Chapter 3

INVESTIGATING THE COMMERCIAL PEACE

The theories presented in chapter 2 suggest a number of competing propositions about the trade-conflict relationship. Scholars have begun to apply social-scientific techniques to investigating the relative accuracy of these alternative portrayals of the trade-conflict relationship. However, the evidence produced from such efforts remains limited and mixed. This is, in part, a product of the differing approaches that scholars adopt to investigate the trade-conflict relationship. For example, scholars with alternative conceptions of trade and interdependence may choose to focus their attention in different areas, employing different explanatory models, different samples, and different measures of key constructs. Thus, differing findings within the literature should be understandable.

This chapter seeks to overcome some of the problems posed in previous research by setting forth a strategy for evaluating competing propositions about the trade-conflict relationship. The first section discusses previous efforts to assess empirically the impact of trade on conflict. Next, some of the main problems confronting trade-conflict researchers and a strategy to address some of these constraints are outlined. Then, I turn to my own empirical investigation of the trade-conflict relationship and discuss findings that are germane.

GAPS IN OUR KNOWLEDGE

Regardless of the perspective from which one approaches the trade-conflict debate, a litany of precedents exists to support one's position. Proponents of the argument that trade and other interstate linkages foster peace cite World War II as the primary example of the dangers inherent in rampant policies of protectionism. Liberals point to the intense economic rivalry, high protectionism, and economic instability that characterized the pre–World War II era and argue that the adverse economic impact of protectionism and the lack of incentives to deter conflict between states were root causes of the inability of states to stem the tide of that war. On the other hand, theorists who maintain that trade fails to prevent conflict or that interdependence may increase

conflict point to the high level of economic interdependence that existed among European states on the eve of World War I. Although World Wars I and II are the most prominent examples employed in debates about the pacifying or conflictual aspects of economic relationships, a long list of other cases can be identified in which trading states either engage in or refrain from conflict. While interesting, anecdotal cases relevant to the trade-conflict relationship reveal no discernible pattern; one can easily identify cases of positive, negative, and insignificant relationships between trade and conflict.

For that reason, scholars have sought to identify systematically the factors associated with interstate conflict and cooperation.[1] Until recently, economic linkages were largely ignored in the literature devoted to the scientific study of conflict. As a consequence, only a partial picture of the connection between interdependence and conflict is furnished by the literature. Much of the research remains theoretical and anecdotal, with the majority of empirical studies being confined to limited samples of trading relationships. This study's purpose is to analyze a spatially and temporally broader domain than undertaken in previous research, in order to expand our understanding of the range of trading relationships that exist in the world. I hope to complement extensive historical studies of conflict in which economic linkages are absent altogether from the analysis, confined to a limited spatial or temporal domain, or investigated at an alternative level of analysis. My intent here is not to develop a comprehensive multicausal model of conflict, but rather to reveal how economic linkages may constitute an important piece of the conflict puzzle.

Researchers investigating the liberal proposition that trade promotes peace do so from a variety of theoretical and methodological approaches. Barbieri and Schneider (1999) provide a summary of quantitative studies that assess the impact of trade on conflict. This summary, which appears in table 1, indicates the diversity of measures, samples, analytical techniques, and findings among trade-conflict studies. Even scholars who appear to adopt similar research strategies often reach different conclusions about trade's ability to promote peace. Relative to other areas of conflict studies, research on the trade-conflict relationship is limited.

Until recently, historical studies of trade and conflict focused primarily on the system level of analysis, with the exception of Domke's (1988) monadic-level study. System-level studies have failed to achieve a consensus regarding the impact of economic interdependence on interstate

conflict. Several of these studies (including Domke 1988, Rosecrance 1986, and Mansfield 1994) provide evidence that the expansion of trade over time has resulted in a general reduction in intensive forms of interstate conflict, whereas Waltz (1979), in his system-level analysis, argues that the decrease in interdependence during the post–World War II period is one of a set of factors contributing to peace in that era. Despite the lack of consensus across these studies, system-level research informs our understanding about the major trends and consequences of global interdependence. Yet, the extant literature provides very little information about variations that exist across relationships within the global system. Just as systemic interdependence varies across historical periods, with differing consequences for interstate relations, interdependence also varies in degree and character across pairs of states. Even within an interdependent world, some states may engage in war. The question posed here is whether states are more likely to engage in war with important trading partners or against those states with which they fail to trade.

To answer this question, it is important look within the system—at relations between states. Dyadic-level studies can address the question of who engages in conflict with whom. These studies, however, have been largely confined to the post–World War II era, a period that some consider unique in terms of the proliferation of international regimes and system characteristics that may be more conducive to the maintenance of harmonious trading relations. Blainey's (1973, chap. 2) proposition that what we consider a cause of peace may actually be the effect of peace may apply to the trade-conflict relationship in the post–World War II period—the expansion of trade may be the product and not the cause of peaceful relations between states.[2]

Several dyadic-level studies provide empirical support for the notion that trade promotes peace (Gasiorowski 1986a, 1986b; Gasiorowski and Polachek 1982; Oneal et al. 1996; Oneal and Ray 1997; Oneal and Russett 1997; Polachek 1980; Polachek et al. 1999; Polachek and McDonald 1992; and Sayrs 1990).[3] But these studies are all confined to the post–World War II period, and the majority focus on a limited spatial domain. Many focus exclusively on a subset of states referred to as "politically relevant" dyads: pairs of states that are contiguous or contain a major-power state (Oneal et al. 1996; Oneal and Ray 1997; Oneal and Russett 1997).

Even at the dyadic level, the empirical findings are mixed. Wallen-

TABLE 1. SUMMARY OF STATISTICAL STUDIES OF THE TRADE-CONFLICT RELATIONSHIP

Author(s)	Temporal Domain and Unit of Analysis	Methodological Techniques	Control Variables	Main Findings
Russett (1967)	1946–1965 41 warring dyads	Factor analysis Contingency tables		Trade to war [+]
Wallensteen (1973)	1920–1968 144 warring dyads	Contingency tables		Trade to war [+]
Polachek (1980)	1958–1967 dyads (30 states)	Regression, two staged LS	14 NAs	Trade to net conflict [–]
Gasiorowski and Polachek (1982)	1967–1978 US-Warsaw Pact	Regression Granger causality		Trade to net conflict [–]
Gasiorowski (1986a)	1948–1977 dyads (130 states)	Regression	PE, GDP	Mixed
Domke (1988)	1871–1975 states	Probit		Mixed
Polachek and McDonald (1992)	1973 dyads (14 OECD states)	Regression	PE, GDP	Trade to net conflict [–]
Polachek (1992)	1948–1978 dyads	Regression	DE, NA	Trade to net conflict [–]
Polachek (1997)	1948–1978 dyads (11 states)	Regression Three staged LS	17 NAs	Trade to net conflict [–]
	1958–1967 dyads (30 states)		RT	Trade to democratic peace [+]

Oneal et al. (1996)	1950–1985 PRD	Logit	A, EG, C, G, RT	Interdependence to MIDs [–]
Oneal and Ray (1997)	1950–1985 PRD	Logit	A, C, EG, G, RP, RT	Interdependence to MIDs [–]
Oneal and Russett (1997)	1950–1985 PRD	Logit	A, C, EG, GP, PC, RP, RT	Interdependence to MIDs [–]
Oneal and Russett (1999)	dyads	Logit	A, C, EG, GP, PC, R, RP	Interdependence to MIDs [–]
Barbieri (1995)	1870–1985 dyads	Logit	A, C, PR, RP	Interdependence to MIDs and wars [+]
Barbieri (1996a)	1870–1938 dyads	Logit	A, C, RT, RP	Interdependence to MIDs [+]
Barbieri (1997)	1870–1985 dyads	Logit	A, C, RT, RP	Interdependence to MIDs [+]
Mansfield (1994)	1850–1964 system	Regression	Con, EO, H	Trade to MP war [–] Openness to war [+]

Source: Reprinted from Barbieri and Schneider 1999, 395 (table II).

Key: A = Alliance ties; C = Contiguity; Con = Concentration of power; DE = Defense expenditure; EG = Economic growth; EO = Economic openness; GP = Geographic proximity; H = Hegemony; NA = National attributes (social-economic and demographic variables); PC = Political change; PE = Price elasticities; PR = Political relevance; PRD = "Politically relevant" dyads; RT = Regime type; RP = Relative power; TD = Temporal dependence.

steen (1973) and my own work provide evidence of the conflictual nature of interdependent relationships.[4] These analyses include a more comprehensive temporal and spatial domain than those found in dyadic studies that support the trade-promotes-peace hypothesis and are therefore more generalizable to a diverse group of trading relationships.

One might conclude that the variation in empirical findings in dyadic-level studies could be attributed to the period being investigated. However, as I reveal shortly, my investigation reveals no variations in the trade-conflict relationship across historical periods. Whether or not one accepts the argument that the post–World War II period is unique, it is important to determine empirically whether the trade-conflict relationship in this period is generalizable to other periods. For the characteristics that define the post–Cold War era and relations within the evolving interstate system may be more reminiscent of earlier periods of history. Thus, to understand what the future may hold for interdependent relations, it is useful to begin with an examination of the past. Does the proposition that trade promotes peace transcend time and space?

In addition, we might ask ourselves whether the propositions concerning the trade-conflict relationship are equally applicable to various levels of analysis (i.e., individuals, classes, states, and systems).[5] In some cases, the theories describing the trade-conflict relationship are more easily analyzed at one particular level of analysis, but the theories described in this study are generally framed in a manner that implies that they are equally applicable across levels of analysis. For example, liberals portray the benefits of trade as operating in interpersonal relations as well as international relations. Neo-Marxists have applied Marxian descriptions of the conflict inherent to interclass relations to those operating between states. This study focuses primarily on relationships between pairs of states, but it is informed by assumptions about economic relationships cast at different levels of analysis. Similarly, this investigation should advance our understanding about interdependence between actors at various levels of analysis.

RESEARCH STRATEGY

One of my main goals is to assess the empirical accuracy and generalizability of the competing views about trade's effect on peace. To do so requires analysis of a broader set of relationships than has previously been examined, to better consider those factors that might account for varia-

tions in the trade-conflict relationship. My focus of inquiry resides on dyadic interstate relationships, or pairs of states.[6] I wish to evaluate whether states behave differently toward other states, depending upon the degree of economic ties between them. This is a different question than asking whether trading states are more pacific than others or whether the international system is more peaceful during periods of high economic interdependence than low interdependence (see chap. 5).

The dyadic relationships included in my analyses vary with respect to the constituent states' national attributes, including economic, political, geographic, demographic, and ethnic characteristics. My criterion for including dyads in the study is grounded in the availability of data for the states comprising the dyad and for dyadic interactions. The study includes the period 1870–1992. In some instances the variables that I employ in my analyses necessitate that the particular tests be restricted to the post–World War II period.

For each dyad-year, values are recorded for the dependent variable at time t and for the explanatory variables at time $t - 1$ (i.e., a one-year lag is introduced for all the independent variables). I employ lagged independent variables in order to reduce the problems posed by the reciprocal nature of the trade-conflict relationship. In fact, most researchers seem to believe that trade not only affects conflict, but also that conflict affects trade. Scholars differ in assessing the relative strength of these relationships. While further study is needed on this question, I choose to focus my inquiry here on the impact of trade on conflict, having found that relationship to be stronger than that of conflict on trade.

Although one of my key objectives in this study is to expand my domain of inquiry beyond that of others in order to assess the generalizability of the trade-promotes-peace proposition, data limitations pose barriers to the cases that I might analyze. For example, data availability is highly correlated with the level of development of a nation, particularly in the nineteenth century. This results in an inherent bias toward the disproportionate inclusion of developed states in the sample. I sought to overcome this bias by compiling data allowing me to produce a sample more closely reflective of the population of possible dyadic relationships present in the interstate system.[7] In addition, trade data, which are central to this investigation, contain their own set of problems. One problem is that these data are inherently biased in favor of states with important trading relationships, because data for a given state's top trading

partners are more frequently reported in distinct categories than in cases of minor trading partners. Generally, the values of trade for minor trading partners are reported in an aggregated category labeled "all other countries." Data are unavailable about which states fall within this category. Thus, it is impossible to determine from most data sources whether two states refrained from trade or simply carried on a relatively limited share of trade. Some researchers choose to treat missing trade values as representative of zero trade ties between states, but I believe that such an assumption is false in many cases.

While some might consider minor trade flows to be similar to zero trade flows from a statistical perspective, there is certainly an important conceptual difference between states that have minor trade ties and those who have no trade. The absence of trade ties may indicate an absence of contact between states. Since contact is a necessary, but not sufficient, condition for conflict, it would be useful if we could determine whether states engaged in a minimum amount of trade, rather than no trade whatsoever. Unfortunately, this is not always possible. In the absence of detailed reports about a given trading relationship, I adopted the following coding rule. For the pre–World War II period, the absence of a trade-flow report with a given country was treated as a missing value. For the post–World War II period, almost all zero values were treated as missing. However, there were some cases where one state reports trading flows as being present and the other has a missing value. In such cases, some minor trade flows are treated as zero trade values when at least one state's trade report indicates that trade takes place between these states, since the International Monetary Fund (1991) maintains a minimum trade value reporting standard and treats values below a certain minimum threshold as zero trade.[8]

The Dependent Variable: Militarized Interstate Disputes

In examining whether trade promotes peace, scholars differ in their conception of what a peaceful relationship entails and of what constitutes a violation of peace. For example, some may assume that peace exists when no war is present (Domke 1988). However, the absence of war alone is a very narrow definition of the type of relationship most people would accept as peaceful. For some scholars, high levels of cooperation signify peace, despite the fact that threats of violence and violent acts themselves

may be present in a given relationship. In my own mind, peace entails more than just increased goodwill between actors. It involves refraining from threats and uses of force. Interdependent actors may engage in conflictual and cooperative behaviors (Azar and Eckhart 1978; Coser 1956; Hower 1990; Simmel 1955). Is it legitimate to describe a relationship as peaceful when actors resort to threats of violence, even if those threats are followed by gestures of cooperation? I assume that peace, at a minimum, should entail a commitment to refrain from violent behavior or threats to use violence. For this reason, I conceptualize peace as *the absence of militarized conflict,* rather than the presence of cooperation.

This distinction is an important one, since some empirical studies of the trade-conflict relationship combine cooperative and conflictual behaviors into an aggregate measure of "net conflict" (see Sayrs 1990; Polachek 1980).[9] In so doing, the general or aggregated characterization of the relationship might mask the violence present in the relationship. I assume that a peaceful relationship should be free from acts of military force short of war, including the threat to employ force. This does not mean that two or more actors have a perfect harmony of interests. Instead, it means that when conflicts of interest arise, nonviolent strategies are employed to resolve them.

In this study, I do not assume that the conflicts that arise between states are necessarily related to trade or other economic issues. In this respect, my investigation differs from those studies that focus on the economic causes of war (e.g., Richardson 1960, chap. 7). I do, however, assume that trade ties should affect the manner in which conflicts are resolved. If the trade-promotes-peace hypothesis is accurate, then interdependence should *condition* the means by which states resolve their conflicts of interest, regardless of the issue of dispute. For example, a state may have the capacity to use military force to win concessions in a particular interstate disagreement, but presumably would refrain from doing so against a state with whom it has strong ties. At its base, the relevant question here is whether the pacifying influence of trade is capable of defusing the desire to employ force when conflicts of interest arise between states.

Relationships characterized as peaceful should entail a different dynamic of conflict resolution than relationships described as hostile. We would not expect actors engaged in peaceful relationships to resort to threats of violence to get a friendly state to comply with their wishes. If

anything, rewards are probably the strategy of choice for achieving compliance in a friendly relationship, while punishments are used in hostile relationships to compel another state to alter its behavior. This is, of course, an empirical question, and beyond the scope of this study. It does suggest, however, that trade may be part of an overall package of behaviors between friendly states. The methods a state employs to achieve compliance when a conflict of interest arises are determined, in part, by the overarching relationship between states. Similarly, a state's willingness to comply or compromise is partly dependent upon its relationship to the state issuing the demand. With respect to the methods used to achieve compliance, liberals assume that the bond between economic partners should make military strategies less likely. In addition, within interdependent relations, a state's willingness to conform to another state's demands should emerge from peaceful negotiations, a desire to continue harmonious relationships, or some sense of mutual obligation between partners. In short, truly peaceful interstate relationships should never involve using or threatening to use force in order to compel another state to alter its behavior.

Scholars engaged in the quantitative study of the trade-conflict relationship primarily rely on the Correlates of War revised Militarized Interstate Dispute (MID) data set (Jones, Bremer, and Singer 1996) to measure peace in a given relationship as the absence of militarized conflict between states. A MID is defined as "a set of interactions between or among states involving threats to use military force, displays of military force, or actual uses of military force" (Gochman and Maoz 1984, 586).[10] The MID data set permits researchers to measure the occurrence of MIDs, as well as several characteristics of these events. In this chapter, I examine whether pairs of states that are highly interdependent upon each other are less likely than others to engage in militarized interstate disputes. In the next chapter, I evaluate trade's impact on several characteristics of disputes beyond the onset of the conflict. This includes investigating whether the extent of a state's economic ties seems to influence the characteristics of military conflict, including whether interdependent states are more or less likely than others to prevent conflicts from escalating and are more likely to achieve negotiated settlements to conflict. Below, I account for the involvement of pairs of states in serious disputes. I sort yearly observations of dyads in the international system into two categories. The first category will consist of all those

years in which a dyad experiences an outbreak of a MID (coded with a value of one). The second category consists of all those years in which the pair was not involved in a dispute (coded with a value of zero).[11] Multiple-party disputes are disaggregated into the constituent parties on each side of the conflict to reflect the dyadic nature of the study, whereby dyads composed of states on opposite sides of the conflict are coded as experiencing a dispute. MIDs are coded as such for the first year in which they occur; that is, multiple-year disputes are coded only once for a particular dyad. I adopt this rule, since the analytical technique that I employ in this study, logit regression, assumes that the events being analyzed are independent of each other.

The Independent Variables: Conceptualizing and Operationalizing Interdependence

The primary difficulty in operationalizing trade and interdependence arises from the lack of a clear consensus about what these concepts are intended to capture. Given the differences in our theoretical conceptions of the trade-conflict relationship, researchers should not be surprised if we construct different operationalizations of the key variables central to our analysis. The theories that guide our analyses lack the necessary degree of specificity to facilitate a consensus about the most appropriate way to measure trade and interdependence, and the best strategy to analyze their impact on conflict. Theoretical ambiguities leave many things open for individual interpretation and yield countless possibilities for measurement construction. Even theorists who have similar theoretical conceptualizations of interdependence differ in how they prefer to measure the concept.

Scholars engaged in trade-conflict research might benefit from taking a closer look at the efforts of integration and dependency theorists who decades ago dealt with the same types of issues we confront today. Within each of these research programs, researchers employed a number of alternative operational measures of the phenomenon they wished to capture, whether integration or dependence. For example, Hirsch identifies more than sixteen operationalizations of trade dependence used in two decades of dependency literature (1986, 117). Since the time of his review, researchers have introduced new measures of dependence and interdependence and continue to do so, making it difficult to compare empirical findings across studies. Researchers appear to have made few

advances in measurement construction from that which existed decades ago. While not ideal, having numerous measures of interdependence seems far less problematic than having one measure that does not fit our conceptualization of the phenomenon. But having so many measures makes it difficult to compare empirical findings and to accumulate knowledge. We have not thought enough about what different measures might be telling us, particularly when they yield alternative findings.

For example, Hughes's (1971) assessment of three common measures of integration seems timely for those contemplating which measures are most suitable for assessing the trade-conflict relationship. He analyzes the Savage and Deutsch (1957) null model, the export percentage model (exports/total exports), and the gross national product model (exports/GNP). Hughes argues that these are all reasonable measures, but adds that they may produce different findings. He believes that the way a researcher opts to introduce the size control for trade relative to either total transactions or total income can be traced to their notion of whether they believe integration is a constant sum or variable sum process. For the first two models, an increase in trade with one state must lead to a concurrent decline in integration with other states, since total trade represents, figuratively speaking, a pie being divided among partners. When GNP is used as a control for dyadic trade flows, integration can grow over time with all partners (i.e., if GNP is also growing). For interdependence, the growth in trade with one partner would signify a decline in dependence on all other states, if one were using total trade to reflect the importance of dyadic trade flows. On the other hand, a GNP-based measure may reflect a growing pie, where increased interdependence with one partner need not lead to a decline in dependence on other partners.

Clearly, we could think of interdependence in both ways. It is inappropriate to say that one is wrong and the other right, since each captures important pieces of information. Therefore I employ two groups of measures of interdependence. One set is constructed using total trade as a control for dyadic flows, and the other uses GDP as the control; I refer to these sets of measures as partner-dependence and economy-dependence measures respectively (Barbieri 1995). There are instances in which one set of measures may be more appropriate than the other, but when speaking about interdependence, in general, both pieces of information contribute to our understanding of this multifaceted phenomenon. Employ-

ing alternative measures of interdependence may provide important information about the variations that arise when dependence originates from different sets of factors (e.g., the importance of trade ties for an economy, rather than the relative importance of a given trade partner).

Certainly, dependence, and by extension interdependence, can be thought of as either the relative importance of a particular trading relationship to that which exists with other partners or to the importance of that trading relationship to the overall economy. However, there are practical constraints to relying on GDP-based measures that might make these measures less ideal than others for a given research purpose. For example, data for GNP or GDP are available for only a small number of states in the pre–World War II period. In addition, historical data on total trade tend to be more accurate than data on GNP or GDP, since national trade statistics were recorded for most countries in the nineteenth and earlier twentieth centuries, while the data used to calculate GDP were not systematically compiled by the majority of countries until after 1950. Even then, scholars question the accuracy of these statistics for developing countries, which leads to one of many sources of bias in accurately capturing the third world experience. One characteristic of developing states is that a large percentage of economic activities take place outside the formal sector; that is even true today, but was much more the case prior to World War II. In general, scholars wishing to rely on GDP-based measures restrict the focus of their analysis and the accuracy of those measures for different classes of states. Scholars have made efforts to estimate GDP figures for the pre–World War II era and to adjust post–World War II estimates to account for some of the criticisms of these measures. Still, these estimates are far less reliable than those of recorded economic activities.

Although GDP- or total trade–based measures are the most commonly used means of assessing trade dependence, researchers have proposed a number of alternatives. For example, Polachek (1980) measures the absolute value of dyadic trade flows in his early studies of the trade-conflict relationship, but he also includes GDP as a separate variable among his controls for national attributes. Polachek and McDonald (1992) emphasize the importance of using elasticity of supply and demand to measure the importance of trade flows and to capture a more realistic measure of gains from trade. Similarly, Blanchard and Ripsman (1994) develop a measure of dependence based on the strategic impor-

tance of commodities traded with a particular partner. Researchers make a valid point in stressing the need to consider the importance of commodities traded in evaluating trade dependence. However, practical constraints make it difficult to implement their recommendation on a general basis. Unfortunately, the elasticity measures and the measures of the strategic importance of commodities traded require information that is not available for a large number of countries or for a significant period of time. For example, a measure of strategic importance requires information about a state's strategic needs, as well as potential sources of supply and the availability of the commodity. The strategic importance of commodities varies by nation and over time, and data reflecting those variations accurately are difficult to obtain. My goal here is to evaluate a wide range of trading relationships, and this leads me to rely on measures that can be derived for a more general sample of states.

In addition to using different denominators in ratio-level variables, scholars offer a variety of means to combine national-level dependence scores into dyadic-level indices. I find fault with few of the dyadic-level measures employed in trade-conflict literature, with the exception of employing the lower state's dependence score as an indicator of dyadic interdependence (Oneal and Russett 1999). The rationale for this measure is that the least dependent state is the "weakest link," in Dixon's terms (1993); it is less constrained to refrain from force, because it needs the relationship less. Yet, one state does not define a dyadic relationship. Even if one state is less constrained to use force, the state that is more constrained should work harder to resolve a conflict of interest before it escalates. Imagine that State A has two trading partners, State B and State C. State A is not very dependent on either partner, but State B is highly dependent on A, while State C is not. State A's degree of constraint may not vary in these two relationships, but the two partners should vary in their desire and effort to maintain peace in the relationship.

In general, I think it is problematic to employ the characteristics of only one nation when describing the characteristics of a dyad. In fact, I would argue that it contradicts many liberal assumptions about the more open society being able to influence the less open society. For example, U.S. policies based on constructive engagement suggest that Western powers have the capacity and obligation to influence less democratic, economically open states. The weakest link assumption says that China's relationship with the United States should be no different than China's

relationship with an autocratic state that has a low level of dependence similar to that of the United States.

Operationalizing Dimensions of Interdependence

In general, the trade-conflict literature emphasizes two dimensions of economic interdependence that I intend to measure: the salience and the symmetry of dependence. By *salience,* I mean the importance of a trading relationship, relative to other trading relationships. Is the level of trade between two states significantly higher than that conducted with other states? Low levels of salience, however equal, may not provide the necessary bonds to deter conflict between states. By *symmetry,* I mean the equality of trade dependence between partners. Are states in a given trading relationship equally dependent upon each other, or is one state much more dependent on the relationship? A large state may rely on a small state for only 10 percent of its total trade, while the small state may depend on the large state for 80 or 90 percent of its imports and exports.

My measure of salience is intended to capture the liberal emphasis on the importance of extensive trade ties, while the symmetry measure captures the concern that some critics have that dependence be balanced. Both elements of interdependence may have an independent effect on trading relationships and also an interactive effect. By interactive effect, I mean that the joint presence of these variables produces more than just the independent additive effect of each variable. Since there may be both an additive and interactive effect from salience and symmetry, I employ a model that incorporates both effects.

For the post–World War II period, I employ two groups of measures of interdependence. One set is constructed using total trade as a control for dyadic flows and the other using GDP as the control.[12] I refer to the measures derived from total trade as *partner-dependence measures,* while those derived from GDP are referred to as *economy-dependence measures.* The partner- and economy-dependence measures are highly correlated, making it difficult to estimate their independent effects simultaneously in a single model. Yet, these measures are conceptually distinct and at times empirically distinct. For example, in the pre–World War II era, the major powers, who have high estimated GDP values, were also the major traders. Therefore, total trade and GDP would be positively correlated. However, in the post–World War II period, there is more variation in the association between GDP and total trade. In general, there is an

inverse relationship between a state's dependence on foreign trade, relative to GDP, and the state's level of development (Domke 1988).

It is useful to compare the empirical findings derived from alternative measures of interdependence for two reasons. Measurement choice may affect empirical findings. More important, while alternative measures are often treated as substitutes, I believe they may be capturing different elements of interdependence, whose impact on interstate relations might vary.

First, before building dyadic measures, I construct national measures of dependence for a given relationship. Equation (1) represents *partner dependence,* a measure intended to evaluate the importance of dyadic trade (import and export flows between states composing a dyad) relative to a state's total trade (total exports and imports with all partners),

$$\text{Partner Dependence}_i = \frac{\text{Dyadic Trade}_{ij}}{\text{Total Trade}_i} = \frac{\text{Imports}_{ij} + \text{Exports}_{ij}}{\sum_{k=1}^{N} (\text{Imports}_{ik} + \text{Exports}_{ik})} \quad (1)$$

where N is the number of trade partners for State i. If a state has many trading partners with whom it trades a good deal, then it will not assign much importance to any particular partner. A state's partner-dependence score will be high vis-à-vis another state if the state conducts a large percentage of its trade with that country. Equation (2) contains a measure of *economy dependence,* which is similar in form to partner dependence, but the baseline for evaluating the importance of the dyadic trade flow is the size of the state's economy rather than its total volume of trade:

$$\text{Economy Dependence}_i = \frac{\text{Dyadic Trade}_{ij}}{\text{GDP}_i} = \frac{\text{Imports}_{ij} + \text{Exports}_{ij}}{\text{GDP}_i}. \quad (2)$$

As mentioned, the partner- and economy-dependence measures are highly related to one another (with a correlation of 0.7), but it is possible for them to vary inversely. For example, a state may have high partner dependence and low economy dependence. Such a situation would arise if a state's economy was not heavily dependent upon foreign trade, but the same state elected to conduct most of its trade with a few trade part-

ners. If the state could not acquire certain products domestically and relied on one partner for those products, high partner dependence might reflect a form of dependence not captured with the economy-dependence measure, where the dyadic trade flow would appear minor relative to the national product. On the other hand, if a state was very dependent on foreign trade, relative to national production, but chose to rely on a large number of trading partners, it might have a low partner-dependence score for a relationship, but a high economy-dependence score. In the sample analyzed in this study, the partner-dependence score tends to be higher than the economy-dependence score. Economy dependence was higher than partner dependence in only 8 percent of the observations in the post–World War II period. The economy-dependence measure tends to be higher in cases where states have low GDP values.

After constructing measures of partner dependence and economy dependence for each state in a dyadic relationship, I construct two separate sets of dyadic measures of interdependence. The respective national measures are substituted for the dependence terms in equations (3) and (4) below. The same procedure is used for the total trade– and GDP-based measures.

I require some method of averaging the national dependence scores for each state in a dyad in order to create a dyadic measure of salience. I elected to use the geometric mean, rather than the arithmetic mean, since the former measure assigns a lower value to dyadic salience than the latter when the trade shares for each partner are highly unequal. The presence of one high trade-share will not produce an artificially high measure of dyadic salience, as may be the case if one employs the arithmetic mean for averaging. In addition, the geometric mean will produce scores higher than the arithmetic mean when both states have a high measure of salience, but a score lower than the arithmetic mean when the salience for each state is highly unequal. Salience for a pair of states reflects the extent to which the partners are important to each other; higher dyadic-salience scores indicate that the relationship is important for both partners. The index of dyadic salience is constructed as follows in equation (3):

$$\text{Salience}_{ij} = \sqrt{\text{Dependence}_i \times \text{Dependence}_j}. \quad (3)$$

While I use the geometric mean in my salience measure to incorporate some consideration of the balance of dependence, I wish to consider the

independent effect of symmetry separately. Therefore, I construct an index of symmetry that conforms to a scale similar to that used for the salience score. The index ranges from zero to one, where high values indicate symmetrical ties and low values indicate asymmetrical dependence. When states are equally dependent on the trading relationship, the symmetry score equals one. Simply taking the difference of trade shares would produce a measure where high values would entail asymmetry and low values would denote symmetry. The inverse of this relationship is necessary to provide a scale that conforms to the salience measures.[13] The measure of symmetry is reported in equation (4).

$$\text{Symmetry}_{ij} = 1 - \left| \text{Dependence}_i - \text{Dependence}_j \right| \tag{4}$$

Clearly, symmetrical ties between states that conduct 10 percent of their trade with each other and between those that conduct 90 percent of their trade with each other constitute different types of relationships. Conceptually, in my view, interdependence involves a combination of salience and symmetry. In other words, a pair of states is highly interdependent, as opposed to dependent or interconnected, only if they trade a lot with each other and their dependence is mutual. This is to say that there is an interaction effect between salience and symmetry, so that the impact of salience on conflict depends on the degree of symmetry in the relationship and vice versa.

Generally, researchers measure the interaction effect of two variables by taking the product of the variables. However, I wish to construct an index of interdependence that is consistent with my theoretical conception of the phenomenon, where salience and symmetry are each important in assessing the level of interdependence in the relationship. Relying on the direct product of salience and symmetry poses theoretical and statistical problems for index construction, since the distribution of the salience measure for my sample has much greater variance than the symmetry measure. With the direct product formulation of the interaction term, salience has a disproportionate influence on the variance in the interdependence index. This formulation also produces an index of interdependence that is highly correlated with the salience variable, creating problems of multicollinearity.

To allow each component of interdependence to contribute equal proportions to an interdependence index, I standardize salience and sym-

metry by creating *z*-scores for each variable. There is an important theoretical reason to standardize the variables that create the interaction term. These variables should logically contribute equally to the creation of the interaction. Yet, the distribution of values for these two variables varies considerably, despite the fact that both are measured on a scale ranging from zero to one. This means that the variable salience, which possesses greater variation in its distribution of values, contributes disproportionately to the interaction value. To avoid this result, I have standardized the terms to make sure that both variables have the opportunity to contribute equally to this new variable. Taking the value of each observation, subtracting the mean value of the variable, and dividing that value by its standard deviation creates the *z*-scores. Standardizing the variables in this fashion reduces the variation in observed values. I then create an interdependence index that is the product of the *z*-scores of salience and symmetry. This index is reflected in equation (5).

$$\text{Interdependence}_{ij} = \text{Salience}_{ij} \times \text{Symmetry}_{ij} \tag{5}$$

Standardizing salience and symmetry before constructing the index is also desirable, since it reduces the collinearity between the interaction term and its constituent elements. It is common for an interaction term to be highly collinear with one or more of the variables used to index the interaction effect. However, researchers disagree about whether the additive and interaction effects of variables should be included in a model when variables are highly collinear. In general, researchers disagree over how to handle the problem of high multicollinearity among variables. When variables are highly related, it is difficult to estimate the independent effects of separate variables on the dependent variable (Kennedy 1998, chap. 11). However, Friedrich (1982) demonstrates that it is more desirable to include, rather than exclude, a multiplicative interaction term with the constituent elements used to create it, even if the variables are highly collinear. Unfortunately, many researchers are either unfamiliar with his arguments or view them with skepticism, and consider any estimation derived from models containing highly related variables to be suspect.[14] For this reason, I chose to address the concern of those scholars who argue that multicollinear terms are inappropriate within the context of my interdependence variables, by offering an alternative index to capture the joint effect of salience and symmetry.

For both the partner- and economy-dependence sets of measures, the nonstandardized variables salience and symmetry did not pose problems of multicollinearity. The correlation between these variables was –0.58 and –0.49 for the partner- and economy-dependence measures respectively. The symmetry variable was not highly collinear with a direct-product interaction term (i.e., the interdependence index) for either set of measures. The correlation between symmetry and the nonstandardized interdependence index was –0.45 for the partner-dependence measures and –0.34 for the economy-dependence measures. However, salience and the direct-product interaction term were highly collinear. In the case of the partner-dependence measures, the correlation was 0.96; for the economy-dependence measures, the correlation between salience and the interaction term was 0.94. Creating the standardized index of interdependence reduced the collinearity problem. For the partner-dependence measures, the correlation between salience and the adjusted interdependence index is –0.71, and the correlation between symmetry and the index is 0.63. For the economy-dependence measures, the correlation between salience and the interdependence index is –0.48, and between symmetry and the index is 0.53. Thus, this standardized interdependence index is desirable on theoretical and statistical grounds. It provides an index in which salience and symmetry are equally weighted, and it reduces the problems posed by high collinearity.

Control Variables

In estimating the impact of interdependence on dyadic conflict, it is important to control for factors that might affect both trade and conflict. Otherwise, the relationship between trade and conflict revealed in the analyses may be spurious. The factors that are most germane to my analyses are contiguity, joint democracy, alliance ties, and relative capabilities. The literature suggests that each is theoretically interesting in its own right (Bremer 1992b), but here I am interested in these factors' impact on the trade-conflict relationship.

Contiguity

Empirical tests have consistently revealed that contiguous dyads have both higher levels of trade (Aitken 1973; Arad and Hirsch 1981)[15] and higher levels of conflict (Bremer 1992b; Gochman 1992; Goertz and Diehl 1992; Vasquez 1993).[16] Similarities exist between the arguments

advanced to describe the relationship between geography and conflict and those used to explain the impact of economic interdependence. For example, a widely held argument that links geographic proximity to higher levels of conflict is the notion that conflicts of interest are more likely to occur between states that have high levels of contact (Waltz 1979). Goertz and Diehl (1992) explain that borders may create either the context or the issue of a dispute. States may engage in conflict over territorial issues, or their close proximity might give them more interaction opportunities to engage in conflict over other issues (see Vasquez 1993). The same might be said of trade ties—tensions might erupt over trade matters, or the increased interaction associated with trade might lead to conflicts over other issues.

I use the COW contiguity data set[17] to create a dichotomous index of contiguity (by land and by sea up to 400 miles).[18]

Joint Democracy

Controlling for the presence of joint democracy is not only important for its presumed pacifying influence on conflict (see Bremer 1992a, 1992b, 1993; Dixon 1993, 1994; Maoz and Abdolali 1989; Maoz and Russett 1993; Morgan and Campbell 1991; Morgan and Schwebach 1992; Ray 1995; Raymond 1994, 1995; Russett 1993),[19] but also because regime type, political orientation, and other interstate similarities are thought to influence trade relations (Dixon and Moon 1993; Polachek 1997; Pollins 1989a, 1989b).

Additionally, it is important to control for the influence of joint democracy since a high correlation is often assumed to exist between economic (free-market) and political (democratic) freedoms.[20] Dixon (1994) notes the difficulty in disentangling the various normative and structural factors believed to be associated with peace between democratic states. Cultural norms might influence the types of institutional arrangements existing in a nation, while institutions might also affect norms of behavior. It is difficult to determine the causal influence in the relationship between normative and institutional arguments. The problem of mutual influences is compounded when we introduce trade into the equation, since regime type, cultural similarities, and trade patterns have reinforcing influences.

For example, democratic states are less likely to fight each other. We also know that states with similar regime types are more likely to trade

(Dixon and Moon 1993). Polachek (1997) finds that democratic states are more likely to trade with other democratic states and attributes the democratic peace to their high trade ties. Again, the direction of the causal influence is unclear. Regime type can affect trade patterns, but trade patterns might also affect regime type. The expansion of trade ties between states is assumed to give rise to greater commonalties in the social, political, and economic domain. As mentioned earlier, a popular argument advanced in contemporary politics by Western states, such as the case of the United States' trade policy with China, is that trading with an undemocratic state will expose that state to democratic principles and will serve as an impetus for their eventual transition to a more democratic form of government.

Some argue that states with cultural similarities are more likely to trade with each other (Russett 1967). The expansion of trade is also believed to contribute to a convergence of cultures. Thus, culture can affect trade patterns, which in turn can affect cultural similarities. The problem of distinguishing causal influence is compounded when I consider the fact that culture may determine, in part, regime orientation. There may be an interaction effect among these closely related influences. For example, research by Dixon (1994) and Raymond (1994) reveals that democratic states are more likely to pursue nonmilitary and mediated strategies of conflict resolution. The same might be said of trading states. These states should not only have an added incentive to resolve conflicts nonviolently, but should also be better equipped to do so if both states are democratic. Thus, the joint presence of trade ties and democratic institutions may produce different effects than if one of these variables was present alone.

While exploring the connections between regime type and trade is interesting, it is important to remember that the trade-promotes-peace argument is not contingent upon regime type. On the contrary, liberals and other supporters of free trade portray commerce as a means to overcome regime, cultural, and other national divisions. Gasiorowski and Polachek (1982) illustrate this point in their assertion that the increase in trade between the United States and the Eastern bloc nations led to a warming of political relations in the midst of the Cold War. Similarly, Peres and Naor (1993) maintain that the expansion of trade ties among Middle Eastern states will ensure a stable peace in the region.

Data from *Polity III* (Gurr, Jaggers, and Moore 1989; Jaggers and

Gurr 1995, 1996) are used to construct measures of joint democracy. First, I construct national measures of the democratic nature of the regime, using the ordinal measures for institutional democracy and institutional autocracy from *Polity III.* For each state I calculate the value of the democracy score minus the autocracy plus a value of ten, divided by two to average the scores.[21] The two national scores are then combined into a dyadic score (which is the product of the two adjusted democracy scores) designed to capture the interaction effect of joint democracy. The joint democracy measure ranges in value from zero to one hundred and is constructed as follows:

$$\text{Joint Democracy} = \left(\frac{(\text{DemocracyA} - \text{AutocracyA}) + 10}{2}\right)\left(\frac{(\text{DemocracyB} - \text{AutocracyB}) + 10}{2}\right)$$

Alliances

Extensive economic interdependence may be regarded as a form of implicit (economic) alliance; yet, other forms of alliances (formal security alliances) can alter the conflict-proneness of dyadic relationships. Similarly, alliance ties can affect trade patterns. Gowa (1994) shows that states are more likely to trade with their allies during the post–World War II period.[22]

I include a dichotomous index of alliances. Pairs of states with mutual defense pacts, neutrality agreements, or ententes are labeled as allies, receiving a value of one, while dyads without alliances are coded a value of zero.[23] Data are derived from the COW formal alliance data set (Small and Singer 1969).[24]

Relative Power (Capabilities)

The impact of relative power on conflict has received considerable attention, with theorists differing over whether power preponderance or a balance of power is most conducive to promoting peace (Morgenthau 1948; Organski and Kugler 1980; Weede 1976). Recent empirical research at the dyadic level reveals that a preponderance of power is associated with the most peaceful relations (Bremer 1993; Geller 1993). Relative power is important to incorporate in the present analyses, since it may affect both conflict and trade. For example, asymmetrical dependence may

reflect other forms of unequal power between states. Dependency theorists and neo-Marxists argue that power shapes economic relationships, resulting in dependence for less powerful states. Liberal economists might also view dependence as being higher between states with unequal power, as a natural result of the heterogeneous factor endowments of developed and developing states, which should lead to greater trade. Interestingly, developed states tend to invest more and trade more with other developed states, despite the similarity of their factor endowments.

I operationalize power using the COW *Composite Index of National Capabilities* (CINC) data set. These data allow me to measure each state's share of the interstate system's total military, industrial, and demographic resources (Bremer 1980, 1992b). The ratio of the larger to smaller state's capabilities is initially calculated. Since this measure is greatly skewed with some very high values present, in the analyses that follow, the log of the larger-smaller ratio is used instead. Theoretically speaking, the log transformation is also a sounder measure, since it implies a decreasing marginal advantage of increasing power differences. For example, it makes little difference whether a state has 100 or 1,000 times more power than its opponent does, since the preponderance of power should produce similar effects when power differences are great.

Temporal Dependence

Logistic regression is used to estimate the impact of interdependence on the probability that a dyad will engage in a dispute.[25] As with ordinary least squares models, logit models assume independence of events, an assumption that is likely violated when analyzing disputes, since the occurrence of one dispute might affect the outbreak of another one. More problematic for an analysis of interstate conflict is the fact that disputes are relatively rare events, and most observations for the dependent variable are zero (nonevents or peace). These nonevents may be related. For example, dyads with long periods of peace are more likely to remain in a peaceful condition and less likely to experience a militarized dispute.

Beck, Katz, and Tucker (1998) recommend a technique to address temporal dependence in logit models with discrete dependent variables, which is now being widely employed in conflict studies. The technique entails including a variable, named peace-years, reflecting the number of years that a particular dyad has remained at peace and a set of cubic splines derived from the peace-years variable. The peace-years variable

should be negatively related to dispute occurrence according to the logic that the larger number of years that states in a dyad remain at peace, the less likely they will be to engage in a militarized dispute. In the analyses that follow, Beck, Katz, and Tucker's technique is employed.

EMPIRICAL ANALYSIS

Partner Dependence

Table 2 reports the results of a set of analyses executed with the partner-based dependence measures. The coefficients for the variables salience ($\beta = 7.349$), symmetry ($\beta = -2.340$), and interdependence ($\beta = 0.045$) are all statistically significant. This suggests that it is important to consider several dimensions of interdependence when evaluating trade's impact on conflict. The positive coefficient for salience reveals that dyads with extensive trade ties are more likely than other dyads to engage in conflict. This relationship undercuts the liberal argument that greater trade ties are likely to foster peace. The negative coefficient for symmetry reveals that balanced dependence appears to diminish the conflictual nature of trade ties. Yet, the interdependence index, which assesses the joint effect of salience and symmetry, reveals that a growth in interdependence is positively associated with conflict.

In evaluating the meaning of the coefficients for the additive effects of salience and symmetry versus the joint effect represented by the interdependence index, it is useful to interpret the respective coefficients of salience and symmetry when one condition is set equal to zero. For example, imagine a case in which a dyad is highly asymmetrical, with the value of symmetry being zero. Under these conditions, only the salience coefficient would be relevant for assessing the impact of trade ties on conflict. Symmetry and the interdependence index would be equal to zero, so they would have no impact on the estimated effects on conflict. Thus, the coefficient for salience provides the estimated impact of this variable when symmetry is equal to zero, while the coefficient for symmetry provides the estimate of its impact when salience is equal to zero. The latter situation would not be substantively interesting in terms of assessing the impact of symmetry, since zero salience means zero trade. The fact that dependence is perfectly symmetrical simply means that the states composing the dyad are completely equal in their absence of dependence. Of more substantive relevance is the question of how the expansion of trade

ties might have a differing effect at various levels of symmetry. By estimating the joint effect of salience and symmetry with the interdependence index, I am assuming that the individual contribution of either salience or symmetry to dyadic conflict, expressed in their respective coefficients, may vary across different ranges of the other variable. For example, the impact of salience may vary across different ranges of values for symmetry—trade dependence may have a different effect when sym-

TABLE 2. INTERDEPENDENCE AND DISPUTES, 1870–1992 (USING PARTNER-DEPENDENCE MEASURES)

Independent Variables	Dispute Occurrence$_t$
Salience$_{t-1}$	7.349***
	(0.924)
Symmetry$_{t-1}$	–2.340***
	(0.438)
Interdependence$_{t-1}$	0.045***
	(0.011)
Contiguity$_{t-1}$	1.892***
	(0.079)
Joint democracy$_{t-1}$	–0.012***
	(0.001)
Alliance$_{t-1}$	0.145*
	(0.076)
Relative capabilities$_{t-1}$	–0.088***
	(0.023)
Peace	–0.361***
	(0.019)
Spline 1	–0.002***
	(0.000)
Spline 2	0.001***
	(0.000)
Spline 3	0.000
	(0.000)
Constant	–0.725
	(0.468)
χ^2	4,024.74***
Log-likelihood	–5,091.75
Pseudo R^2	0.26
N	138,065

Note: Robust standard errors appear in parentheses.
Significance levels refer to two-tailed tests.
*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

metry is low and high. Likewise, symmetry may have a differing effect when salience is low, compared to when it is high.

The statistically significant sign for the interdependence index reveals that there is an interaction effect present. Given the nonlinear nature of logit estimates, it is easier to evaluate the overall relationship of interdependence and conflict through graphical means. I use the estimated coefficients from the logit analysis to evaluate the impact on conflict at various combinations of trade dependence. In figure 2, I graph the possible values of salience, symmetry, and the interdependence index. The horizontal axis represents the share of each state's trade with its partner. These trade shares are used in conjunction with the logit estimates to produce a surface plane that corresponds to the probability of conflict present at the various combinations of trade shares. The figure demonstrates that at the lower levels of interdependence, trade does not appear to have a dramatic impact on conflict. There is some evidence that asymmetrical ties are more conflictual than symmetrical ties at the low range of trade dependence. As mentioned previously, this corresponds to the negative coefficient for symmetry when salience is set equal to zero. Once dependence grows for each partner, the likelihood that a dyad will experience a dispute increases, as revealed by the positive coefficients for salience and the interdependence index. Dyads with both extensive and symmetrical ties appear to be the most conflictual. Mutual dependence might diminish conflict at lower levels of dependence, but at higher levels of dependence, the effect is reversed. The evidence contradicts the assumption that high interdependence promotes peace. It also shows that there are variations in the impact of interdependence at different levels of salience. The findings suggests that mutual dependence may diminish conflict, but only when dependence is limited.

Fortunately, most states depend very little on any single trade partner. Thus, most dyads fall within the lower ranges of values observed on the surface plane, where conflict is less likely. Moreover, dependence tends to be balanced. Yet, the balance occurs because each state in a dyadic relationship depends very little on its partner. It is balanced because most states are relatively equal in their tendency to keep dependence low.

The control variables yield few surprises for those familiar with empirical studies of dyadic conflict. The positive coefficient for contiguity indicates that contiguous dyads are more conflictual than noncontiguous dyads. Dyads that are jointly democratic are less conflictual than others,

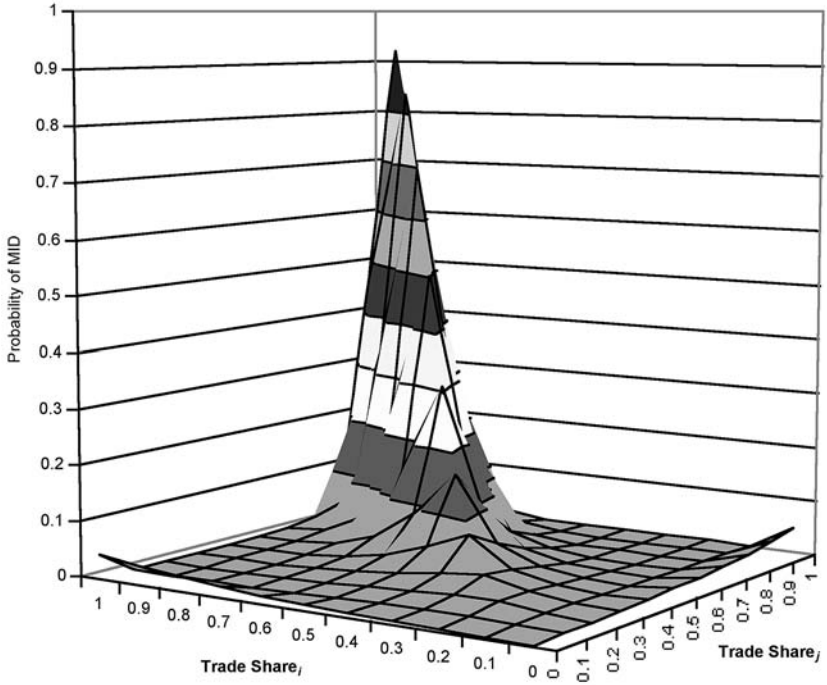

FIG. 2. Partner dependence and dispute probabilities

as indicated by the negative coefficient for this variable. The bonds represented by alliances, like those of trade, do not appear to reduce the likelihood of conflict; instead alliances tend to be positively associated with conflict. Once again, this raises questions about the view that bonds between states foster peace. The coefficient for relative power reveals that dyads with unequal power are more peaceful. The peace counter is negative and statistically significant, as expected, suggesting that those dyads with a longer history of peace are less likely to experience a dispute. The coefficients for the spline variables indicate that the temporal dependence between observations diminishes as time (i.e., peace-years) increases.

In considering the empirical findings for the components of interdependence, it appears that the extensiveness of trade ties has the greatest influence on the probability of conflict. This raises the question of whether the explanatory power of the estimated model might be

improved if we considered only the salience of the economic relationship. Do symmetry and the interaction effect captured by the interdependence index improve our understanding of dyadic conflict, or is it sufficient to consider simply the extent of the trade ties? To answer this question, I compared alternative model specifications to determine whether including particular variables improves the explanatory power of the model. I do this by using a likelihood ratio test to assess whether excluding a variable significantly weakens the explanatory power of the model.

First, the full model reported in table 2 is estimated. Then it is compared to a model excluding each of the components of interdependence in turn. If excluding a variable does not reduce the power of the model, then the variable may not provide sufficient enhancement to the model to warrant its inclusion. I first exclude the interdependence index to determine whether the additive model of salience and symmetry provides similar results to those obtained with the fuller model. When the likelihood ratio test reveals a statistically significant chi-square value, it means that the saturated model is preferred to the restricted model, the one that excludes the added variable of interest. When I exclude the interdependence index from the estimated model, salience and symmetry remain statistically significant, and the directional influence of their coefficients is similar to that reported in table 2. The magnitude of the coefficients for salience increases to 9.40, while the magnitude of the coefficient for the variable symmetry declines to –0.59.

The likelihood ratio test reveals that the model including the interaction effect captured in the interdependence index is better than the model excluding it, at the 0.00001 level of significance. Next, I excluded the symmetry variable from the full model and found that its exclusion also reduced the explanatory power of the model. The likelihood ratio test was significant at the 0.00001 level. Once again, the directional influence for the remaining variables, salience and the interdependence index, remains similar to that observed in the saturated model. The magnitude of the influence for salience is greater (with a coefficient of 16.81), while that for symmetry is reduced to –0.78. The saturated model is also significantly better than the model containing salience alone with the control variables.

There are, of course, many criteria for evaluating whether to include a variable in a statistical model, only one of which is its contribution to the

explanatory power of the model. Including variables for theoretical reasons may be viewed as equally important. In this case, including the separate components of interdependence and assessing their additive and interactive effects are deemed desirable on statistical and theoretical grounds. Thus, in the remainder of this study, I rely on models that account for the independent and joint contribution of salience and symmetry.

We might also consider whether including economic relationships at all improves our understanding of conflict beyond that obtained by simply including the control variables. The control variables reflect the more traditional concerns of conflict theorists who have, until recently, largely ignored the role of economic relationships in studies of interstate conflict. A comparison of models containing and excluding the economic variables examined here reveals that their inclusion significantly improves the explanatory power of the model. Economic ties do matter for understanding interstate conflict, but they matter in ways that are unanticipated by liberals.

Economy Dependence

Next, I consider whether the results obtained with the partner-dependence measures are similar to those obtained when employing the economy-dependence measures. Table 3 reports the results of analyses that employ the latter measures. Recall that the economy-dependence measure differs from the partner-dependence measure in that the latter measure weights the importance of trade flows relative to GDP, rather than total trade. Unfortunately, researchers wishing to evaluate the importance of a given trade flow relative to a nation's GDP must confine their analysis to the post–World War II period, unless they wish to rely upon a very limited sample of cases. This approach, in turn, leads to qualifications about the trade-conflict relationship. It is still useful to compare the findings from these measures with those obtained from the partner-based measures of interdependence to determine whether the findings remain robust across measures and whether there may be real differences in the consequences of different forms of dependence.

The results reported in table 3 are similar to those that I report in table 2 above. Specifically, the coefficients for salience ($\beta = 11.111$), symmetry ($\beta = -4.235$), and the interdependence index ($\beta = 0.028$) are all statistically significant and reveal a pattern consistent with that reported in the

analysis of the partner-based measures of interdependence. In this case, the choice of measurement does not appear to alter my empirical findings. Whether I employ total trade or GDP-based measures of interdependence, the consequences appear similar. Interdependence fails to inhibit conflict. Instead, high interdependence appears to be associated with more conflictual relations than low dependence.

The control variables also reveal patterns similar to those found in the previous analysis, with the exception of the alliance variable. Here, the

TABLE 3. INTERDEPENDENCE AND DISPUTES, 1948-92 (USING ECONOMY-DEPENDENCE MEASURES)

Independent Variables	Dispute Occurrence$_t$
Salience$_{t-1}$	11.111***
	(3.416)
Symmetry$_{t-1}$	–4.235***
	(0.969)
Interdependence$_{t-1}$	0.028**
	(0.011)
Contiguity$_{t-1}$	2.022***
	(0.088)
Joint Democracy$_{t-1}$	–0.011***
	(0.001)
Alliance$_{t-1}$	0.123
	(0.092)
Relative capabilities$_{t-1}$	–0.081**
	(0.027)
Peace	–0.419***
	(0.024)
Spline 1	–0.002***
	(0.000)
Spline 2	0.001***
	(0.000)
Spline 3	0.000
	(0.000)
Constant	–1.353
	(0.999)
χ^2	2,922.92***
Log-likelihood	–3,449.62
Pseudo R^2	0.28
N	119,296

Note: Robust standard errors appear in parentheses. Significance levels refer to two-tailed tests.
*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

alliance coefficient is positive, as in the first analysis, but it lacks statistical significance. Since the two analyses are conducted on different historical periods, one might conclude that the findings result from historical differences in the relationship between alliances and conflict. To determine whether this is the case, I examined the bivariate effect of alliance ties on interstate conflict in the pre–World War II and post–World War II samples, in addition to the full sample. In all cases, the bivariate analyses of alliance ties and conflict revealed a statistically significant positive relationship. However, when the logit model reported in table 2 is estimated with the other control variables, the alliance variable remained positive, but lacked statistical significance when samples of the pre–World War II and post–World War II periods were analyzed separately. Thus, we might conclude that the effect of alliance ties is weak when controlling for other factors or that it reveals itself only in large samples, but not smaller ones.

To what extent does the trade-conflict relationship itself vary across historical periods? Since the partner-based measures of interdependence are the only measures that allow me to look at both the pre–World War II and post–World War II period, separate analyses on these two periods are estimated. The results of this comparative analysis are reported in table 4. Although there is some variation in the magnitude of the coefficients, the basic pattern of the trade-conflict relationship appears consistent across time. Variations in interdependence at the system and dyadic level may have occurred over time, as a result of increased globalization, but trade's impact on conflict does not appear to have changed.

In sum, the empirical findings fail to offer support for the liberal argument that trade promotes peace. At the same time, the empirical analyses fail to offer overwhelming support for the critical view that symmetrical ties may be more beneficial. Symmetrical relations appear to be less conflictual when trade ties are minor, but the pacifying influence of mutual dependence is not observed at high levels of dependence. This suggests that the extensiveness of trade ties are the dominant factor in evaluating the impact of trade on conflict. Moreover, the argument that trade ties are unimportant relative to more traditional factors believed to influence conflict lacks empirical support. Including economic interdependence in our analyses of conflict improves the predictive power of our models.

An optimistic reading of the findings presented here would be that few

states rely heavily on other states. Therefore, most dyads experience very limited interdependence, and so they fall within the lower range of values observed in my illustrations. It is here that symmetrical ties may offer some hope for reducing the conflict propensity of dyadic relationships. Unfortunately, the findings suggest that efforts to expand trade ties in the hopes of producing extensive interdependence may result in less peaceful relationships. The wisest strategy for a leader to adopt appears to be

TABLE 4. INTERDEPENDENCE AND DISPUTES, COMPARING HISTORICAL PERIODS (USING PARTNER-DEPENDENCE MEASURES)

	Dispute Occurrence$_t$	
Independent Variables	1870–1944	1945–92
Salience$_{t-1}$	6.449***	8.723***
	(1.533)	(1.420)
Symmetry$_{t-1}$	–2.939***	–2.264***
	(0.856)	(0.497)
Interdependence$_{t-1}$	0.057**	0.042***
	(0.022)	(0.011)
Contiguity$_{t-1}$	1.284***	1.976***
	(0.147)	(0.090)
Joint Democracy$_{t-1}$	–0.014***	–0.012***
	(0.002)	(0.001)
Alliance$_{t-1}$	0.212	0.093
	(0.174)	(0.090)
Relative capabilities$_{t-1}$	–0.144**	–0.080**
	(0.047)	(0.027)
Peace	–0.257***	–0.410***
	(0.035)	(0.024)
Spline 1	–0.001***	–0.002***
	(0.000)	(0.000)
Spline 2	0.001**	0.001***
	(0.000)	(0.000)
Spline 3	–0.000	–0.000
	(0.000)	(0.000)
Constant	0.125	–0.692
	(0.893)	(0.533)
χ^2	593.51***	3,030.18***
Log-likelihood	–1,493.88	–3,534.04
Pseudo R^2	0.17	0.29
N	16,783	121,282

Note: Robust standard errors appear in parentheses.
Significance levels refer to two-tailed tests.
*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

restricting the extent to which he or she allows his or her state to become dependent upon any other state or on the global economy as a whole. Limited dependence may offer states the ability to reap the benefits of trade, without subjecting themselves to the costly aspects of interdependence, such as the threats to national autonomy that may result in tension.

In addition to contradicting conventional liberal wisdom, the empirical findings are inconsistent with some published evidence that supports the view that trade promotes peace (e.g., Oneal et al. 1996; Oneal and Ray 1997; Oneal and Russett 1997). The differences in empirical findings across studies might be attributable to a number of factors. First, most alternative studies focus on a more limited domain of cases than that explored here, such as "politically relevant dyads." However, the relationships that I report in this chapter apply to "politically relevant" and "non-relevant" dyads (Barbieri 1998). Some might assume that the differences in findings might result from alternative measurements of interdependence. The findings presented here do not reveal significant differences across results obtained with total trade– and GDP-based measures, but measurement choice may prove to be one source of variation in empirical findings if additional measures were compared. The more likely explanation is that relying on different measures means including different cases in one's analysis, since data may be missing for some variables and not others. In addition, researchers differ in the manner in which they measure conflict. Even studies that focus on MIDs code the dependent variable differently. Some scholars code multiple-year disputes as one for every year in which the dispute is ongoing. Finally, researchers employ different control variables. Even when using the same control variables, researchers differ on how they measure them. The potential sources of variation have been explored elsewhere (Barbieri 1996c, 1998), but no conclusive evidence indicates the source of the variation in findings.

This leads to the question of why researchers reach different conclusions about the trade-conflict relationship. Differences arising from sample or measurement variation would suggest that trade's impact is not consistent across all types of relationships or that different forms of dependence captured by alternative measures may have alternative consequences for interstate relations. The variations in empirical findings might not be a simple statistical artifact, but may reflect real differences in trade's impact. This, in itself, is important to consider. It suggests that

the results found here only scratch the surface of the more significant question of why variations obtain in trading relationships. When taken as a whole, what should be obvious from the trade-conflict literature is the absence of firm evidence that trade promotes peace. If such evidence existed, I would expect this relationship to remain robust across studies.

Does this mean that the liberal vision of trade's pacifying effect is unwarranted? Not necessarily—trade may improve the ability of states to resolve the most serious conflicts and to prevent them from escalating into the deadliest types of battles. Recall that militarized interstate disputes may include threats, displays, or uses of force. Even among events in which force is used, there are variations in the intensities of conflicts. In the next chapter, I investigate whether interdependent states experience different types of military conflicts than do other dyads.