occurrence. These findings also suggest that a dyad with a positive event score in a given year might also experience a MID because the events data contain richer and different information. To explore this further, it is necessary to use regression models with a number of other control variables that might clarify the difference between these two data sets.

Results of the Regression Models

For the multivariate analysis, we estimate three multiple regression models where the statistical results are shown in Table 4. These results lead to a number of findings. In Model A, results for the events data have a statistically significant relationship with all the control variables. Furthermore, over the period from 1990-2001, the results from Model A show a positive relationship between net cooperation and economic factors, such as the source and target countries' GDP performance and their trade interdependence. This finding suggests that countries with better GDP performance or deeper trade interdependence tend to have a more amiable relationship, at least as measured by events data. For variables of power, higher degrees of power parity contribute to more cooperative events while dyads with at least one large power also maintain a better dyadic relationship. As for democracy, dyads having a higher joint democracy measure enjoy a more cooperative relationship. The geographic factors also show results consistent with prior research. On the one hand, countries sharing the same border have more cooperative events results; on the other hand, the effect of capitals' distance on the dyadic relationships is negative; that is, a greater distance between the capitals of two countries actually reduces cooperative event results. In other words, proximity increases cooperation.

Model B presents a different story about the effects of control variables on the peace-conflict models. For the economic factors, only the source countries' GDP and

their trade interdependence with target countries show statistically significantly positive effects on the occurrence of a MID. This result suggests that source countries' better GDP performance triggers more MIDs, and their deeper trade interdependence with the target countries actually leads to *more* disputes. The factors of power also have significant effects on MID occurrence: With more power parity, more MIDs occur; with a major power involved, more MIDs also occur. However, a higher degree of joint democracy in a dyad significantly discourages MID occurrence. Geography also predicts MID occurrence in that, when countries are contiguous or close to each other, more MIDs are likely to occur. Time issues also are significant in the analysis because dyadic countries with a longer stretch of peaceful years appear to have fewer disputes.

Effects of the same independent variables on the occurrence of high level MIDs are similar to the ones on the occurrence of all level MIDs presented in Model B, except the economic factors. In Model C, all economic variables have insignificant effects on high level MID occurrence. In other words, the occurrence of use of force MIDs is not related to any economic concerns but to the other factors of dyadic power, democracy, geography, and time trends.

Next, we compare the results from the events data (Model A) with those from the MIDs data (Model B & Model C). Table 5 shows both the similarity and

differences in the results. As depicted in the table, only one variable, joint democracy, has the same directional effect in all three models (Model A=B=C), whereas other variables, such as source country GDP (A<> B), trade interdependence (A<> B), capability ratio (A<> B&C), major power dyad (A<> B&C), contiguity (A<> B&C), and capitals' distance (A<> B&C), show extreme opposite directions of results for the events data model (Model A) and the MIDs data models (Model B & Model C). Furthermore, when comparing only Model C with Model B, economic issues appear to affect interstate disputes but they rarely escalate into large conflicts in which military force is used. Therefore, the empirical results indicate that three different models designed to use three dependent variables show different outcomes. The choice of which data set to use for the dependent variable in peace-conflict models does appear to influence the results of the analysis.

Factors Causing Differences between the Events Model and the MIDs Models

Finally, we analyze the differences between the results of the events data model (Model A) and those of the MIDs data models (Model B and Model C) by introducing two more models from the events data set. Table 6 shows both Model A-1 and Model A-2 along with the three original models to further consider the events information. In Model A-1, only cooperative events are taken into account so that the annual accumulated score of all of the dyad's cooperative events becomes the

dependent variable with the same independent variables as Models A, B, and C. Similarly, Model A-2 uses all of the dyad's conflict events as a dependent variable. Results of the two extra models suggest three findings. First, all control factors, except dyadic capitals' distance, have significant effects on the causes of dyadic cooperation and conflict interactions. Second, however, the effects of those factors on the interactions have two different outcomes. On the one hand, Model A-1 indicates that the factors of GDP performance, trade interdependence, capability ratio, major power dyad, and contiguity significantly increase more dyadic cooperative interactions. On the other hand, the same factors also significantly cause more dyadic conflict interactions in Model A-2. Third, only the variable of joint democracy has a consistent result of increasing cooperation and decreasing conflict interactions.

These three findings from the two extra models can be used to explain the reasons that the same factors have different results in the events data model and the MIDs data model. Model A-2 using all dyadic conflict scores is similar to the results in the MIDs data models that records only militarized interstate conflicts. While comparing Model A-2 with the MIDs data models in Model B and Model C, the results indicate the same outcome in that variables of trade interdependence (insignificant in the presence of high-level MIDs), capability ratio, major power dyad, and contiguity significantly cause more conflicts, whereas joint democracy

significantly decreases conflicts. At this stage, the analytic results seem to suggest a vague solution, in which the international community should build peace (decrease interstate conflicts) by encouraging democratic systems, as well as by discouraging international trade, depreciating power-balance structures, and being cautious of relationships with great powers and neighboring countries. However, this conclusion based on the MIDs data is premature because the MIDs models focus only on the dimension of interstate conflicts and do not consider all international interactions.

In fact, the reality is that international interactions consist of both cooperation and conflict events. For example, international trade might cause international disputes but would also create a number of cooperative opportunities. If the dyadic cooperative opportunities are also taken into consideration, a different conclusion would be reached. Thus, while Model A-1, using all dyadic cooperative interactions, indicates economic activities, power relations, democratic politics, and border contiguity significantly increase cooperative interactions, Model A shows the same direction after considering offsetting effects from both cooperative and conflictual interactions. In other words, although the same control factors might cause more interstate conflicts according to Models A-2, B, and C, Model A indicates that overall effects from those variables will eventually result in more cooperative phenomena.

As a result, a more vivid picture of international interactions is presented by the results of Model A. A better conclusion can therefore be drawn to explain today's international interactions, according to Model A and its events data set, in which improving countries' GDP performance, encouraging international trade, pursuing power-balance structures, appreciating relationships with great powers and neighboring countries, and implementing democracy will significantly increase more cooperative relationships and phenomena in real international interactions. In a word, while the MIDs data set provides a single dimension to analyze why conflicts occur, the events data set offers a broader perspective by including real-world factors to learn how to avoid conflicts and create a more cooperative atmosphere for more peaceful international interactions.

V. Conclusions

Previous studies focused on independent variables to understand the factors' effects on the causes of interstate conflicts. These analytic processes, however, took the dependent variables for granted by using either MIDs data or events data without gauging their effects on the analyses. As a result, even though the models and arguments found robust support for their explanations, the influence of the dependent variables on the results was underestimated. Further, and more importantly, the definition of *peace* and *conflict* is a key point, which is related to the designation of

which data set is appropriate as the research model's dependent variable. The process of determining dependent variables affects the reliability and accuracy of the analysis but has seldom been addressed.

The initial purpose of this study was to identify the problems caused by the choice of different data sets in the peace-conflict model. As a result, this study explored the differences between measuring interstate conflict with events data and MIDs data. Our findings suggest a significant relationship between the events data and the MIDs data; therefore, researchers could use either of the data sets to measure interstate peace and conflict. However, further empirical analysis in this study showed that similar variables found to influence interstate conflict affected the models' results differently, depending on which data set was used for measuring the dependent variable. Therefore, the results of this study suggest that the choice of the dependent variable computed from different data sets does matter in the results of the peace-conflict models. A deeper comparison between the results of the MIDs data and those of the events data further reveals that the former presents only a static measure of the causes of interstate conflict, whereas the latter introduce more dimensions by including real-world circumstance to analyze the international interactions in which cooperative interactions could offset perceptions of conflict.

The present study provides a number of avenues for future research. For example, while the results of this research suggests the choice of the dependent variable in peace-conflict modeling does matter, any conclusion and finding from this paper should be treated as only preliminary. The temporal domain of the empirical comparison in this paper is limited to only twelve years of data, between 1990 and 2001. As a result, further data collection and tests should be continued and encouraged to improve the generalizability of these findings. In addition, it is possible that data collected after 2001—often referred to as the Post 9/11 period, when big powers exhibited greater use of force in conflicts—may present different findings. Thus, any future research projects comparing these two data sets in terms of peace-conflict modeling that collects more recent data would be beneficial.

References

Anderson, Sally, and Mark Souva. 2010. "The Accountability Effects of Political Institutions and Capitalism on Interstate Conflict." *Journal of Conflict Resolution* 54: 543-565.

Azar, Edward E. 1982. *Codebook of the Conflict and Peace Databank.* College Park: Center for International Development, University of Maryland.

Azar, Edward. 1980, The conflict and peace data bank (COPDAB) project, Journal of Conflict Resolution 24:143-152.

Azar, Edward and J. D. Ben-Dak. 1975, Theory and Practice of Events Research: Studies in Inter-nation Actions and Interactions, (Gordon and Breach Science Publishers, New York).

Barbieri, Katherine. 2002. *The Liberal Illusion: Does Trade Promote Peace?* Ann Arbor: The University of Michigan Press.

Barbieri, Katherine. 1996. "Economic Interdependence: A Path to Peace or a Source of Interstate Conflict?" *Journal of Peace Research* 33: 29-49.

Barbieri, Katherine, Omar Keshk, and Brian Pollins. 2008. "Correlates of War Project Trade Data Set Codebook, Version 2.0." Accessed August 18, 2011. http://www.correlatesofwar.org/COW2%20Data/Trade/Trade.html.

Beck, Nathaniel, Jonathan Katz, and Richard Tucker. 1998. "Taking Time Seriously:

Time-Series-Cross-Section Analysis with a Binary Dependent Variable." *American Journal of Political Science* 42: 1260-1288.

Bennett, D. Scott. 2006. "Toward a Continuous Specification of the Democracy-Autocracy Connection." *International Studies Quarterly* 50: 313-338.

Bennett, D. Scott, and Allan Stam. 2000. "EUGene: A Conceptual Manual." *International Interactions* 26: 179-204.

Boehmer, Charles R., and David Sobek. 2005 "Violent Adolescence: State Development and the Propensity for Militarized Interstate." *Journal of Peace Research* 42: 5-26.

Bond, Doug, Joe Bond, and Churl Oh. 2002. "Operationalizing and Assessing TRACE: Tool for the Rapid Assessment of Complex Emergencies." Weston, MA: Virtual Research Associates. Accessed August 8, 2011. http://vranet.com/papers/FinalTRACEReport2002.pdf.

Bond, Doug, Joe Bond, Churl Oh, J. Craig Jenkins, and Charles Lewis Taylor. 2003. "Integrated Data for Events Analysis (IDEA): An Event Typology for Automated Events Data Development." *Journal of Peace Research* 40: 733-745.

Bond, Doug, J. Craig Jenkins, Charles L. Taylor, and Kurt Schock. 1997. "Mapping

Mass Political Conflict and Civil Society: Issues and Prospects for the Automated Development of Event Data." *Journal of Conflict Resolution* 41: 553-579.

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

Bueno de Mesquita, Bruce, James D. Morrow, Randolph M. Siverson, and Alastair Smith. 1999. "An Institutional Explanation of the Democratic Peace." *American Political Science Review* 93: 791-807.

Bueno de Mesquita, Bruce, Alastair Smith, Randolph M. Siverson, and James D. Morrow. 2003. *The Logic of Political Survival.* Cambridge, MA: MIT Press.

Chang, Yuan-Ching. 2005. "Economic Interdependence and International Interactions: Impact of Third-Party Trade on Political Cooperation and Conflict." *Cooperation and Conflict* 40: 207-232.

Chang, Yuan-Ching, Solomon W. Polachek, and John Robst. 2004. "Conflict and Trade: The Relationship between Geographic Distance and International Interactions." *Journal of Socio-Economics* 33: 491-509.

Charron, Nicholas. 2010. "Déjà Vu All Over Again: A Post-Cold War Empirical Analysis of Samuel Huntington's 'Clash of Civilizations' Theory." *Cooperation and Conflict* 45: 107-127.

Davies, John L., and Chad K. McDaniel. 1994. "A New Generation of International Event-Data." *International Interactions* 20: 55-78.

Dixon, William J. 1993. "Democracy and the Management of International Conflict." *Journal of Conflict Resolution* 37: 42-68.

———. 1994. "Democracy and the Peaceful Settlement of International Conflict." *American Political Science Review* 88: 14-32.

Ellis, Glynn, Sara McLaughlin Mitchell, and Brandon C. Prins. 2010. "How Democracies Keep the Peace: Contextual Factors that Influence Conflict Management Strategies." *Foreign Policy Analysis* 6: 373-398.

Frazier, Derrick V. 2006. "Third Party Characteristics, Territory and the Mediation of Militarized Interstate Disputes." *Conflict Management and Peace Science* 23: 267-284.

Gartzke, Erik. 1998. "Kant We All Just get Along? Opportunity, Willingness, and the Origins of the Democratic Peace." *American Journal of Political Science* 42: 1-27.

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

Gasiorowski, Mark, and Solomon W. Polachek. 1982. Conflict and Interdependence:

East-West Trade and Linkages in the Era of Detente. *Journal of Conflict Resolution* 26 (4):709-29.

Gelpi, Christopher F., and Joseph M. Grieco. 2008. "Democracy, Interdependence, and the Sources of the Liberal Peace." *Journal of Peace Research* 45: 17-36.

Gerner, Deborah J., Philip A. Schrodt, Ronald A. Francisco, and Judith L. Weddle. 1994. "Machine Coding of Event Data Using Regional and International Sources." *International Studies Quarterly* 38: 91-119.

Gochman, Charles S., and Zeev Maoz. 1984. "Militarized Interstate Disputes, 1816-1976: Procedures, Patterns, and Insights." *Journal of Conflict Resolution* 28: 585-616.

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

Hegre, Havard. 2000. "Development and the Liberal Peace: What Does It Take to Be a Trading State?" *Journal of Peace Research* 37: 5-30.

———. 2008. "Gravitating toward War: Preponderance May Pacify, but Power Kills." *Journal of Conflict Resolution* 52: 566-589.

Heston, Alan, Robert Summers, and Bettina Aten. 2011. "Penn World Table Version 7.0, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania." Accessed August 18, 2011.

http://pwt.econ.upenn.edu/php_site/pwt_index.php.

Huth, Paul K., and Todd L. Allee. 2003. *The Democratic Peace and Territorial Conflict in the Twentieth Century.* New York: Cambridge University Press.

Jones, Daniel M., Stuart A. Bremer, and J. David Singer. 1996. "Militarized Interstate Disputes, 1816-1992: Rationale, Coding Rules, and Empirical Patterns." *Conflict Management and Peace Science* 15: 163-213.

Kegley. Charles. 1975. "Introduction: The Generation and Use of Events Data," in Charles Kegley, ed. *International Events and the Comparative Analysis of Foreign Polity*. Columbia: Univ. of South Carolina Press.

King, Gary, and Will Lowe. 2003. "An Automated Information Extraction Tool For International Conflict Data with Performance as Good as Human Coders: A Rare Events Evaluation Design." *International Organization* 27: 617-642.

Lektzian, David, Brandon C. Prins, and Mark Souva. 2010. "Territory, River, and Maritime Claims in the Western Hemisphere: Regime Type, Rivalry, and MIDs from 1901 to 2000." *International Studies Quarterly* 54: 1073-1098.

Lektzian, David, and Mark Souva. 2009. "A Comparative Theory Test of Democratic Peace Arguments, 1946-2000." *Journal of Peace Research* 46: 17-37.

Lemke, Douglas, and William Reed. 1996. "Regime Types and Status Quo Evaluations: Power Transition Theory and the Democratic Peace."

International Interactions 22: 143-164.

Leng, Russell J., and J. David Singer. 1988. "Militarized Interstate Crises: The BCOW Typology and Its Applications." *International Studies Quarterly* 32: 155-173.

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

Marshall, Monty G. 2010. "Polity IV Project: Political Regime Characteristics and Transitions, 1800-2009." Accessed August 18, 2011. http://www.systemicpeace.org/polity/polity4.htm.

McClelland, Charles A. 1978. *World Event/Interaction Survey (WEIS) Project, 1966-1978.* Ann Arbor, MI: Inter-University Consortium for Political and Social Research.

Mitchell, Sara McLaughlin. 2002. "A Kantian System? Democracy andThird-Party Conflict Resolution." *American Journal of Political Science* 46: 749-759.

Morgan, T. Clifton, and Valerie L. Schwebach. 1992. "Take Two Democracies and Call Me in the Morning: A Prescription for Peace?" *International Interactions* 17: 305-320.

Mousseau, Michael. 2000. "Market Prosperity, Democratic Consolidation, and

Democratic Peace." *Journal of Conflict Resolution* 44: 472-507.

———. 2005. "Comparing New Theory with Prior Beliefs: Market Civilization and the Democratic Peace." *Conflict Management and Peace Science* 22: 63-77.

Mousseau, Michael, Havard Hegre, and John R. Oneal. 2003. "How the Wealth of Nations Conditions the Liberal Peace." *European Journal of International Relations* 9: 277-314.

OECD (Organisation for Economic Co-operation and Development). 2009. *Preventing Violence, War and State Collapse: The Future of Conflict Early Warning and Response.* Paris: OECD.

Oneal, John R., and Bruce Russett. 1997. "The Classical Liberals Were Right: Democracy, Interdependence, and Conflict, 1950-1985." *International Studies Quarterly* 41: 267-294.

———. 1999. "Assessing the Liberal Peace with Alternative Specifications: Trade Still Reduces Conflict." *International Studies Quarterly* 43: 423-442.

Peceny, Mark, Caroline C. Beer, and Shannon Sanchez-Terry. 2002. "Dictatorial Peace?" *American Political Science Review* 37: 15-26.

Pevehouse, Jon C. 2003. "Trade and Conflict: Does Measurement Make a Difference?" in E. Mansfield and B. Pollins, *New Perspectives on Economic Exchange and Armed Conflict,* Ann Arbor: University of Michigan Press.

Pevehouse, Jon C. 2004. “Interdependence Theory and the Measurement of International Conflict.” *Journal of Politics* 66: 247-266.

Polachek, Solomon. 1980. “Conflict and Trade,” *Journal of Conflict Resolution*: 55-78.

Polachek, Solomon, Carlos Seiglie, and Jun Xiang. 2007. “The Impact of Foreign Direct Investment on International Conflict.” *Defence and Peace Economics* 18: 415-429.

Polachek, Solomon and Carlos Seiglie. 2007. “Trade, Peace and Democracy: An Analysis of Dyadic Disputes” in *Handbook of Defense Economics*, Volume 2, edited by K. Hartley and T. Sandler, Elsevier: pp.1017-1073.

Solomon Polachek, Carlos Seiglie and J. Xiang. 2011. “Globalization and International Conflict: Can FDI Increase Cooperation Among Nations?” in the *Handbook of the Economics of Peace and Conflict*, edited by M. Garfinkel and S. Skaperdas, Oxford University Press.

Polachek, Solomon W., John Robst, and Yuan-Ching Chang. 1999. “Liberalism and Interdependence: Extending the Trade-Conflict Model.” *Journal of Peace Research* 36: 405-422.

Reuveny, Rafael. 2003. “Measuring Conflict and Cooperation: An Assessment,” in Economic Interdependence and International Conflict: New Perspectives

on an Enduring Debate, edited by E. Mansfield and B. Pollins, Ann Arbor: University of Michigan Press, 254-269.

Robst, John, Solomon Polachek, and Yuan-Ching Chang. 2007. "Geographic Proximity, Trade, and International Conflict/Cooperation." *Conflict Management and Peace Science* 24: 1-24.

Rummel, Rudolph J. 1972. *The Dimensions of Nations.* Beverly Hills, CA: Sage.

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

Singer, J. David. 1988. "Reconstructing the Correlates of War Dataset on Material Capabilities of States, 1816-1985." *International Interactions* 14: 115-132.

Singer, J. David and Melvin Small. 1972. *The Wages of War 1816-1965: A Statistical Handbook. John Wiley & Sons.*

Souva, Mark. 2004. "Institutional Similarity and Interstate Conflict." *International Interactions* 30: 263-280.

Werner, Suzanne. 2000. "The Effects of Political Similarity on the Onset of Militarized Disputes, 1816-1985." *Political Research Quarterly* 53: 343-374.

Xiang, Jun, Xiaohong Xu, and George Keteku. 2007. "Power: The Missing Link in the Trade Conflict Relationship." *Journal of Conflict Resolution* 51: 646-663.

Table 1

The Goldstein Score and IDEA Code in Event Types

Goldstein score	*IDEA code*	*Definition*	*Goldstein score*	*IDEA code*	*Definition*
8.3	072	extend military aid	-2.8	12	accuse
7.6	074	rally support	-3	161	warn
7.6	073	extend humanitarian aid	-3	16	warn
7.4	071	extend economic aid	-3.4	122	denounce or denigrate
6.5	081	make substantial agreement	-3.8	194	halt negotiations
5.4	064	improve relations	-4	1134	break law
5.2	0523	promise humanitarian support	-4	1132	disclose information
5.2	0522	promise military support	-4	1131	political flight
5.2	0521	promise economic support	-4	113	defy norms
5.2	052	promise material support	-4	1123	veto
4.8	083	collaborate	-4	1122	censor media
4.8	08	agree	-4	1121	impose curfew
4.7	05	promise	-4	112	refuse to allow
4.5	051	promise policy or nonmaterial support	-4	111	reject proposal
3.5	0432	forgive	-4	11	reject
3.5	04	endorse or approve	-4.4	2122	political arrest and detention
3.4	093	ask for material aid	-4.4	2121	criminal arrest and detention
3.4	092	solicit support	-4.4	212	arrest and detention
3.4	043	empathize	-4.4	171	nonspecific threats
3.4	041	praise	-4.5	1963	administrative sanctions
3	082	agree or accept	-4.5	1961	strike
2.9	065	ease sanctions	-4.5	196	strikes and boycotts
2.8	054	assure	-4.5	19	sanction
2.8	033	host meeting	-4.9	151	demand
2.5	062	extend invitation	-4.9	15	demand
2.2	0655	relax curfew	-5	201	expel
2.2	0654	demobilize armed forces	-5	20	expel
2.2	0653	relax administrative sanction	-5.2	1813	protest defacement and art
2.2	0652	relax censorship	-5.2	1812	protest procession
2.2	0651	observe truce	-5.2	1811	protest obstruction
2.2	0632	evacuate victims	-5.2	181	protest demonstrations
2.2	063	provide shelter	-5.6	193	reduce or stop aid
2.2	06	grant	-5.8	172	sanctions threat
2.2	0431	apologize	-6.4	175	nonmilitary force threats
2	013	acknowledge responsibility	-6.4	17	threaten
1.9	066	release or return	-6.8	2112	guerrilla seizure
1.9	032	travel to meet	-6.8	2111	police seizure
1.6	0933	ask for humanitarian aid	-6.8	21	seize
1.6	0932	ask for military aid	-6.9	183	control crowds
1.6	0931	ask for economic aid	-6.9	1814	protest altruism
1.6	09	request	-6.9	18	protest
1.5	1011	offer peace proposal	-6.9	174	give ultimatum
1.5	101	peace proposal	-7	2231	military clash
1.5	03	consult	-7	195	break relations
1.2	102	call for action	-7	1734	threaten military war
1.1	01	yield	-7	1733	threaten military occupation
1	031	discussions	-7	1732	threaten military blockade
0.8	10	propose	-7	1731	threaten military attack
0.6	012	yield position	-7	173	military force threat
0.6	011	yield to order	-7.6	1827	military border violation
0.1	091	ask for information	-7.6	1826	military border fortification
0.1	024	optimistic comment	-7.6	1825	military mobilization
0	99	sports contest	-7.6	1824	military troops display
0	98	A and E performance	-7.6	1823	military naval display
0	97	accident	-7.6	1821	military alert
0	96	natural disaster	-7.6	182	military demonstration
0	95	human death	-8.3	224	riot or political turmoil
0	94	human illness	-8.7	221	bombings
0	72	animal death	-9.2	2236	military seizure
0	27	economic status	-9.2	2123	abduction
0	26	adjust	-9.2	211	seize possession
0	25	vote	-9.6	2228	assassination

(continued)

Goldstein score	*IDEA code*	*Definition*	*Goldstein score*	*IDEA code*	*Definition*
0	24	adjudicate	-9.6	2227	guerrilla assault
0	2321	government default on payments	-9.6	2226	paramilitary assault
0	2312	private transactions	-9.6	2225	torture
0	2311	government transactions	-9.6	2224	sexual assault
0	231	transactions	-9.6	2223	bodily punishment
0	23	economic activity	-9.6	2222	shooting
-0.1	094	ask for protection	-9.6	2221	beatings
-0.1	022	pessimistic comment	-9.6	222	physical assault
-0.1	021	decline comment	-9.6	22	force
-0.1	02	comment	-10	2237	biological weapons use
-0.9	141	deny responsibility	-10	2235	assault
-1	14	deny	-10	2234	military occupation
-1.1	0631	grant asylum	-10	2233	coups and mutinies
-2.2	192	reduce routine activity	-10	2232	military raid
-2.2	121	criticize or blame	-10	223	military engagements
-2.4	132	formally complain			
-2.4	131	informally complain			
-2.4	13	complain			

Note: IDEA codes and event definitions ordered by level of cooperation-conflict on the Goldstein scores. Source: Adapted from King and Lowe (2003, 622-23).

Table 2

Event Scores and All Militarized Disputes (All MIDs), 1990-2001

Dyad Type	No MIDs	All Levels MIDs (Levels 1 - 5)
No Event	320,768	329
Positive Event Results	31,026	621
Negative Event Results	5,914	634

Note. Pearson Chi-Square (2) = 15,000, *p* value < 0.01

Table 3

Event Scores and Use of Force Militarized Disputes (High Level MIDs), 1990-2001

Dyad Type	No MIDs	High Levels MIDs (Levels 4 & 5)
No Event	320,915	182
Positive Event Results	31,263	384
Negative Event Results	6,071	477

Note. Pearson Chi-Square (2) = 13,000, *p* value < 0.01

Table 4

Differences between Dyadic Event Scores, All MIDs Occurrence, and High Levels MIDs Occurrence, 1990-2001

Variables	**Model A** **DV: Event Scores** [#1] *coefficient* *s.e.*	**Model B** **DV: MIDs Occurrence**[#2] *coefficient* *s.e.*	**Model C** **DV: High MIDs Occurrence**[#3] *coefficient* *s.e*
Source Country GDP	.000094 ** 3.13e-06	.0000116 * 5.07e-06	6.06e-06 6.47e-06
Target Country GDP	.0000228 ** 3.15e-06	7.35e-06 5.26e-06	7.09e-06 6.61e-06
Trade Interdependence	8.868977 ** .0596783	.0738349 ** .0177715	-.0330981 . 0507223
Capability Ratio	.9356168 ** .0892829	.7490484 ** .1336341	. 8144426 ** . 1577025
Major Power Dyad	4.777673 ** .0864133	1.781789 ** .0954176	1.628968 ** . 1203521
Joint Democracy	.0076082 ** .0007673	-.0158018 ** . 0013914	-.0136896 ** . 0016902
Contiguity	2.027929 ** .1349431	2.420556 ** . 0914837	2.691779 ** .1142665
Capitals Distance	-.000022 * 9.18e-06	-.0003359 ** . 0000249	-.0002917 ** . 0000302
Peace Years	N/A	-1.515796 ** . 0786211	-1.580256 ** .0970926
Peace Years 2	N/A	. 2430958 ** . 0218152	.247734 ** .0274285
Peace Years 3	N/A	-.0124278 ** . 0015206	-.0125298 ** .0019341
Constant	-1.069481 ** .065981	-3.367149 ** . 1172952	-3.847145 ** .1452683
	N 201450 Model chi2 4310.79 ** Adj R2 0.1461	N 213396 Model chi2 4544.83 ** Pseudo R2 0. 3698	N 213396 Model chi2 3216.44 ** Pseudo R2 0.3696

*** = $p < .01$; ** = $p < .05$; one-tail significance test, robust standard errors.

[#1] Event Scores = net cooperation (cooperative events scores – conflict events scores)

[#2] MIDs Occurrence = possibility of any levels MIDs occur (MID hostility levels 2-5)

[#3] High MIDs Occurrence = possibility of only high levels MIDs occur (MID hostility levels 4-5)

Table 5

Comparison of Variables Effects in Models A, B, and C

	Variables	**Similar Directional Effects**
Variables have similar directional effects on the peace-conflict models	Joint Democracy	Model A = B = C
	Capability Ratio	Model B = C
	Major Power Dyad	Model B = C
	Contiguity	Model B = C
	Capitals Distance	Model B = C
	Peace Years	Model B = C
	Variables	**Opposite Directional Effects**
Variables have opposite directional effects on the peace-conflict models	Source Country GDP	Model A<> B
	Trade Interdependence	Model A<> B
	Capability Ratio	Model A<> B & C
	Major Power Dyad	Model A<> B & C
	Contiguity	Model A<> B & C
	Capitals Distance	Model A<> B & C

Table 6

Differences between Dyadic Event Scores, Dyadic Cooperation Scores, Dyadic Conflict Scores, All MIDs Occurrence, and High Levels MIDs Occurrence, 1990-2001

Variables	**Model A** **DV: Event Scores**[#1] *coefficient* *s.e.*	**Model A-1** **DV: Pure Cooperation**[#1-1] *coefficient* *s.e.*	**Model A-2** **DV: Pure Conflict**[#1-2] *coefficient* *s.e.*	**Model B** **DV: MIDs Occurrence**[#2] *coefficient* *s.e.*	**Model C** **DV: High MIDs Occurrence**[#3] *coefficient* *s.e*
Source Country GDP	.000094 ** 3.13e-06	.0001395 ** 3.31e-06	.0000455 ** 2.59e-06	.0000116 * 5.07e-06	6.06e-06 6.47e-06
Target Country GDP	.0000228 ** 3.15e-06	.0000301 ** 3.33e-06	7.34e-06 ** 2.61e-06	7.35e-06 5.26e-06	7.09e-06 6.61e-06
Trade Interdependence	8.868977 ** .0596783	14.49416 ** .0630637	5.62518 ** .0494365	.0738349 ** .0177715	-.0330981 . 0507223
Capability Ratio	.9356168 ** .0892829	1.302986 ** .0943477	.3673688 ** .0739605	.7490484 ** .1336341	. 8144426 ** . 1577025
Major Power Dyad	4.777673 ** .0864133	7.419947 ** .0913153	2.642273 ** .0715833	1.781789 ** .0954176	1.628968 ** . 1203521
Joint Democracy	.0076082 ** .0007673	.0046976 ** .0008108	-.0029106 ** .0006356	-.0158018 ** . 0013914	-.0136896 ** . 0016902
Contiguity	2.027929 ** .1349431	6.684531 ** .1425981	4.656603 ** .1117846	2.420556 ** . 0914837	2.691779 ** .1142665
Capitals Distance	-.000022 * 9.18e-06	-9.23e-06 9.70e-06	.0000127 7.61e-06	-.0003359 ** . 0000249	-.0002917 ** . 0000302
Peace Years	N/A	N/A	N/A	-1.515796 ** . 0786211	-1.580256 ** .0970926
Peace Years 2	N/A	N/A	N/A	. 2430958 ** . 0218152	.247734 ** .0274285
Peace Years 3	N/A	N/A	N/A	-.0124278 ** . 0015206	-.0125298 ** .0019341
Constant	-1.069481 ** .065981	-1.513297 ** .0697239	-.4438162 ** .0546575	-3.367149 ** . 1172952	-3.847145 ** .1452683
	N 201450 Model chi2 4310.79 ** Adj R2 0.1461	N 201450 Model chi2 10294.93 ** Adj R2 0.2902	N 201450 Model chi2 2614.50 ** Adj R2 0.0940	N 213396 Model chi2 4544.83 ** Pseudo R2 0. 3698	N 213396 Model chi2 3216.44 ** Pseudo R2 0.3696

**= p<.01, * = p<.05, one-tail significance test, robust standard errors.

[#1] Event Scores = net cooperation (pure cooperative events scores – pure conflict events scores)

[#1-1] Pure Cooperation = accumulated amount of all cooperation scores

[#1-2] Pure Conflict = accumulated amount of all conflict scores

[#2] MIDs Occurrence = possibility of any levels MIDs occur (MID hostility levels two to five)

[#3] High MIDs Occurrence = possibility of only high levels MIDs occur (MID hostility levels four and five)