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War, Trade, and Distrust: Why Trade Agreements Don't Always Keep the Peace*

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There is growing evidence that preferential trade agreements (PTAs) provide strong institutional incentives to prevent international conflict among member states, often creating the conditions of trust that can help prevent militarized aggression. We provide an approach to the study of how international institutions influence conflict behavior that considers how PTAs exclude as well as include members and create asymmetrical relationships among members that could exacerbate conflict. PTAs do more than create expectations of economic gains and reduce opportunism; they also create hierarchical relations between states, which can encourage conflict under different conditions due to distrust. We theorize these conditions for militarized international disputes, develop appropriate measures using social network analysis, and test our expectations on new PTA data during the period 1950 to 2000.

KEYWORDS: centrality; militarized disputes; preferential trade agreements; social network analysis

Does trade interdependence promote peace among states? A long intellectual tradition suggests as much, as liberals have argued that the formation of global trade ties and institutions creates incentives to settle disputes before they come to violence (Angell, 1913; Doyle, 1997; Mitrany, 1966; Nye, 1971; Russett and Oneal, 2001). Trade with foreign nations fosters economic interdependence among governments, generates expectations about wealth gains, now and into the future, and may even create a sense of community among nations (Deutsch, 1957; Gartzke, 1998; Haas, 1960; Polachek, 1980; Russett et al., 1998). International institutions like preferential trade arrangements (PTAs) or the World Trade Organization (WTO) that organize trade ties reinforce these peace-making processes. They provide a formal institutional mechanism through which states lengthen the shadow of future trade

relations, credibly commit to economic interdependence, and cooperate to overcome coordination problems. In the process, trade institutions increase trust through creating strong expectations of future gains, enhancing political relations and preserving peace among trade partners (Fernandéz and Portes, 1998; Mansfield and Pevehouse, 2000; Mansfield et al., 1999; Schiff and Winters, 1998).

Various scholars have contested this liberal argument (Baldwin, 1980; Barbieri, 1996; Buzan, 1984; Gilpin, 1981; Hirschman, 1945), yet most of the evidence available today suggests that the liberals might be right: economic interdependence can promote collective security among trade partners, and trade institutions are central to the peacekeeping process. Studies illustrate that trade partners are systematically less likely to resort to military conflict than states that do not trade (Gartzke et al., 2001; Maoz, 2009; Oneal et al., 1996, 2003). Others show that when trade becomes institutionalized through PTAs, members of the same arrangement are even less likely to go to war than are other states and that PTAs are more effective in preventing conflict as trade between members grows (Dembinski et al., 2004; Mansfield and Pevehouse, 2000, 2003; Mansfield et al., 1999).

However, we have reason to be skeptical that mutual membership in trade institutions always or primarily dampens conflict. While it is possible that institutional interactions reveal or alter states' interests to create trust among members, which may in turn inhibit conflict, we suggest that this trust-building property only holds under conditions of symmetrical relationships between states in institutions. Large asymmetries in these relationships, by contrast, can actually undermine trust between states and thereby lead to *additional* militarized conflict in the international system. More specifically, we argue that the distribution of ties in the network formed through PTAs can lead to large asymmetries in dependence and influence, thus undermining trust and promoting conflict.

Hafner-Burton and Montgomery have shown that neither international governmental organizations (IGOs) nor PTAs simply provide a benign forum for state interaction (Hafner-Burton and Montgomery, 2006, 2008, 2009). They also create social networks that define hierarchies of social order in which states hold relative positions of power over each other. Like military power (Waltz, 1979), states' social power in this network of institutional memberships creates expectations for behavior and gives states the ability to coerce, bribe, reward, or punish others, defining the conditions under which acts of military aggression or cooperation are rational strategies of action. These positions are emergent properties of the overall pattern of institutional memberships that define the social network among states, and can just as easily provide incentives for conflict as for cooperation.

In this article, we draw upon the insights of social network analysis[1] to investigate how states in the international system form relationships through their

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[1]For a general primer on social network analysis, see Scott, 2000; for a technical primer, see Wasserman and Faust, 1994; on social network analysis (SNA) in international relations, see Hafner-Burton et al., 2009. For some prominent examples of SNA in IR, see Dorussen and Ward, 2008; Elkins, 2009; Elkins et al., 2006; Hafner-Burton and Montgomery, 2006, 2008; Ingram et al., 2005; Manger et al., 2008; Maoz, 2009, 2010; Maoz et al., 2005, 2007; Ward and Hoff, 2007; Ward et al., 2007.

membership in international trade institutions, like PTAs and the WTO, and how these relationships in turn create an international structure that can shape violent conflict. In the realist view, mutual memberships in international institutions—in social network analysis terms, *ties*—are epiphenomenal: they have no impact on states' propensity for conflict, which is only characterized by relative disparities in military capabilities or trade gains (Mearsheimer, 1994). In the liberal view, ties bind states positively: trade institutions produce symmetrical relationships of amity that solve problems of relative gains that can lead to war through multiple mechanisms. Neither assumption, however, accurately describes how trade institutions create incentives for conflict. Institutional ties between actors shape conflict, but they do not necessarily have positive effects.

Rather, ties place states into particular positions of power within a social network. Social network analysis allows for conceptualization and measurement of the emergent properties of networks such as institutions. As a conceptual framework, network analysis moves from the individualist perspective, in which institutional membership is considered to affect state behavior simply through membership in individual institutions, to a perspective that emphasizes the emergent properties of networks of institutions, whether from the perspective of the direct network of states or from both direct and indirect ties as well. Rather than measuring the effects of institutions through totaling up the number that a country joins or the characteristics of individual institutions, network analysis measures the collective effects of direct and indirect ties through institutions on state behavior.

Here, we focus on two particular social positions—states' *direct sensitivity dependence* (hereafter *dependence*) on each other and their relative *access centrality* due to both direct and indirect ties in the social network formed by PTAs.[2] Conceptually, for any pair of states, the relative *dependence* of one state on another increases with the number of joint memberships and decreases with the number of non-joint memberships. States that have a large number of ties to other states have high *access centrality*; this quality increases further for states that have ties to other well-connected states. We define and describe both terms in detail in the pages to come. We hypothesize that asymmetries in *dependence* or *access centrality* increase conflict since they undermine trust between states.

In the following pages, we position our argument within the broader context of debates over the effects of international organizations and economic interdependence on conflict through trust and develop our core propositions. We introduce new data on state membership in trade institutions from 1950 to 2000 and derive our principal indicators using social network tools. We use these tools to empirically identify and describe states' structural positions within the social network created by ties, and systematically test our argument using cross-national data on interstate military disputes. In the process, we take great care to replicate previous work where possible and to build on existing scholarship.

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[2]On different forms of dependence, see Maoz, 2009, 2010. On access centrality, see Hafner-Burton et al., 2009.

How Institutions Can Lead to Trust

Since the time of Immanuel Kant, scholars of international politics have proposed that peace is possible through the forging of an international social structure based on liberal principles of rights, obligations, and law (Kant, [1795] 1991). In the modern world, international institutions and economic interdependence create this social structure through the establishment of authority, providing a foundation for the building of trust among nations in an anarchic world and the diffusion of the value of cooperation (Angell, 1913; Zimmern, 1936). Europe has been an important example. Looking to Europe, integration theorists have argued that economic integration between nations can, over time, create a communal understanding and interest in collective security, as learned forms of cooperation in markets spill over into areas of higher security politics (Haas, 1971; Mitrany, 1966, 1976; Nye, 1971). PTAs, like the European Community, can merge the interests of age-old rivals by establishing a community of states and peoples long divided (Wallace, 1994).

While integration theorists looked toward the experience of Europe, Karl Deutsch proposed the more general concept of a security community, where economic integration among liberal states could create a sense of community based on trust and reciprocity (Deutsch, 1957). A pluralistic security community forms among members that hold similar core values grounded in common institutions and mutual responsiveness, creating a shared identity, loyalty, and sense of 'weness' among states (Adler and Crawford, 2002). Building from Deutsch, Adler and Barnett argued many years later that this sense of community among states is not simply a European phenomenon, but can and does exist internationally (Adler and Barnett, 1998). States within this community have the ability to cultivate peaceful methods of interacting, although they do not always succeed or choose to do so.

The underlying theme of both theoretical traditions has been adopted by scholars seeking to provide evidence that international institutions in general and trade institutions in particular assuage conflict by generating trust and mutual identification and proffering norms of peace-making among states with common institutional ties. In their influential work on the democratic or "Kantian" peace, Russett and Oneal argue that shared memberships in intergovernmental organizations (IGOs) increase cooperation among nations and reduce their propensity to go to war (Oneal and Russett, 1999; Russett and Oneal, 2001). Among the various means through which IGOs can have a pacifying effect is the generation of narratives of mutual identification through the construction of mutual identity and the legitimation of norms developed within the organizations that facilitate cooperation and create common interests. Bearce extends this line of argument to commercial institutions and suggests that the key to generating trust is improved contact between potential rivals (Bearce, 2003). Trade institutions, accordingly, can promote peace by bringing government decision makers together in repeated interactions that can generate bonds of trust[3] among potential adversaries and reduce problems of

[3]Schiff and Winters (1998) similarly assume that trade between neighboring states creates trust and reduces the likelihood of conflict and that international organizations can serve a trust-building function. See also Schiff and Winters (2002).

misperception. Mansfield and Pevehouse correspondingly suggest that PTAs can produce focal points around which states shape their expectations for acceptable behavior, preventing breakdowns in cooperation that might otherwise lead to violence (Garrett and Weingast, 1993; Mansfield and Pevehouse, 2000).

Why Trade Institutions Don't Always Keep the Peace

Many before us have been skeptical of the claim that interdependence promotes peace among states. It is well understood that international institutions can have adverse effects on conflicts among member states, mismanaging crisis situations and worsening conflict intensity (Gallarotti, 1991), or producing rivalry among states due to their relative social positions (Hafner-Burton and Montgomery, 2006). We are nevertheless among the first to directly tackle the principal claims supporting the liberal thesis that trade institutions dampen conflict, and to propose an explanation for why conflict often characterizes outcomes.

This is important because we observe significant instances of violent conflict[4] between PTA members: the 1990s alone included border clashes between Armenia and Azerbaijan, members of the Commonwealth of Independent States (CIS); the outbreak of war in the Great Lakes, with foreign involvement in the Democratic Republic of Congo from Angola, Namibia, Rwanda, Uganda, and Zimbabwe, all members of the Common Market for Eastern and Southern Africa (COMESA); the Iraqi invasion of Kuwait and violent border clashes between Egypt and Sudan, all members of the Council of Arab Economic Unity (CAEU); and fighting between India and Pakistan, members of the South Asian Association for Regional Cooperation (SAARC). North and South Korea frequently are involved in violent incidents; both are members of the Global System of Trade Preferences Among Developing Countries (GSTP). A majority of these disputants are also members of the WTO. Powers contends that in Africa, 16% of all militarized international disputes registered by the Correlates of War data from 1950 to 1992 occurred between PTA members (Powers, 2003, 2004). These examples show clearly that members of the same trade institution can and do conflict, that conflict often breaks out into violence, and that commerce is frequently not enough to keep the peace. They stand in sharp contrast to the liberal expectation that trade institutions dampen conflict through an increase in trust.

Trade institutions do increase repeated contact between members; however, contact does not necessarily build trust or a sense of community. The lessons of European integration theory suggest that building community through upgrading the common interest between PTA members requires a minimum level of homogeneity: a pluralist social structure, a high level of economic and industrial development, and ideological similarity (Haas, 1960). Security communities are also most likely to develop through economic relations among Western nations, as even the most institutionalized forms of integration in the developing world

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[4]As per the usual convention, we define "violent" MIDs to be any MID in which at least one death occurred.

cannot be said to create the mutual identification at the core of the concept (Bearce, 2003). Although evidence suggests that economic integration has led to the formation of a collective identity and trust among member states of the European Union over time, it is well understood that "democratic features of liberal democracies enable the community in the first place" (Russett and Oneal, 2001: 166). The liberal argument that trade institutions dampen conflict by building trust among leaders to overcome commitment problems consequently chiefly applies to the Western world of advanced democratic nations. Yet the overwhelming majority of trade institutions manage trade between partners that include at least one developing or nondemocratic state, and there is no evidence to show that these institutions build trust over asymmetrical distribution of gains. Boehmer, Gartzke, and Nordstrom cogently argue that states that belong to many different international institutions may have a greater number of international interests to competitively defend and a greater array of opportunities to enact aggressive behavior in defense of those perceived interests (Boehmer et al., 2002). We extend this argument one step further; trade institutions create and shape states' interests, affecting not only the number of potential issues for dispute, but also establishing conditions that can lead to distrust. Institutions do this by placing states in social positions of power within international relations, which shape expectations for behavior by defining which issues are legitimate for contestation via military means and enable states to coerce, bribe, reward, or punish each other. We address this possibility in the next section.

How Trade Institutions Undermine Trust and Fuel Conflict

Although we do not share the liberal view that trade institutions necessarily or regularly promote peace among members, we are equally skeptical of critics' arguments maintaining that they have no relationship to war or a negative relationship. Rather, we argue that trade institutions are neither inherently likely nor unlikely to keep the peace among member states. States form social networks through membership in these institutions. Mutual memberships create *ties* between states and, although the strength of these ties increases with additional joint memberships, they do not necessarily create positive or negative bonds between states. These ties define states' relative positions in social hierarchies in the international political economy. Like the balance of military power, these positions are state characteristics that are measured (and have their effects) relative to other states, shaping the conditions under which conflict or cooperation become rational strategies of action.

We are concerned with two particular types of relative social positions: *dependence* and *access centrality*. Take two states, A and B; state A's *dependence* on state B is proportional to the number of trade institutions both belong to and is inversely proportional to the total number of trade institutions state A belongs to. In other words, A's *dependence* on B increases if A and B join additional trade

institutions together, but A's *dependence* on B decreases if A joins additional trade institutions without B. Like differences in military capabilities, different levels of *dependence* create structural motives for peace among trading partners in some circumstances, and conflict under others (Hafner-Burton and Montgomery, 2006). Here, we focus on one particular type of dependence: direct dyadic sensitivity dependence due to the PTA network. It is direct because the measure relates primarily to direct links to each of the two actors in question; dyadic because it looks at the strength of the link between the two actors; and sensitivity because it measures how sensitive each actor is to the other due to the link rather than the potential opportunity cost of breaking it. Although multiple different kinds of dependence (direct and indirect; monadic, dyadic, and systemic; sensitivity and vulnerability; single and multi-dimensional) are relevant to relations between states (Maoz, 2009, 2010), we are focusing on this particular type and measuring it in this way in this article because it provides for a direct contrast between the mechanism of trust through *interdependence*, typically also measured as direct dyadic sensitivity interdependence (i.e. the strength of a tie between two states, the number of PTAs that both belong to), and the mechanism of distrust through *dependence*, which can be measured by dividing the liberal measure by the total number of PTAs that each state belongs to.

Specifically, we expect that distrust will characterize conditions of asymmetrical *dependence*. We consequently expect the liberal prediction to be most robust when states hold positions of *dependence* vis-à-vis each other that are relatively equal; under these conditions, mutual memberships in trade institutions are most likely to produce trust and, therefore, to create conditions favorable to conflict avoidance. However, we expect that states will be more likely to conflict with members of their trade institutions when one state is much more *dependent* on the other; under these conditions, disparity in *dependence* is more likely to lead to distrust, and therefore, provide incentives for the distrustful state to initiate a conflict.

> *Hypothesis 1:* Dyads characterized by greater relative disparity in dependence will be more likely to engage in militarized disputes than dyads characterized by relative equality in dependence.

While the (direct dyadic sensitivity) *dependence* of two states on each other can be derived from their direct membership ties alone, *access centrality* is an emergent property of the ties between all states in the entire system. There are three (major) classes of centrality measures—access, brokerage, and efficiency—which measure the extent to which an actor is generally well-connected to others, can act as a broker between actors, and can reach other actors quickly (Hafner-Burton et al., 2009). Here, we use the access centrality measure since this family of measures has been shown to be important in the relationship between international institutions and conflict in general and PTAs in particular (Hafner-Burton and Montgomery, 2006, 2008, 2009). Conceptually, a state's

access centrality in a network is proportional to the ties received from other states. A state with high *access centrality*—that is, one with a large number of strong ties to other important states—is particularly socially powerful and important in the network of trade institutions. Further, we believe that a large number of ties to other important states will increase that state's capabilities further, and so we use a measure of access centrality (eigenvector centrality) that reflects this. With large disparities in centrality, we expect that (similar to our predictions on *dependence*) trust will be more likely to form among states that have equal *access centrality*, while distrust and therefore conflict will characterize relationships between pairs of states with large disparities in *access centrality*.[5] Disparities in social power thus operate opposite to disparities in material power, where (according to realist arguments) equality leads to increased conflict and a preponderance of power suppresses it.

> *Hypothesis 2:* Dyads characterized by greater relative disparity in access centrality will be more likely to engage in militarized disputes than dyads characterized by relative equality in access centrality.

Large disparities in dependence and access centrality create asymmetries in states' abilities to socially coerce, bribe, reward, or sanction each other; more influential and access central states simply have more social capital to expend. These states will distrust marginal countries that are not well integrated into their networks and will be more likely to escalate conflict rather than resolve disputes peacefully. Conversely, less influential states have little ability to respond to social coercion and so may choose to respond in a material way through military or economic action. Disparities thus produce incentives for forum-switching for such states. Highly dependent or peripheral states are excluded from communities and fear domination within economic forums, and thus rather than attempting to compete in the socioeconomic sphere where disparities are large, countries have incentives to enter militarized conflicts instead. Expectations and abilities combine to undermine trust across these dyads.

Research Design

We test our two hypotheses using pooled cross-national time-series data on state dyad-years. Our attention is focused on all dyads[6] from the period 1950 to 2000, although we replicate our results on politically relevant dyads in order to facilitate

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[5]Dependence is inherently a directed dyadic quantity that defines a relative hierarchy between two states, whereas access centrality is a monadic quantity that defines an absolute hierarchy among all states. We reduce both quantities to undirected dyadic quantities, since we argue that it is the relative position of two states with respect to each other that affects conflict.

[6]We choose to use all dyads instead of politically relevant dyads since the effects captured by taking only a subset of states (power projection capabilities, distance between dyads) are already included in our model.

comparison across studies that consider only the latter sample.[7] In order to ensure comparison with studies supporting the liberal thesis that international institutions dampen conflict, we base our analysis on Mansfield and Pevehouse, who consider the effects of PTAs on conflict (Mansfield and Pevehouse, 2000); we also draw insights from Oneal and Russett's analysis of the effects of IGOs on conflict.[8] We incorporate their data and update them in several ways. In order to examine the post-Cold War period, we rely on an alternative trade institution data set, since Mansfield and Pevehouse's data only consider PTA membership from 1950 to 1985. We consider membership in a greater number of PTAs and observe membership from 1950 to 2000.[9] In our sample, we include membership in the General Agreement on Trade and Tariffs (GATT) and the WTO because these trade institutions are just as likely as PTAs to offer a basis for mutual trust. We base our GDP and trade data on Gleditsch's expanded set (Gleditsch, 2002), our measures of regime type from Polity IV (Marshall and Jaggers, 2003), and generate the remainder of our data using EUGene (Bennett and Stam, 2000, 2005). We employ Beck, Katz and Tucker's splines to correct for temporal dependence in the dependent variable (Beck et al., 1998; Tucker, 1999), and calculate our social network variables using the sna package in R (Butts, 2007; R Development Core Team, 2007). Regression analysis was done in STATA (Stata Corporation, 2005).

Trade institutions exhibit a great deal of institutional variation. Ideally, any study comparing the effects of relative institutional ties on conflict with the effects of absolute ties would also include information about varying institutional qualities, such as dispute settlement mechanisms or security aims. Unfortunately, these data are simply not available for most trade institutions. Following both Mansfield and Pevehouse (2000) and Oneal and Russett (1999), we consequently adopt the simplifying assumption that trade institutions can be analyzed as if they supply homogenous institutional qualities across agreements. We thus assume that social network properties that emerge through a given institution (such as NAFTA) create equivalent types of social ties to those created by another institution (such as ASEAN).

The liberal perspective suggests that increased information through organizational mechanisms as well as social interaction itself and a feeling of sameness and mutual identification decreases conflict. Consequently, both components of the liberal argument suggest that the conflict-decreasing properties of trade

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[7]In order to facilitate replication of our findings, we have made our data, including our PTA and state samples, available at the following locations: http://irps.ucsd.edu/ehafner/ and http://ahm.name/.

[8]Oneal and Russett's (1999) study gives full details of their model specification and their results.

[9]Data were collected by Emilie Hafner-Burton using sources from the WTO, McCall Smith (2000), and Schott (2003). We would like to thank Ed Mansfield, Jon Pevehouse, Bruce Russett, and John Oneal for generously sharing their data.

institutions should be proportional to membership, not simply dichotomous; more arrangements mean more information, and similarly more common iden- tification. In order to test our social network hypotheses, we thus create a count measure of mutual membership in institutions. This is important because Mansfield and Pevehouse rely on a binary measure of mutual PTA ties between dyads (Mansfield and Pevehouse, 2000). This measure allowed them to test whether two states with mutual membership in any PTA are less likely to dis- pute than two states without membership. Our count measure of mutual mem- bership better fits both the liberal hypotheses and our social network hypotheses.

We start by deriving a general measure of mutual membership in trade institu- tions. We incorporate all trade institutions in the sample, including non- preferential institutions such as GATT, PTAs composed of other PTAs such as the EU-Gulf Cooperation Council, and non-reciprocal arrangements such as the Cotonou arrangement and the numerous EU arrangements with individual states outside of the EU. We treat all memberships as symmetrical and equal for the purposes of calculating liberal and social network variables, since co-membership in any of these institutions is a mutual affiliation that could transmit information or increase affinity.

For each year, we observe the n states and k trade institutions that exist for that year, forming an n by k affiliation matrix A.[10] Each entry is either 1 (if a state is a member of an institution) or 0 (if not). We then convert the affiliation matrix A into a sociomatrix S by multiplying the matrix by its transpose ($S = A'A$). Each off-diagonal entry s_{ij} is equal to the number of trade institution that states i and j have in common (our variable $PTASAME_{ij}$), while the diagonal s_{ii} is equal to the total number of trade institutions country i belongs to. The diagonal elements are the total number of PTAs a given country belongs to; the off-diagonal elements indicate the number of PTAs two countries share.

We then define the *dependence* of state i on state j as the number of shared memberships of i and j divided by the total number of trade institution member- ships of state i, producing a dependence matrix $\check{S}$.

$$DEPENDENCE_{ij} = \check{s}_{ij} = s_{ij}/s_{ii}$$

An actor with high *access centrality* is the recipient of many ties. If we believed that only direct ties mattered, we would use a simple form of *access centrality*, degree centrality, computing by summing over an actor's incoming ties. However, according to our hypothesis, it is not simply the incoming ties that matter, but also the importance of the actors sending those ties. Consequently, we define the *access centrality* of a state as the sum of the state's ties to the other actors in the system,

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[10]An affiliation matrix is a social network term for a special case of a two-mode matrix. A two-mode matrix has two distinct types of entities; an affiliation matrix is a two-mode matrix with only one set of actors. See Wasserman and Faust (1994: 29–30).

Table 1. Estimates of the Effects of PTAs on MIDs, 1950 to 2000: Replications and Core Models

Variable	(1) Replications of M&P (2000)			(2) Base Model	(3) Network Model
	1950–1985	*1950–2000*		*1950–2000*	*1950–2000*
	pr dyads	pr dyads	all dyads	all dyads	all dyads
PTA_{ij}	3.98E-02 (1.33E-01)	4.76E-02 (8.91E-02)	0.35 (0.09)***		
$PTA_{ij} \times TRADE_{ij}$	−2.14E-04 (1.13E-04)+	−3.50E-06 (8.44E-06)	9.17E-06 (1.23E-05)		
$PTA_{ij} \times GDP_L$	3.17E-06 (1.32E-06)*	8.52E-08 (3.37E-07)	−2.41E-07 (4.85E-07)		
$PTA_{ij} \times GDP_H$	−7.64E-07 (3.62E-07)*	4.65E-10 (7.76E-08)	−6.56E-08 (8.05E-08)		
$PTASAME_{ij}$				−2.82E-02 (1.18E-02)*	−2.99E-02 (1.30E-02)*
$DEPENDENCE_D$					0.22 (0.10)*
$ACCESS\ CENTRALITY_D$					2.46 (0.83)**
DEM_L	−4.57E-02 (1.04E-02)***	−6.33E-02 (8.56E-03)***	−7.58E-02 (8.62E-03)***	−7.93E-02 (9.60E-03)***	−7.65E-02 (9.52E-03)***
DEM_H	3.23E-02 (9.81E-03)**	3.70E-02 (8.30E-03)***	4.36E-02 (7.49E-03)***	4.53E-02 (7.82E-03)***	4.00E-02 (7.38E-03)***
$GROWTH_L$	1.77E-03 (4.66E-03)	−2.81E-03 (3.84E-03)	−2.10E-03 (3.84E-03)	−7.70E-03 (3.57E-03)*	−7.71E-03 (3.54E-03)*
$TRADE_{ij}$	−2.77E-05 (1.68E-05)+	−5.73E-06 (1.52E-05)	−2.64E-05 (1.79E-05)	−1.75E-05 (7.12E-06)*	−1.65E-05 (6.79E-06)*
GDP_L	1.05E-06 (2.28E-07)***	6.50E-07 (1.95E-07)**	1.26E-06 (3.24E-07)***	6.34E-07 (3.05E-07)*	5.86E-07 (2.90E-07)*
GDP_H	2.61E-07 (5.54E-08)***	1.32E-07 (3.03E-08)***	4.45E-07 (2.32E-08)***	3.34E-07 (4.16E-08)***	3.28E-07 (4.37E-08)***
$CAPRATIO_{ij}$	−2.91E-03 (6.61E-04)***	−3.25E-03 (7.08E-04)***	−1.81E-03 (5.50E-04)**	−2.91E-03 (9.20E-04)**	−2.91E-03 (9.15E-04)**
$ALLIES_{ij}$	−0.15 (0.13)	−4.76E-02 (1.07E-01)	0.22 (0.11)+	3.79E-02 (1.26E-01)	3.57E-02 (1.27E-01)
$HEGEMONY$	1.08E-02 (2.12E00)	1.81 (1.90)	4.90 (1.97)*	1.23 (1.91)	−0.40 (1.89)
$CONTIG_{ij}$	1.32 (0.16)***	1.27 (0.15)***	2.94 (0.13)***	−4.98 (0.51)***	−5.07 (0.49)***
$MAJPOWER_{ij}$				1.17 (0.15)***	1.19 (0.16)***
$LOGDIST_{ij}$				−1.04 (0.07)***	−1.05 (0.07)***
N	25209	42320	407209	407209	407209

All models are estimated using logit and include a natural spline function with three knots, omitted from the table due to space considerations. Numbers in parentheses are panel corrected standard errors. Pr dyads are politically relevant dyads. + p < .10; * p < .05; ** p < .01; *** p < .001.

Table 2. Robustness Checks of the Estimates of the Effects of PTAs on MIDs, 1950 to 2000

Variable	(3) Networks	(4) Minimal Model	(5) PR dyads	(6) DISPUTE	(7) Trade Dep
$PTASAME_{ij}$	−2.99E-02 (1.30E-02)*	−6.72E-02 (1.29E-02)***	−6.16E-02 (1.97E-02)**	−6.47E-03 (1.14E-02)	−4.57E-02 (1.24E-02)***
$DEPENDENCE_D$	0.22 (0.10)*	0.37 (0.16)*	3.90E-02 (8.92E-02)	0.22 (0.09)*	0.30 (0.09)**
$ACCESS\ CENTRALITY_D$	2.46 (0.83)**	3.49 (0.90)***	2.24 (0.78)**	2.10 (0.71)**	2.87 (0.91)**
DEM_L	−7.65E-02 (9.52E-03)***		−6.12E-02 (8.79E-03)***	−8.90E-02 (9.34E-03)***	−7.98E-02 (1.01E-02)***
DEM_H	4.00E-02 (7.38E-03)***		3.26E-02 (7.75E-03)***	3.79E-02 (7.44E-03)***	4.72E-02 (7.58E-03)***
$GROWTH_L$	−7.71E-03 (3.54E-03)*		−4.43E-03 (3.63E-03)	−5.59E-03 (3.20E-03)+	−3.51E-03 (3.61E-03)
$TRADE_{ij}$	−1.65E-05 (6.79E-06)*		−5.80E-06 (4.40E-06)	−1.60E-05 (5.53E-06)**	
$TRADEDEP_L$					−6.71 (8.60)
GDP_L	5.86E-07 (2.90E-07)*		5.60E-07 (1.55E-07)***	4.25E-07 (2.46E-07)+	
GDP_H	3.28E-07 (4.37E-08)***		2.00E-07 (3.22E-08)***	2.88E-07 (4.45E-08)***	
$CAPRATIO_{ij}$	−2.91E-03 (9.15E-04)**		−2.93E-03 (6.94E-04)***	−3.28E-03 (8.42E-04)***	−2.76E-03 (9.92E-04)**
$ALLIES_{ij}$	3.57E-02 (1.27E-01)		−7.20E-02 (1.10E-01)	5.56E-02 (1.17E-01)	0.12 (0.13)
$HEGEMONY$	−0.40 (1.89)		0.42 (1.91)	2.73 (1.78)	−5.73 (1.81)**
$CONTIG_{ij}$	−5.07 (0.49)***	−4.15 (0.52)***	−3.29 (0.64)***	−4.24 (0.52)***	−4.55 (0.62)***
$MAJPOWER_{ij}$	1.19 (0.16)***	1.69 (0.15)***	−0.28 (0.15)+	1.31 (0.16)***	1.82 (0.16)***
$LOGDIST_{ij}$	−1.05 (0.07)***	−0.96 (0.07)***	−0.57 (0.08)***	−0.90 (0.07)***	−0.98 (0.09)***
N	407209	534407	42320	407209	407209

All models are estimated using logit and include a natural spline function with three knots, omitted from the table due to space considerations. Numbers in parentheses are panel corrected standard errors. PR dyads are politically relevant dyads. $^+$ p < .10; * p < .05; ** p < .01; *** p < .001.

weighted by the *access centrality* of the actors sending ties to that state. In practice, we compute the eigenvector centrality[11] of the dependence matrix $\check{S}$.[12]

We then convert these measures into undirected dyadic form by computing the difference for each quantity: $DEPENDENCE_D = |DEPENDENCE_{ij} - DEPENDENCE_{ji}|$ and $ACCESS\ CENTRALITY_D = |ACCESS\ CENTRALITY_i - ACCESS\ CENTRALITY_j|$.

Statistical Analyses

We begin by replicating the core findings presented in Mansfield and Pevehouse (2000) using our new trade institution data. In order to do so, we estimate the following model:

$$
\begin{aligned}
MID_{ij} = {} & \beta_0 + \beta_1 PTA_{ij} + \beta_2(TRADE_{ij} \times PTA_{ij}) + \beta_3(GDP_L \times PTA_{ij}) + \beta_4(GDP_H \times PTA_{ij}) \\
& + \beta_5 DEM_L + \beta_6 DEM_H + \beta_7 GROWTH_L + \beta_8 TRADE_{ij} \\
& + \beta_9 GDP_L + \beta_{10} GDP_H + \beta_{11} CAPRATIO_{ij} + \beta_{12} ALLIES_{ij} + \beta_{13} HEGEMONY \\
& + \beta_{14} CONTIG_{ij} + \varepsilon_{ij}
\end{aligned}
$$

$$(1)$$

A militarized international dispute (MID_{ij}) occurs when a state threatens or enacts military force against another state. The observed value of the dependent variable is binary, equaling 1 if a dyad *ij* begins a MID in a given year *t,* and 0 if no MID is observed. This variable is often termed MID onset, in contrast to $DISPUTE_{ij}$, which equals 1 for each year of a MID rather than just the first year. We include MID joiners as experiencing a MID onset in the year that they join.

To replicate, we employ independent variables consistent with Mansfield and Pevehouse and effectively lagged by one year. The core of their analysis rests on the results of PTA membership on conflict. The authors measure whether a pair

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[11]Bonacich power centrality (a generalization of eigenvector centrality, see Bonacich, 1987) is a frequently-used measure in the access centrality family of measures (Hafner-Burton et al., 2009) that takes into account through the parameter β how much access comes from being connected to other well-connected nodes ($\beta > 0$) or to more isolated nodes ($\beta < 0$). The latter happens in exchange networks (Cook et al., 1983). Since our network is not an exchange network and our theoretical expectation is that social influence comes from being connected to others who are well-connected in institutional networks, we choose $\beta > 0$. There is little guidance in the literature as to how to choose β, and so consequently we default to the simpler eigenvector measure, which occurs when the parameter β approaches the reciprocal of the largest eigenvalue of the sociomatrix.

[12]Using the directed dependence matrix $\check{S}$ instead of the symmetrical raw sociomatrix S can be problematic in cases where a network contains unreciprocated ties. In these cases, alternate, eigenvector-like measures should be used. However, in the dependence matrix, every outgoing tie has an incoming tie as well. Consequently, eigenvector approaches are equally valid (Bonacich and Lloyd, 2001).

of states ij share membership in any PTA during a given year t, drawing upon their sample of institutions from 1950 to 1985. They call this binary variable PTA_{ij} and expect that dyads sharing any mutual memberships will be less likely to conflict. We replicate this variable in our new and updated sample including more institutions and covering the period 1950 to 2000. Since Mansfield and Pevehouse's sample appeared to exclude general trade institutions that were not agreements (e.g. GATT), for the purposes of initial replication in Table 1 we exclude these institutions and compute PTA_{ij};[13] using PTA_{ij}, and we re-create several interaction terms with GDP and trade variables, described below. However, for the reasons stated above, we use a continuous measure that includes these institutions for our extensions of the model in Table 2, $PTASAME_{ij}$.

Four additional variables are used to discriminate between the effects of PTAs and the effects of other liberal forces influencing conflict. Mansfield and Pevehouse test a 'weak link' hypothesis about the dependence of democracy. DEM_L measures the political character of the less democratic state in a dyad, which they expect to be the stronger determinant of conflict behavior. Because a MID can result from the actions of a single state, they argue that MID likelihood mainly depends on the level of political constraint experienced by the weak link— the less constrained state in each dyad (or the less democratic state). The variable ranges from –10 for a state characterized by extremely autocratic political institutions, to 10 for a state characterized by extremely democratic political institutions. Following Mansfield and Pevehouse, our second model also includes the regime type of the more democratic state in the dyad, DEM_H. This weak link theory extends to economic growth as well. Since states with lagging growth may have incentives to launch wars to divert the public's attention from poor economic conditions, both studies include a measure of economic growth. $GROWTH_L$ measures the percentage change in GDP per capita during the previous three years for the state in each dyad that has experienced the smallest change. $TRADE_{ij}$ measures the sum of i's exports to and imports from j in year t.

The authors consider additional variables to control for realist expectations about the causes of conflict. GDP_H and GDP_L measure the real Gross Domestic Product of the state with the highest and lowest national income in 1996 US dollars, respectively. $CAPRATIO_{ij}$ is the ratio of the stronger state's military capability—measured by averaging its share of world population, urban population, military expenditures, military personnel, iron and steel production, and energy consumption—to that of the weaker dyad member. This may increase conflict (if the stronger state is tempted to take over the weaker one) or decrease it (if the stronger state deters the weaker state from attacking). $ALLIES_{ij}$ equals 1 if the dyad members were linked by formal mutual defense treaties, neutrality pacts, or entente, and equals 0 otherwise. This variable is important to control for the common wisdom that allies are generally less likely to fight each other than

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[13]For the subset of overlapping dyads between our samples, our PTA_{ij} is highly correlated with their variable (~0.84).

non-allied states because they share a common security interest. The authors also include the variable *HEGEMONY* in order to control for the strength of the most powerful state relative to other states in the international system. This variable is computed by the percentage of total global GDP generated by the state with the largest GDP in the previous year (the United States for every year in our sample). Finally, $CONTIG_{ij}$ controls for the potential that MIDs result when at least one member of a dyad can reach the other member with effective military force. The variable equals 0 if two states are not directly or indirectly contiguous and 1 if they share a territorial boundary.[14]

In the first column of Table 1, we report estimates of our replication of Mansfield and Pevehouse, Model (1), using our measure, PTA_{ij}. In order to be as consistent as possible with their analysis, in this column we limit our time span from 1950 through 1985[15] and our sample to politically relevant dyads. In the second column, we expand the replication through 2000 and in the third column we replicate this second model on an expanded sample of states that include all dyads.

When using the same variable construction as Mansfield and Pevehouse (binary PTA_{ij}, excluding organizations composed of PTAs and general trade institutions), the same timespan (1950–1985), and the same dyads (politically relevant), we find very similar results. The coefficient on PTA_{ij} does switch signs from their results, but as both are small and highly insignificant, this is a consistent finding. Our coefficients on the three interaction terms are in the same direction as their results, although at lower levels of significance. The remaining variables also have similar results, except for *HEGEMONY*, which is insignificant in our tests. However, when we expand our timespan through 2000, we find that none of the PTA-related variables are significant; moreover, when we move to all dyads, we find that PTA_{ij} is highly significant and positive, indicating that shared membership in a PTA overall actually leads systematically to increased conflict.

Using these results, we build a base model, Model (2), from which we compute all subsequent models. For the reasons stated previously, we believe that a count measure that includes all trade institutions is more compatible with both versions of the liberal hypothesis (as well as a better measure for construction of social network variables); the anomalous finding that PTAs seem to increase conflict in some models adds empirical support for our argument that a binary measure is inadequate. Consequently, we include our continuous measure $PTASAME_{ij}$ that includes all trade institutions in all remaining regressions instead of PTA_{ij}. Because the interaction terms between membership in trade institutions and trade and GDP are insignificant when we expand the time horizon of the study either with all dyads or politically relevant ones, we exclude them from Model (2). We also introduce two additional control variables used by Oneal and Russett in their studies of the effects of IGOs on MIDs: $LOGDIST_{ij}$ controls for the natural

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[14]See Mansfield and Pevehouse (2000) for complete descriptions of their variable codings.

[15]Due to limits on the temporal span of the GDP variables (1950–2000), where we include this variable our first year is 1951.

logarithm of mileage between the two capitals (or major ports for the super-powers) of dyad partners, while $MAJPOWER_{ij}$ controls for the effects of great powers.[16] The variable takes on a value of 0 if a dyad is made up of minor powers and 1 if it contains at least one great power. Both are important to control for realist explanations of war.

$$MID_{ij} = \beta_0 + \beta_1 PTASAME_{ij}$$
$$+ \beta_2 DEM_L + \beta_3 DEM_H + \beta_4 GROWTH_L + \beta_5 TRADE_{ij}$$
$$+ \beta_6 GDP_L + \beta_7 GDP_H + \beta_8 CAPRATIO_{ij} + \beta_9 ALLIES_{ij} + \beta_{10} HEGEMONY$$
$$+ \beta_{11} CONTIG_{ij} + \beta_{12} MAJPOWER_{ij} + \beta_{13} LOGDIST_{ij} + \varepsilon_{ij}$$

$$(2)$$

Using Model (2) as our base, we add $DEPENDENCE_D$ and $ACCESS$ $CENTRALITY_D$ in Model (3) to test our social network hypotheses about dependence and access centrality. We report estimates of the parameters from Model (3) in the final column of Table 1. Our results show that membership in trade institutions can both increase and decrease conflict among members. Consistent with the liberal expectation, dyads linked by more ties to trade institutions are less likely to go to war. However, in contrast with the liberal expectation, we find two circumstances under which memberships in trade institutions can significantly increase the likelihood of conflict among members. When dyads are characterized by relative disparities in *dependence* or *access centrality* within the network of trade ties that characterize the structure of the international political economy, states are more likely to fight. When dyads are characterized by relative equality in *dependence* or *access centrality*, states are less likely to engage in militarized disputes, controlling for the number of overall memberships.

We also test the empirical import of our findings. Using CLARIFY (Tomz et al., 2003), we set all variables at their median levels, then increase each variable of interest separately to its 95% level. Increasing $PTASAME_{ij}$ in this way decreases MID onset by 7%. By contrast, increasing $DEPENDENCE_D$ and $ACCESS\ CENTRALITY_D$ to the same level increases MID onset by 17% and 10% respectively. To think of this a different way, suppose that two states A and B at the median in all other variables belong to just one joint PTA in total, so $PTASAME_{ij}$ is 1 and $DEPENDENCE_D$ is 0. Now suppose that state A joins a PTA with state C as well. $DEPENDENCE_D$ then becomes 0.5, while $PTASAME_{ij}$ remains at 1. The chance of militarized dispute onset increases by 10% as a result. If state A and state B joined a second PTA together, by contrast, $PTASAME_{ij}$ would become 2, while $DEPENDENCE_D$ would stay at 0, decreasing militarized dispute onset by 3.5%. While these are not enormous, in terms of the influence that states' individual choices can have, they are quite important.

Our findings, moreover, are robust. We have taken a number of steps to provide results that are as consistent with as many different sample and variable specifications as possible. Although we cannot report all of those steps here, we do

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[16]Oneal and Russett have a slightly different set of countries as major powers; we use the COW2 dataset to determine major power status.

address some of the more important issues. Table 2 offers estimates across four new models. In Model (4), we test a minimalist model by eliminating all realist and liberal variables while retaining geographic variables, social variables, and $PTASAME_{ij}$. In Model (5), we test whether our results are consistent when we truncate our sample to politically relevant dyads. In Model (6), we consider an alternative specification of the dependent variable that takes on a value of 1 throughout the entire dispute rather than just the onset. Finally, Model (7) offers different specifications of the relationship between trade, GDP, and conflict: instead of three separate components, we include Oneal and Russett's measure of trade dependence $TRADEDEP_L$, equal to the lower ratio of bilateral trade to GDP in a given dyad. We also substituted in Zeev Maoz's dependence balance measure (Maoz, 2009, 2010), which has a 0.97 correlation with our own, in all models; the results were substantively unchanged.

Our results are quite stable across models, with some variation. In the minimal model, all three remaining variables ($PTASAME_{ij}$, $DEPENDENCE_D$, and $ACCESS\ CENTRALITY_D$) have a greater effect at the same or better significance levels. When we restrict our sample to only politically relevant dyads, the coefficient on $DEPENDENCE_D$ becomes insignificant. This is an interesting finding, since it could indicate that the effects of PTA dependence (but not access centrality) are limited to countries that fall outside of traditional definitions of "politically relevant" states. We are conducting further research to investigate the causes of this particular finding, although we strongly prefer measuring political relevance through the inclusion of variables rather than through the exclusion of cases. When using $DISPUTE$ as the dependent variable instead of dispute onset (MID), $PTASAME_{ij}$ becomes insignificant, while the coefficient on $DEPENDENCE_D$ increases significantly and the coefficient on $ACCESS\ CENTRALITY_D$ decreases slightly. When including the effects of trade dependence, we find that while trade dependence itself is insignificant, the parameter estimates for $ACCESS\ CENTRALITY_D$ and $PTASAME_{ij}$ increase, while $DEPENDENCE_D$ decreases slightly.

Conclusion

PTAs are not inherently trust-building or rivalry-inducing institutions and membership does not automatically reveal previously hidden information about military capacity, build trust, or ensure commitment to peace. Instead, there is significant variation in the effects of trade institution membership across states in the international system. While there are a group of states that fulfill the conditions for the liberal peace, for many states at the fringes, membership can actually increase conflict by defining hierarchies of access centrality and dependence that cause conflict with those at the bottom of those hierarchies.

Our findings therefore strongly confirm the liberal belief that trade institutions can keep the peace *under some circumstances*—when they create ties among states with relatively equal social positions within the international political economy, facilitating trust and reciprocity. Yet trade institutions do not always keep the

peace, and the liberal mechanisms are not universally applicable. We show that trade institutions can also create relative disparities in social status among members and that these disparities increase the likelihood of militarized conflict. Far from being vehicles of peace, trade institutions generate inequalities of social power that can lead to distrust and, ultimately, to conflict among nations.

Social network analysis gives us a way to conceptualize and tools to measure the effects of international institutions beyond simple membership effects. In particular, it allows us to think about asymmetries created by the uneven distribution of ties across the international system. Here, we have identified two important asymmetries in the international trade institution network that lead to increased militarized conflict: PTA access centrality and direct dyadic PTA sensitivity dependence. Without the use of network analysis, such results would be difficult to conceive of and impossible to measure. These two measures do not exhaust the possible effects of the network of PTAs on conflict. Other centrality measures related to the brokerage and efficiency families could have significant effects on conflict through different mechanisms, while the network also creates potentially important dependencies at the monadic, dyadic, and systemic levels through direct and indirect effects and through both sensitivity and vulnerability. Measuring these effects will be important for the future agenda of network analysis in international relations.

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