The Intergovernmental Network of World Trade: IGO Connectedness, Governance, and Embeddedness[1]

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Membership in certain intergovernmental organizations (IGOs), such as the World Trade Organization, has long been argued to stimulate trade. Yet, evidence linking IGOs to trade is mixed. The authors argue that identifying the influence of IGOs requires attention not only to the institutions IGOs enact, but also to the network through which they enact them. This approach allows them to demonstrate that trade between two countries increases by an average of 58% with every doubling of the *strength* of IGO connection between the countries. They also contribute to debates regarding the mechanisms through which structural relationships influence economic behavior by showing that substantial trade benefits occur not only through economic IGOs, but also through IGOs that were formed for social and cultural purposes, and that connections through IGOs that are organizationally strong have more impact than those through minimalist IGOs.

Institutions are the bedrock of commercial exchange. Defined as formal or informal sets of rules, norms, and decision-making principles, institutions help lower the uncertainty and risk inherent in transactions among

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traders. In this light, institutions are widely viewed as a pillar of economic growth, bolstering incentives for commerce. Recently, attention has turned from whether institutions matter to questions about how they matter. In this article, we consider the link between the social structures in which institutions are embedded and their efficacy. Institutions are associated with social units (groups, networks, organizations, nations) that determine which actors are subject to the institutions, with which other actors they may more effectively trade, and what happens when they violate the institution. We examine the link between institution and social structure in the context of intergovernmental organizations (IGOs), a prominent institutional form aimed at promoting international trade and smoothing international interactions more generally.

The significance of social structure is readily apparent in international trade, where national and subnational borders can often act as substantial barriers, even when the social units they divide have comparable institutions (Frankel 2000). One of the most striking illustrations of the connection between social structure and institutional governance is the European Community (EC, now the European Union or EU), which is associated with an increase in intra-EC trade. The success of the EC is not so much a story of institutional innovation, at least with respect to the institutions that govern trade per se, but rather of the creation of an integrated, transnational society, which has helped to expand the set of actors that may effectively interact under the institutional umbrella (Fligstein and Stone Sweet 2002).

Recent sociological analyses of the EC notwithstanding, most studies underemphasize the link between institutions and the social structures that host them. This is particularly clear in the literature on international institutions and trade, which has struggled to show a connection between IGOs and global commerce. IGOs are organizations that meet regularly, are formed by treaty, and have three or more states as members (Pevehouse et al. 2003). Prominent examples include the World Trade Organization (WTO) and the United Nations (UN). More representative of the more than 300 current IGOs, however, are organizations like the Andean Development Corporation or the Universal Postal Union. Researchers have sought for decades to identify the economic impact of these increasingly pervasive organizations, but have produced little evidence of any positive effect (e.g., Jacobson, Reisinger, and Mathers 1986; Rose 2004). Consequently, IGOs have been attributed only a marginal role in increasing

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trade (Milner 1999). We contend that this mixed record is the result of a failure to account fully for the social structural implications of IGOs. More specifically, IGOs create an intercountry network in which a large and interrelated set of trade-related institutions is embedded. Accounting for this broader network enables us to paint a very different picture of the influence of IGOs on trade.

The recognition that IGOs forge connections between countries makes relevant a large sociological literature that links interactor connections to exchange. This literature has shown that a range of formal and informal connections between actors smoothes exchange between them (Granovetter 1985; Uzzi 1996; DiMaggio and Louch 1998), and that the pattern of connections is a key determinant of competition (Burt 1992). We apply these ideas to help understand the influence of connections through IGOs for bilateral trade and find support for both the idea that more connections increase trade, and that the broader network affects competition, such that trade between two countries is less if they have similar patterns of connections to others.

Our context also allows us to make a fresh contribution to the network approach to economic sociology by taking up two criticisms of that literature. The first criticism is that network theorists reify social structure and underattend to issues regarding the origin and change of networks (Fligstein and Stone Sweet 2002). In our context it is clear that IGO connections are forged through IGOs themselves, and that these organizations form a link between trade-related institutions, on the one hand, and a broader network of countries, on the other. Furthermore, by tracking IGOs over an extended period (1885–1992), we produce dynamic measures of the network these IGOs help create.

With sufficient dynamism in our network variables, we are able to overcome a related limitation of static analyses of network influence: namely, that they may confound network measures with persistent attributes of the nodes or the dyads. We achieve this by including a variety of control variables and dyad fixed effects, which permit us to show that IGO connections influence trade *independent* of other notable factors, including physical distance, population and economy size, regime type, ethnic and colonial ties, and shared language. Our specifications also include year fixed effects, which control for global trends and events that may affect trade and/or international relations.

The second criticism is that network theorists have underemphasized the institutional content of connections, treating social structure as an end in itself and failing to account for the fact that similar social structures can house various and sometimes opposing institutions (Salancik 1995; Nee and Ingram 1998). Essentially, this is the opposite of the criticism of the institutions literature that motivated us to consider social structure in

the first place. In our reading, it is not that network theorists ignore institutions, but rather that they are catholic as to the mechanisms through which connections may influence exchange. This approach is empirically justifiable, as most connections contain a diverse set of influences on exchange. However, it would be theoretically useful to have more evidence that identifies specific mechanisms through which connections affect exchange, especially in light of arguments by economists that the influence of connections can be accounted for by nonsocial mechanisms (Gibbons 1999). We are able to produce such evidence by dividing IGO connections into those that arise through IGOs formed for economic purposes (EIGOs) and those formed for social and cultural purposes (SCIGOs). Consistent with a core principle of economic sociology, we find that SCIGO connections bring substantial increases in bilateral trade. Furthermore, we find that the magnitude of the effect of both EIGO and SCIGO connections depends on the *organizational capacity* of the IGOs that create them. This result sheds new light on the mechanisms of network influence by linking the benefits of association to more formal structures.

IGOS AND THE GOVERNANCE OF TRADE

The new institutional analysis of exchange relies on transaction costs, which arise because of the risk of malfeasance and uncertainty inherent in trading (Williamson 1975). In almost every exchange, there is a moment where one of the parties has control over all or most of the goods and must decide whether to follow through on the agreed-upon bargain, or make a grab for more. This problem is obvious in the simplest of exchanges, as where children swap toys on the playground. The risk of malfeasance increases substantially when the exchange is more complex, as in global commerce, where differences in law, physical distance, and language have all been found to impede trade (Frankel 2000).

The second source of transaction costs, uncertainty, may be a more important inhibitor of international trade. The risk of malfeasance aside, exchange is fraught with difficulties in recognizing opportunities for exchange, finding partners, measuring quantity and quality, and equating the value of goods that may be imperfectly divisible. Indeed, these factors are likely behind the so-called "border effects" (Helliwell 1998) that riddle trade, whereby commerce tends to flow more between subnational units of a country (i.e., provinces or states) than across national borders, controlling for physical distance and economy size. Here, political-cultural differences make communication and understanding more difficult, the upshot being that many opportunities for international exchange are doubtless missed (Evans 2003).

Institutions are widely thought to moderate these transaction costs. Laws that enforce contracts at the domestic level enable exchange partners to credibly commit to future actions and reduce the risk of malfeasance (North 1990). When legal sanctions are ineffective or inaccessible, reputation and normative sanctions can create similar benefits (Macaulay 1963; Greif 1994). An example of an IGO that promotes rules of "fair" exchange is the WTO, which sets out rights and obligations for trade based on the principles of nondiscrimination and reciprocity, and provides for a dispute resolution mechanism to adjudicate these rights and obligations (Busch and Reinhardt 2002). Other IGOs reduce uncertainty by promoting efforts at harmonization, like the International Organization for Standardization. Still others focus on specific issue areas, such as the World Intellectual Property Organisation, or on specific sectors, like the International Coffee Organization.

For all the theoretical interest in IGOs, the fact remains that empirical studies have turned up results that are far from impressive. In the case of international trade, in particular, one could be forgiven for questioning all the attention to IGOs. The reason for this skepticism is that, despite persistent research efforts, there is little hard evidence that IGOs promote trade. Why this disconnect between theory and evidence? We argue that the literature has not given sufficient attention to the role of IGOs in affecting connections *between* their members. The very earliest efforts to identify the influence of IGOs ignored membership—or at least the idea that membership brought specific countries under the umbrellas of IGOs—and simply correlated counts of IGOs with international outcomes (e.g., Singer and Wallace 1970). Later efforts have partly overcome this problem by correlating outcomes for a specific country (i.e., levels of trade, GDP growth, participation in war, etc.) with the number of IGOs to which it belongs. Representative of this approach, Jacobson et al. (1986) find mixed results regarding the link between IGO memberships and trade, noting that IGO memberships seem to matter only for developing countries and only in certain periods.

While the count of memberships recognizes that countries must typically be part of IGOs to benefit from their influence, this approach misses the fact that IGO influence often requires that *both* countries in a transaction be subject to the same IGOs. In other words, it is not just membership, but *joint membership*, that matters. This is most obvious with regard to the many IGOs that promote coordination. After all, what good is it to adopt a convention regarding measurement, data transmission, or accounting, when the parties one would like to transact with do not observe the same convention? The idea that IGO governance depends on connections created by joint membership has recently been applied in analyses of the likelihood of war and has reinvigorated that important

research tradition (Russett and Oneal 2001; Gartzke 2002). We propose that identifying the influence of IGOs on bilateral trade requires a similar shift to the connections among countries that IGOs create *and* to the broader network formed by those connections.

Recent analyses of bilateral trade have considered these so-called "dyadic" connections formed by the WTO and its predecessor, the General Agreement on Tariffs and Trade (GATT), but have produced mixed results. For example, Mansfield, Milner, and Rosendorff (2000) conclude that a GATT/WTO connection promotes trade, while Rose (2004) concludes that it does not. These analyses are a step in the right direction, but they do not go far enough. By considering only one IGO, they miss important issues about the multiplexity of dyadic connections and the interdependence of overlapping institutions. Network theorists emphasize that important interactor relationships are "thick," with multiple dimensions of understanding and influence (Uzzi 1996). As for institutional interdependence, even a small international transaction might depend on the existence of dozens of IGOs that might help a buyer find a seller, coordinate transportation and communication between the seller and buyer, provide them with standardized measurements upon which to base negotiations, and, finally, convert currencies and clear a check.

It is not that we think that all IGOs are of the same importance, for in fact we will show that different types of IGOs impact trade differently. Rather, we subscribe to the view that issues of multiplexity and interdependence necessitate consideration of a broad set of IGOs, at least as a starting point. Reflecting the web of institutional support that IGOs can yield, we look for an influence on bilateral trade of the overall IGO connectedness of two countries. We define two countries as being connected through an IGO when they are simultaneously members of that IGO and are thereby subject to its governing rules. As a first cut, then, the overall IGO connectedness between two countries is simply a count of all the IGOs in which they share membership.

HYPOTHESIS 1.—*As the IGO connectedness between two countries increases, trade between them will increase.*

INSTITUTIONAL GOVERNANCE VERSUS SOCIAL EMBEDDEDNESS

Hypothesis 1 rests on a utilitarian analysis of IGO connectedness. That treatment does not, however, exhaust the theoretical potential of the idea that relationships govern exchange. Relationships may also produce nonutilitarian outcomes that are important for exchange, such as trust, empathy, and sympathy (Granovetter 1985). It is therefore worthwhile to distinguish the utilitarian and affective dimensions of relational gover-

nance, even though they co-occur in most relationships. IGO connectedness presents a rare empirical opportunity to make this distinction, because while many IGOs pursue economic ends, others are formed for explicitly cultural and social purposes. Thus, a finding that SCIGOs, like the Nordic Children's Film Council or the World Health Organization, promoted bilateral trade could join results such as those presented by DiMaggio and Louch (1998) as evidence of the economic impact of relations with a (mainly) social origin.

Two arguments form the microfoundation of our assertion that SCIGOs affect trade: (1) SCIGOs increase awareness, sympathy, empathy, and even trust between the citizens of different countries; and (2) the resulting shift in cross-national relations and perceptions results in more trade. The first argument is the harder to establish, in the face of a shortage of systematic research on the effects of SCIGOs and of the determinants of cross-border relations and sentiments. Nevertheless, a number of arguments support the idea that SCIGOs produce positive interpersonal associations between citizens of different countries. Indeed, this is the espoused objective of many SCIGOS, as with the Department of Social Sciences of UNESCO, which aimed to "knit together social science scholars of the world . . . with the expectation that this will increase international understanding" (Angell 1950, p. 282). One way SCIGOs may effect this end is by forging connections between citizens of different countries. Such contact may be a primary goal of an SCIGO, as with the Asia-Europe Foundation, whose mission is "to foster contacts and intercultural dialogue among people from all walks of life in Asia and Europe" (http://www.asef.org), or the Bureau International des Expositions, which promotes world fairs (http://www.bie-paris.org). SCIGOs may also forge bilateral contacts indirectly as they bring citizens of different nations together for meetings or other operational purposes. Contact with citizens of other nations has been shown to reduce antipathy and to promote more positive stereotypes (Reigrotski and Anderson 1959).

SCIGOs may promote bilateral sympathy and empathy by creating the perception of joint purpose between the citizens of states that pursue shared social, cultural, humanitarian, or other noneconomic ends. Almost all SCIGOs represent such joint purposes; examples include those that protect the environment (e.g., the International Coral Reef Initiative) and those that pursue social welfare (e.g., the Inter-American Children's Institute). There is plentiful evidence from social psychology that groupings produce affinity to group members, the ubiquitous in-group/out-group effect. In the specific context of associations forged through IGOs, Russett and Oneal (2001, p. 233) show that the "affinity" between two states increases as the number of IGO connections between them increases. Bilateral affinity, a variable created by Gartzke (2000), is "the rank order

correlation of states' voting in the United Nations General Assembly. . . . [As it] increases two states are thought to share more interests in common" (Russett and Oneal 2001, p. 231). Since Russett and Oneal's result was based on an aggregate measure of IGO connectedness, we performed an additional test of Gartzke's affinity variable on IGO connectedness, disaggregating this variable into its component parts, including those created by EIGOs and those created by SCIGOs. That analysis showed not only that SCIGOs were a positive influence on bilateral affinity, but also that they were more positive in that regard than EIGOs.

If SCIGOs do create bilateral sympathy, understanding and affinity, and interpersonal connections that span borders, the next question is whether these affect bilateral trade. It is well known in the literature on international business that exchange partners and products are less attractive to the extent that they seem foreign, so anything that increases familiarity between nations can be expected also to increase trade between them (Zaheer 1995; Bilkey and Nes 1982; Grosse and Trevino 1996). For example, the psychological trait "worldmindedness" has been shown to increase professional buyers' willingness to purchase foreign products (Crawford and Lamb 1982). Worldmindedness, which taps an orientation to "international sharing and welfare and reflects an empathy for the peoples of other countries" (Kosterman and Feshbach 1989), is just the sentiment that many SCIGOs aim to create.

Trade may also be affected by the sense of shared purpose (affinity) that SCIGOs create. Again, there is experimental evidence to show that ingroup affinity facilitates economic cooperation (e.g., Erev, Bornstein, and Galili 1993). The oldest axiom regarding global commerce is that trade follows the flag, a truism that is supported by a number of studies that indicate that there is more trade between allies (Mansfield, Milner, and Rosendorff 2000; Oneal and Russett 2001). Even more closely related to our argument, Guiso, Sapienza, and Zingales (2004) analyze data on trust between nations obtained from the Euro-Barometer surveys and find that nations whose citizens feel more trust for each other experience more bilateral trade. Given the evidence that trust, familiarity, shared purpose, and contact between nations promote trade, and the likely possibility that SCIGOs promote those things, we predict that

HYPOTHESIS 2.—*As social/cultural IGO connectedness between two countries increases, trade between them will increase.*

ORGANIZATIONAL CAPACITY OF IGOS

So far we have argued that IGOs influence trade by forging a network of bilateral connections that hosts transaction-smoothing rules *and* affects

intercountry sentiments. The next step in our theory development is to recognize that some IGOs have more impact than others beyond the structure they create and the institutions they overlay on that structure. This step is important substantively, because even casual observers of international organization realize that IGOs vary in their capacities to affect their members and achieve their goals, and that it would be a mistake to ignore the distinction between minimalist organizations (such as the International Wool Study Group) and more powerful ones (like the WTO). It also matters theoretically, as institutional arguments too often emphasize institutions of a given form (laws, organizational policies, social norms, etc.) while underattending to the interdependence between forms, which is so often fundamental to their impact (Nee and Ingram 1998). For example, the effectiveness of an organizational policy will depend on other institutions, such as the national law and culture within which the organization operates (e.g., Meyer and Rowan 1977; Dobbin and Sutton 1998) and the social norms held by the organization's participants (e.g., Heckathorn 1990).

Our current claim is that the effectiveness of an IGO connection will depend on the organizational capacity of the IGO. The issue of whether an IGO has "teeth" is particularly salient, because the basis of IGO authority is voluntary association. IGOs bind their member countries through treaties, and if a country chooses to flout a treaty, the only real sanctions are those imposed by other members, as there is no "higher court" (or third-party enforcer) that can compel members to follow through on their commitments. Just as the norms of a well-structured social group (e.g., Jewish diamond traders) can be expected to have more bite than those of a loosely structured group (e.g., passengers on a subway), the policies of IGOs with effective mechanisms of communication, coordination, dispute resolution, and enforcement should have more impact than those of minimalist IGOs.

Gartzke (2002) demonstrates that the impact of IGOs depends on their organizational structures in an analysis of the determinants of war. As we do, he operationalizes connectedness between two countries as a function of the number of IGOs in which they share membership. He finds that connections through IGOs that were "structured" reduced the incidence of war, while connections through "minimalist" IGOs had no effect. According to Gartzke (p. 22), minimalist IGOs are "without an extensive bureaucracy beyond research, planning, and information gathering," while structured IGOs contain "structures of assembly, executive, and/or bureaucracy to implement policy, as well as formal procedures and rules." The emphasis here on a bureaucratic capacity to implement has a satisfying correspondence to arguments proffered by Weber (1946) and

Evans, Rueschemeyer, and Skocpol (1985) about the source of states' institutional strength.

The example of the GATT/WTO illustrates both the nature of associative control of IGOs and the importance of organizational structure to empower them. Although it is among the most renowned economic IGOs, the GATT/WTO is often likened to a "court without a bailiff." Its influence to quell trade disputes is largely informal, more like a social norm than a law: "The basic force of the procedure [comes] from the normative force of the decisions themselves and from community pressure to observe them" (Hudec 1987, p. 214). As Busch and Reinhardt (2002) explain, the punch of the GATT/WTO comes from the potential to produce a clear normative statement embodied in a ruling, a potential which induces most disputants to settle before a ruling is rendered. But what is required to enable a "clear normative statement?" At a minimum, there must be an accepted standard of what constitutes a violation and a means of adjudicating this would-be violation. In a small social group, an informal consensus might be sufficient backing for a rule, but in a context as complicated as international trade, formal rules are typically necessary, as reflected in Gartzke's definition of a structured IGO, and as exemplified by the WTO's covered agreements. Beyond the standard of nondiscriminatory trade, it is necessary that WTO rulings are perceived as legitimate. Here, Weber's arguments regarding professional bureaucracy as a source of legitimacy are useful—the legitimacy and normative weight of WTO rulings depends on whether "justice" is seen as being rendered by objective and capable interpreters of its rules.

The significance of IGO structure seems equally likely for SCIGOs as it is for EIGOs like the WTO. SCIGOs may not have to enforce policies, but they will nevertheless depend on a bureaucracy to implement policies. The following prediction, therefore, applies for both EIGOs and SCIGOs:

HYPOTHESIS 3.—*IGO connectedness through structured IGOs has a greater positive effect on bilateral trade than does connectedness through minimalist IGOs.*

COMPETITION IN THE IGO NETWORK

The broader pattern of IGO connectedness may influence bilateral trade between two countries through the mechanism of competition. In the literature on networks, it is well accepted that the potential for competition between two actors increases as a function of the similarity of their pattern of relationships to others (Burt 1992). Actors with more similar relationships have more similar capabilities, information, and other resources.

Modern structural sociologists have identified benefits, ranging from the promotion of managers to the innovativeness of laboratories and the profitability of industries, to actors who stand between disconnected—or weakly connected—others. In our context, two countries that had the same IGO connections to all other countries would have a similar set of import and export opportunities, at least to the extent that opportunities are a function of the institutions that contribute to surety, trust, communication, transportation, and other inputs to effective trade. In network parlance, these two countries would be labeled structurally equivalent in the IGO network. *Structural equivalence* is a familiar concept in the network literature, defined as a measure of the degree of similarity, in terms of the pattern of relationships to others, between two actors (Lorrain and White 1971).

But how does the level of trade between two countries depend on structural equivalence? The significance of relationships to others comes from the fact that international trade is an open system, in the sense that countries engage in trade not only to satisfy domestic interests, but also in response to opportunities and necessities that derive from trade itself. This is most apparent in what is called transshipment, which occurs when a country imports goods from one trading partner and exports them to another. Such flow-through trade, whether transparent or obfuscated, depends on a relatively weak connection between the original exporter and the ultimate importer. If those countries were well connected institutionally, politically, and geographically, then they presumably would not need the services of the country that stands between them to facilitate this flow-through trade.

In recent decades, the country that best represents the implication of *low* structural equivalence for trade is Hong Kong, which intermediated between China, with which it has strong intergovernmental ties, and other countries that were more weakly tied to China (Hanson and Feenstra 2001). For example, in the late 1990s, the United States objected to transshipments of textiles from China through Hong Kong as a means of circumventing quota restrictions. Interestingly, New Zealand, in turn, cited this example in raising questions about its own enthusiasm for negotiating an economic agreement with Hong Kong, fearing a flood of Chinese textiles in the wake of a crackdown by U.S. authorities on Hong Kong.[2] While Hong Kong is the textbook example for transshipment, the phenomenon happens elsewhere. Recently, Brussels requested that Poland more fully "secure" its borders on the eve of that country's accession to

[2] Supplementary submission by the Central Districts Federated Clothing, Laundry and Allied Workers Union on the proposed Hong Kong free trade and investment agreement, at http://www.canterbury.cyberplace.org.nz.

the EU, one fear being that Poland's relatively close relations with nonmembers could well inspire a surge of transshipment into the lucrative European market.

Straight transshipment may be the most obvious form of brokering in international trade, but a country spanning weakly connected others may also import raw materials or low-value inputs from one, transform them, and send value-added exports to the other.[3] Alternatively, assembly industries may develop in a country because of preferential access to an export market. Volkswagen, for example, set up shop in Mexico to service the local market, but with trade liberalization sweeping that country in the lead-up to the North American Free Trade Agreement (NAFTA) and the completion of the Uruguay round of the GATT, Volkswagen's Mexico facility emerged as a key exporter to the United States and Canada, its two NAFTA partners.[4]

The bases of all of these opportunities for flow-through trade are differences (inequivalences) in the strength of connectedness in the IGO network. If, for example, other countries established the same strong connection to China that Hong Kong had—a development that would make them more structurally equivalent to Hong Kong—they could trade directly with China without relying on Hong Kong for transshipment. Trade between Hong Kong and its newly structurally equivalent alters would fall. Thus, we make the following prediction:

HYPOTHESIS 4.—*Trade between two countries will be negatively related to the structural equivalence between them in the IGO network.*

ANALYSES OF TRADE

Model

To test our hypotheses, we use the "gravity" model, which is the standard for analyses of bilateral trade. According to Rose (2004, p. 99), the gravity model is "a completely conventional device used to estimate the effects of a variety of phenomena on international trade." The model uses a log-

[3] We do not suggest that structural inequivalence in the IGO network is the only reason that countries occupy different positions in global production systems. Human capital, natural endowments, and industrial policy obviously affect which countries provide raw materials, labor, and technology in global production. Commodity-chain theory in sociology also highlights the importance of country power in determining the pattern of production (Gereffi and Korzeniewicz 1994). Our argument is consistent with these claims, and we would simply add to any of them that whatever determines which countries do what in globally distributed production, importing and exporting is required, and the IGO network smoothes those transactions.

[4] See http://www.umich.edu/~cibe/case_pdf/97-12.pdf and http://www.autonews.com/news.cms?newsId=2709.

log specification to explain trade between two countries as a function of their joint income, asserting trade flows will be proportional to the product of their GDPs.[5] We use the bench-line specification of the gravity model described by Rose (2004, p. 100) with control variables suggested by Oneal and Russett (2001) and the variables we have created to represent the IGO network

$$\begin{aligned}\ln(\text{Trade}_{ijt}) = {} & \beta_0 + \beta_1 \ln(\text{GDP}_i\text{GDP}_j)_t + \beta_2 \ln(\text{GDP}_i\text{GDP}_j/\text{Pop}_i\text{Pop}_j)_t \\ & + \beta_3 \ln(\text{IGOCON}_{ijt}) + \beta_4 \text{StrucEquiv}_{ijt} + \beta_5 \text{Democ}_{ijt} \\ & + \beta_6 \text{Ally}_{ijt} + \sum_{ij} \phi_{ij} D_{ij} + \sum_{t} \alpha_t Y_t + \varepsilon_{ijt},\end{aligned}$$

where i and j are the countries in a dyad, t denotes time, and the variables are

1. Trade_{ijt} is the real value of bilateral trade between i and j in year t.
2. GDP is real GDP.
3. Pop is population.
4. IGOCON_{ijt}, which tests hypothesis 1, is IGO connectedness, the number of IGOs that i and j are *simultaneously* members of in year t. IGOCON is replaced by subcomponents representing connectedness through economic and social/cultural IGOs to test hypothesis 2. Those variables are in turn replaced by their subcomponents representing connectedness through minimalist and structured IGOs to test hypothesis 3.
5. StrucEquiv_{ijt} tests hypothesis 4 and is the Pearson product-moment correlation between the vectors of i and j's IGO connections to *other* countries in year t.
6. Democ_{ijt} is the minimum of the democracy/autocracy scores (taken from the Polity III Database) of i and j in year t. This control is included because democracies are expected both to trade more *and* join more IGOs with each other.
7. Ally_{ijt} is an indicator variable coded one if i and j have a military alliance in year t (taken from the Correlates of War Data Set). This control is included because allies are expected both to trade more *and* to join more IGOs with each other.
8. $\{D\}$ is a set of dyad-level fixed effects.
9. $\{Y\}$ is a set of year fixed effects.

[5] The typical gravity model also includes the log of the distance between the two countries, which we cannot include because we use dyad fixed effects. We show below that our results are robust in a random-effects model that includes the log of distance.

The dyad and year fixed effects are important in this specification (Green, Kim, and Yoon 2001; Rose 2004). First, they account for the nonindependence of observations in our data. Second, they effectively control for all stable dyadic and time-varying global influences on trade. Examples of relevant dyad-level influences include the distance between the two countries, whether they share language, a border, religion, or colonial history. The dyad fixed effects take all of these stable influences out of the mix. Similarly, the year fixed effects account for historical influences that affect all dyads, including discrete events of global import such as the Great Depression, the world wars, and the fall of state socialism, as well as trends such as the legitimacy of international relations or international trade. In other words, the fixed effects control for all influences on trade except those that vary both within a dyad *and* across time. With the fixed effects in place, the coefficients indicate the expected change in bilateral trade of a one-unit change in an independent variable for a given dyad in a given year, not correlations between variables across dyads or time. This is the best way to test our hypotheses directly.

Data and Variable Construction

We take our trade, GDP, and population data directly from the data used in Oneal and Russett (2001). These data are particularly appealing for our purposes because they cover the period 1885 to 1992, whereas other data sets focus on the most recent 50 years, when trade data have been more readily accessible. The period before World War II represents substantial change in the network of IGO connections, so this longer time series is important for testing our hypotheses, though as we show below, our results are comparable when we restrict our analysis to the postwar period. Furthermore, given that some analyses of bilateral trade have shown sensitivity to certain key coding decisions—notably what to do about zero trade values before taking their natural logarithm—it is convenient to use Oneal and Russett's data, given that their codings are the result of a series of methodological debates (though here too, we show below that our results are robust to various popular treatments of the relevant variables).

Oneal and Russett obtained trade data from (*a*) the IMF for the post–World War II era, (*b*) the League of Nations for the interwar period, and (*c*) annual editions of *The Stateman's Yearbook* (e.g., Epstein 1913) for pre–World War I. They also relied on other archival sources in their effort to compile the data and check its reliability and robustness (Russett and Oneal 2001, pp. 139–40). They converted current values of trade and GDP to real U.S. dollars (1990 = 100), listed bilateral trade in millions of dollars and added $100,000 before taking the log (to allow the logs of

dyads with zero trade), and listed real GDP in millions of dollars and population in thousands before logging. We take their data in these forms, so the basic data inputs to our gravity models, including the dependent variable, are the same as theirs. Table 1 lists the 135 countries in the data set and the time frame over which each country is observed.

The basis of our operationalizations of the IGO network is the time-varying listing of IGOs and their members, from 1816 to 2001, provided by Pevehouse et al. (2003). According to their definition, an IGO must

1. include three or more members of the Correlates of War–defined state system,
2. hold regular plenary sessions at least once every 10 years, and
3. possess a permanent secretariat and corresponding headquarters.

IGOs may be formed directly by the states themselves or may be "emanations" formed by another IGO. Pevehouse et al. list all of the IGOs formed directly by states, but exclude emanations. This treatment is appropriate for our purposes because emanations are *not* independent from their parent IGOs and do not therefore represent independent sources of IGO connections. Pevehouse et al. identify 497 IGOs that existed at some point in history. In the first year of our analysis, 1885, there were 14 IGOs operating, 43 in 1914, 65 in 1938, and 314 in 1992, which is the last year of our analysis.

We used the IGO member listing to create a time-varying affiliation matrix of connectedness between two countries. The affiliation matrix is produced by multiplying X_t, a country by IGO matrix, with the cells indicating whether a country is a member of a given IGO at time t, by its transpose: $C_t = X_t \cdot X_t^T$. Thus, C_t is a symmetric country-by-country matrix where the cell c_{ijt} indicates the number of IGOs that country i and country j share joint membership in at time t. To test hypotheses 2 and 3 we followed the same procedure to create affiliation matrices of connections through EIGOs and SCIGOs, and the minimalist and structured representatives of each of those types. This required that we code IGOs as to their function and structure. We followed available coding schemes to do so and describe the process in the appendix. We take the natural logarithms of the IGO connectedness variables, both for consistency with the treatment of other variables in the gravity model, and because exploratory analysis indicated that this functional form best represented the impact of IGO connectedness in our models (our results are qualitatively similar when the IGO connectedness variables are not logged). We added 0.1 to all measures of IGO connectedness before taking the natural logarithms.

Structural equivalence, which tests hypothesis 4, is simply the Pearson product-moment correlation between the vectors that represent i and j's

IGO connections to all other countries (Wasserman and Faust 1994, p. 368). This measure captures the degree of similarity between two countries' IGO connections *to others*, to get at our argument that similarities in relations to others represent competition, while dissimilarities represent brokering opportunities. Some readers have wondered why we use this continuous measure of structural equivalence rather than a measure based on pure structural holes (complete disconnects) in the IGO network. The reason is that brokering opportunities in the IGO network arise from differences in the strength of IGO connections, not from complete disconnects which were relatively rare, especially in later years. For example, currently, all countries have *some* connection to China in the IGO network (there are no complete disconnects), yet much trade to and from China flows through Hong Kong because its IGO connection to China is stronger than that of most other countries.

Descriptive statistics for the variables are presented in table 2. Generally, the correlations between variables that appear in the same models (e.g., not comparing IGO connectedness to its economic and social/cultural components) are modest, although there are some correlations greater than .50 among the network variables. We therefore conducted a number of investigations to insure that our estimations were not compromised by multicollinearity. We estimated hierarchically nested regression models and used *F*-tests to indicate the joint significance of more highly correlated variables (Kmenta 1971, p. 371). The nested models (presented below) showed that the coefficients of correlated variables were robust to various model specifications, and the results of the *F*-tests were consistent with the tests of individual significance, indicating that their standard errors were not inflated. Additionally, we estimated our models on random subsamples of the data, obtaining results comparable in all ways to those we report below (Greene 1997). We also estimated models with the network variables entered singularly, and again, the results were consistent with those we report here. Thus, there is no evidence that multicollinearity compromised our estimations.

Results

Table 3 presents the results of fixed-effects gravity models. Model 1 includes the control variables. Model 2 adds structural equivalence and is a significant improvement over model 1 ($F_{1,143278} = 352.22$, $P < .001$). The coefficient on that variable indicates that there is less trade between two countries when they are more structurally equivalent, in support of hypothesis 4. Model 3 adds the aggregate IGO connectedness measure and improves on model 2 ($F_{1,143277} = 4231$, $P < .001$). The positive coefficient for IGO connectedness is as predicted by hypothesis 1: as two countries

TABLE 1
COUNTRIES ANALYZED

Country Name	Years of Observation*	Country Name	Years of Observation*	Country Name	Years of Observation*
Afghanistan	1925–38	Germany (West)	1955–88	Nicaragua	1925–90
Albania	1925–38	Germany	1885–1938	Niger	1960–89
Algeria	1963–92	Ghana	1960–90	Nigeria	1960–92
Angola	1975–89	Greece	1885–1992	Norway	1905–92
Argentina	1887–1990	Guatemala	1925–92	Oman	1971–89
Australia	1920–92	Guinea	1959–92	Pakistan	1950–92
Austria	1920–92	Guinea-Bissau	1974–92	Panama	1925–92
Austria-Hungary	1885–1913	Guyana	1966–90	Papua New Guinea	1976–92
Bahrain	1975–88	Haiti	1934–89	Paraguay	1920–92
Bangladesh	1973–92	Honduras	1925–92	Peru	1885–1992
Belgium	1885–1992	Hungary	1920–92	Philippines	1950–92
Benin	1960–92	Iceland	1950–92	Poland	1920–92
Bolivia	1925–92	India	1950–92	Portugal	1885–1990
Botswana	1966–89	Indonesia	1960–92	Romania	1885–1988
Brazil	1890–1992	Iran	1925–92	Russia	1885–1989
Bulgaria	1908–92	Iraq	1932–87	Rwanda	1962–92
Burkina Faso	1960–92	Ireland	1922–92	Saudi Arabia	1927–89
Burma	1950–89	Israel	1953–92	Senegal	1960–92
Burundi	1962–92	Italy	1885–1992	Sierra Leone	1961–92
Cameroon	1961–92	Ivory Coast	1960–92	Singapore	1965–92
Canada	1920–92	Jamaica	1962–92	Somalia	1960–89
Central Afr. Rep.	1962–92	Japan	1885–1992	South Africa	1920–92
Chad	1962–92	Jordan	1954–90	Spain	1885–1992
Chile	1895–1992	Kenya	1965–92	Sri Lanka	1950–92
China	1890–1992	Korea	1905	Sudan	1971–92

Colombia	1900–1992	Korea, South	1953–92	Swaziland	1968–89
Comoros	1975–92	Kuwait	1980–89	Sweden	1885–1992
Congo	1961–90	Laos	1984–92	Switzerland	1885–1992
Costa Rica	1925–92	Latvia	1920–38	Syria	1961–92
Cuba	1925–38	Lesotho	1972–92	Tanzania	1963–88
Cyprus	1960–92	Liberia	1925–86	Thailand	1890–1990
Czechoslovakia	1920–90	Lithuania	1920–38	Togo	1961–90
Denmark	1885–1992	Luxembourg	1920–92	Trinidad & Tobago	1962–92
Dominican Rep.	1925–92	Malawi	1965–92	Tunisia	1960–92
Ecuador	1925–92	Malaysia	1960–92	Turkey	1885–1992
Egypt	1937–92	Mali	1960–90	Uganda	1962–92
El Salvador	1925–92	Mauritania	1961–92	United Arab Emir.	1980–89
Estonia	1920–38	Mauritius	1968–92	United Kingdom	1885–1992
Ethiopia	1925–86	Mexico	1890–1992	U.S.A.	1885–1992
Fiji	1970–90	Mongolia	1929–90	Uruguay	1925–92
Finland	1920–92	Morocco	1956–92	Venezuela	1900–1992
France	1885–1992	Mozambique	1976–92	Yugoslavia	1921–90
Gabon	1961–92	Nepal	1960–86	Zaire	1965–89
Gambia	1965–90	Netherlands	1885–1992	Zambia	1964–92
Germany (East)	1970–88	New Zealand	1920–92	Zimbabwe	1967–92

* Years of observation may not be inclusive because of data availability. There are no observations during the world wars, 1914–19 and 1939–45.

TABLE 2
BASIC STATISTICS

	Mean	SD	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) ln(trade)	2.58	2.77	.25	.24	.26	.21	.40	.17	.30	.09	.30	.66	.49	.30	.02
(2) ln(IGO connectedness)	2.81	1.09		.92	.90	.84	.50	.78	.63	.75	.63	.36	.36	.17	.15
(3) ln(EIGO and SCIGO connectedness)	2.59	1.00			.97	.98	.54	.84	.70	.83	.58	.37	.40	.18	.18
(4) ln(EIGO connectedness)	2.14	1.04				.83	.56	.87	.63	.76	.55	.39	.41	.18	.16
(5) ln(SCIGO connectedness)	1.53	.96					.46	.75	.79	.89	.53	.35	.38	.15	.22
(6) ln(EIGO connectedness$_{minimal}$)	.55	1.40						.26	.51	.30	.51	.32	.26	.28	.15
(7) ln(EIGO connectedness$_{structured}$)	1.66	1.37							.55	.72	.43	.39	.40	.06	.16
(8) ln(SCIGO connectedness$_{minimal}$)	.52	1.35								.51	.53	.40	.32	.14	.21
(9) ln(SCIGO connectedness$_{structured}$)	.94	.90									.38	.23	.35	.10	.21
(10) Structural equivalence	.61	.23										.30	.17	.18	.26
(11) ln$(GDP_i \times GDP_j)$	34.57	2.60											.51	.16	−.06
(12) ln$([\text{GDP per cap}]_i \times [\text{GDP per cap}]_j)$	16.13	1.45												.37	−.08
(13) Min democracy in dyad	−3.26	6.65													.02
(14) Military allies	.13	.34													

TABLE 3

FIXED-EFFECTS (Dyad and Year) GRAVITY MODELS OF BILATERAL TRADE, 1885–1992

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
ln(IGO connectedness)			.656***			
			(.011)			
ln(EIGO and SCIGO connectedness)				.588***		
				(.010)		
ln(EIGO connectedness)					.470***	
					(.009)	
ln(SCIGO connectedness)					.130***	
					(.009)	
$\ln(\text{EIGO connectedness}_{\text{minimal}})$						.109***
						(.004)
$\ln(\text{EIGO connectedness}_{\text{structured}})$						.166***
						(.007)
$\ln(\text{SCIGO connectedness}_{\text{minimal}})$						.017***
						(.005)
$\ln(\text{SCIGO connectedness}_{\text{structured}})$						.258***
						(.008)
Structural equivalence		−.684***	−1.831***	−1.696***	−1.694***	−1.367***
		(.036)	(.040)	(.040)	(.040)	(.039)
$\ln(\text{GDP}_i \times \text{GDP}_j)$	.151***	.185***	.083***	.070***	.057***	.060***
	(.013)	(.013)	(.013)	(.013)	(.013)	(.013)
$\ln([\text{GDP per cap}]_i \times [\text{GDP per cap}]_j)$	.761***	.731***	.853***	.859***	.878***	.865***
	(.016)	(.016)	(.016)	(.016)	(.016)	(.016)
Min democracy in dyad	.007***	.008***	.010***	.010***	.010***	.011***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Military allies	.159***	.132***	.127***	.130***	.112***	.164***
	(.019)	(.019)	(.019)	(.019)	(.019)	(.019)
Observations	149,102	149,102	149,102	149,102	149,102	149,102
Dyads	5,725	5,725	5,725	5,725	5,725	5,725
Within-dyad R^2	.3372	.3388	.3578	.3542	.3562	.3531

NOTE.—Standard errors in parentheses.

** $P < .01$.

*** $P < .001$.

become more connected to each other through joint membership in IGOs, the trade between them increases. When IGO connectedness between two countries doubles, the level of trade between them is expected to increase by 58% ($2^{0.656} - 1$). Since IGO connectedness is based on the full set of IGOs, this result indicates the average impact of IGO connections on trade. Model 4 replaces the aggregate IGO connectedness measure with one that reflects connections only through EIGOs and SCIGOs, excluding IGOs that had general or military/political functions.[6] As expected, connectedness through EIGOs and SCIGOs (which make up more than 80% of all IGOs) brings a large increase in trade.

Model 5 breaks out the separate effects of EIGO and SCIGO connections. A test of joint significance indicates that the inclusion of these measures improves on model 2 ($F_{2,143276} = 1939$, $P < .001$; model 2 is the appropriate comparison because the logging of the IGO connectedness measures means that model 5 is not nested in models 3 or 4). Consistent with hypothesis 2, the positive coefficient of SCIGO connectedness indicates that affiliations through these social and cultural organizations do increase bilateral trade. The final model in table 3 breaks EIGO and SCIGO connectedness into that which comes from minimalist and structured IGOs. The four connectedness measures that result are jointly significant ($F_{4,143274} = 486.5$, $P < .001$). As hypothesis 3 predicted, connections through structured IGOs do more to increase trade than connections through minimalist IGOs. This is true for both EIGOs ($F_{1,143274} = 45.99$, $P < .001$) and SCIGOs ($F_{1,143274} = 615.65$, $P < .001$).

The coefficients in model 6 suggest that doubling the level of connection through minimalist and structured EIGOs is associated with increases in trade of 7.8% and 12.2%, respectively. Corresponding figures for SCIGOs are 1.1% for minimalist and 19.6% for structured. While we predicted that SCIGOs would increase trade, we were surprised by the magnitude of the effect of connections through structured SCIGOs, which is even larger than that of structured EIGOs ($F_{1,143274} = 65.13$, $P < .001$).

The control variables in all of the models in table 3 behave as expected. Richer countries, as indicated by GDP and GDP per capita, trade more. Trade is also higher as a function of the minimum level of democracy in

[6] General and political/military IGOs accounted for 89 of the 497 total IGOs. We chose not to highlight specific effects for these "other" IGOs because they do not fit as cleanly into the mechanisms of transaction governance and awareness/affinity that we have highlighted. Presumably, general and political/military IGOs affect trade through both of these mechanisms, but operate also to affect the international balance of power in a way that is beyond the scope of this article. Supplementary models indicated that connections through general and political/military IGOs are associated with higher trade, although the inclusion of these additional connectedness measures does not affect the coefficients of EIGOs and SCIGOs that we interpret to test hypotheses 2 and 3.

the dyad, supporting the claim that democracy promotes trade (Oneal and Russett 2001). Military allies also trade more, consistent with the familiar "trade follows the flag" argument.

Robustness Checks

While the results in table 3 are consistently in support of our hypotheses, there remain alternative model specifications and functional forms of the variables to consider. Table 4 presents a battery of robustness checks of our results. The first alternative we consider is a theoretical one: IGOs may influence trade through the creation of legitimacy. Very briefly, the argument contains the following elements: countries are more legitimate to the extent that they employ familiar structures and engage in certain "statelike" activities, including participation in international organizations (Meyer et al. 1997), and are more attractive trading partners as a function of their legitimacy (Meyer and Rowan 1977). These arguments suggest the total number of IGO memberships of the states in a dyad (as an indicator of their legitimacy) as a predictor of trade.[7] In model 7, the natural logarithm of this variable is added to our full model. Consistent with the legitimacy argument, it has a positive effect on the level of bilateral trade, but importantly, its inclusion does not change the results concerning our main variables of interest.

We also reestimated our model using only dyads that exist for at least 20 years in the data, reported as model 8. The reason for doing this is that Oneal and Russett (2001) suggest that their results were more stable for longer-duration dyads. The results are essentially the same as those reported for all dyads. In model 9 we examined sensitivity to the process by which zero values of trade are logged by rescaling the dependent variable, listing trade in dollars and adding $1 before taking the log (as opposed to listing in millions of dollars and adding $100,000). This effort produces results that are comparable to those in model 6. Model 10 reestimates model 6 using only post–World War II observations. The results are still consistent with all of our hypotheses, except for structural equivalence, which has the expected negative effect on trade but is not statistically significant.

Model 11 respecifies the GDP and population variables to match the treatment in Oneal and Russett (2001), where the GDPs of both countries are first logged and then added, as are the countries' populations. The

[7] Trade may also increase as a function of the total number of IGOs in the world system, as they may legitimize international relations more broadly (Boli and Thomas 1999). In our models, such historical trends are completely controlled for by the year fixed effects.

TABLE 4

FIXED-EFFECTS (Dyad and Year) GRAVITY MODELS OF BILATERAL TRADE, 1885–1992: ROBUSTNESS CHECKS

	Model 7: International Legitimacy	Model 8: Dyads That Last ≥ 20 Years	Model 9: Rescaling of Trade before Logging	Model 10: Post–World War II Observations	Model 11: Oneal and Russett (2001) Gravity Model	Model 12: Random-Effects Model with Distance	Model 13: Instrumental Variables
$\ln(\text{EIGO connectedness}_{\text{minimal}})$	.109***	.123***	.253***	.019***	.109***	.127**	
	(.014)	(.005)	(.014)	(.015)	(.004)	(.004)	
$\ln(\text{EIGO connectedness}_{\text{structured}})$	.165***	.195***	.861***	.285***	.166***	.132***	
	(.007)	(.008)	(.022)	(.017)	(.007)	(.007)	
$\ln(\text{SCIGO connectedness}_{\text{minimal}})$	.016***	.010***	.261***	.022***	.017***	.011***	
	(.005)	(.005)	(.016)	(.006)	(.005)	(.005)	
$\ln(\text{SCIGO connectedness}_{\text{structured}})$	.235***	.276***	.864***	.321***	.258***	.216***	
	(.008)	(.009)	(.026)	(.017)	(.008)	(.008)	
Structural equivalence	−1.454***	−1.456***	−3.410***	−.073	−1.367***	−1.338***	−.999***
	(.040)	(.044)	(.040)	(.070)	(.039)	(.037)	(.040)
$\ln(\text{GDP}_i \times \text{GDP}_j)$	.069***	.086***	2.027***	.361***		.503***	.201***
	(.014)	(.014)	(.044)	(.021)		(.007)	(.014)
$\ln([\text{GDP per cap.}]_i \times [\text{GDP per cap.}]_j)$	.862***	.838***	−.824***	.652***		.564***	.751***
	(.016)	(.017)	(.053)	(.022)		(.010)	(.017)
Min democracy in dyad	.011***	.013***	.001	.006***	.011***	.012***	.001
	(.001)	(.001)	(.003)	(.001)	(.001)	(.001)	(.002)

Military allies	.163***	.174***	−.117	−.154***	.164***	.101***	.011
	(.019)	(.020)	(.062)	(.036)	(.019)	(.018)	(.021)
$\ln(\text{IGO memberships}_i + \text{IGO memberships}_j)$	.086***						
	(.007)						
$\ln(\text{GDP})_i + \ln(\text{GDP})_j$					.925***		
					(.011)		
$\ln(\text{population})_i + \ln(\text{population})_j$					−.865***		
					(.016)		
ln(distance between i and j)						−.835***	
						(.021)	
Instrumented version of ln(IGO connectedness)							.490***
							(.029)
Observations	149,102	112,654	149,102	115,776	149,102	149,102	134,122
Dyads	5,725	2,916	5,725	4,981	5,725	5,725	5,691
Within-dyad R^2	.3537	.4089	.2439	.2908	.3531	.3477	.3273

NOTE.—Standard errors in parentheses.
** $P < .01$.
*** $P < .001$.

results for the variables that test our hypotheses are unaffected by this respecification. In model 12 we include the natural logarithm of the distance between i and j, a variable that is typically included in gravity models but which requires us to use random rather than fixed dyad-level effects, since it does not vary within dyads. As expected, trade is lower when distance is higher, and other results are comparable to those reported above.

The Direction of Causality and the Problem of Endogeneity

While our main models and robustness checks provide consistent evidence that an increase in IGO connectedness is associated with an increase in bilateral trade, they do not demonstrate the direction of causality. There are credible alternatives to our argument that IGO connections cause changes in trade. Below, we describe these alternatives and evaluate them in light of our analysis.

IGO connectedness and trade may be spuriously correlated through one or more other variables.— Spurious correlation might occur because of global or local (dyadic) influences. Our models include year fixed effects to control for the possibility that IGO connectedness and trade are spuriously correlated because of some broad historical process. Further, the averages across all dyads in a year of IGO connectedness and trade are *negatively* correlated (−0.48) and follow very different time trends. Thus, there is no reason to believe that some global trend produces a spurious correlation in our data. In contrast, there are a number of dyad-level factors that are likely to affect both IGO connectedness and trade. Most of these, however, are accounted for by our dyad-level fixed effects, which absorb the influence of any persistent characteristic of the dyad, such as geographic distance, shared border, language, culture, religion, or colonial heritage. Our models also control for the most likely time-varying dyadic influences on IGO connectedness and trade: namely, the levels of democracy and economic productivity in the dyad and the presence of military alliances between its members.

Reverse causality: countries join IGOs because they trade with each other.—It is hard to see how a reverse causality argument could account for the *full pattern* of the relationship between the IGO network and trade. Our theory predicts not only an association between economic IGO connections and trade, but also an effect for social/cultural IGO connections and differential effects for connections through minimalist and structured IGOs. We also make a prediction for structural equivalence, a measure that depends on the network beyond the dyad. At a minimum, any reverse causality argument would have to account for all of these effects. Reverse causality arguments must also detail the mechanisms through

which trade in a dyad leads to specific changes in the IGO network. A single IGO connection between two countries emerges through membership in an IGO that includes *at least* one other country-member, and usually many more, and is therefore coupled to IGO connections to *all of them*. A given country cannot target an IGO connection to another country in response to trade in the dyad, because any attempt to do so would have repercussions throughout the network.

IGO connectedness may be a signal of goodwill, not causally related to trade, but just something countries do to indicate that they are open to trade.—This claim is inconsistent with the fact that structured IGOs matter more than minimalist IGOs. If IGO connections were merely a signal of goodwill or openness, then there is little reason why their impact should depend on the organizational capabilities of the IGOs.

If endogeneity does exist, coefficient estimates for IGO connectedness will be inconsistent.—The above arguments lead us to believe that the causal relationship we specify is most consistent with the results of the analysis. Nevertheless, it would be foolish to deny that IGO connectedness and trade may have some reciprocal relationship. If they do, the consistency of our coefficient estimate for IGO connectedness would be compromised. Instrumental-variable estimation is an increasingly popular method for adjusting for endogeneity (Greene 1997; for recent sociological applications see Ingram and Roberts 2000; Burris 2004). This technique involves creating proxies for the endogenous variable by using variables other than the dependent variable of the regression. In other words, we need a model of IGO connectedness that does not rely on past levels of trade. To build this model, we relied on the literature on the causes of war, with the logic that peace and IGO connections are two types of bilateral relations that may be explained by similar factors (Russett and Oneal 2001).

Specifically, we used lagged values of the following variables to predict the IGO connectedness between two countries:[8] whether they share a border; the distance between them; whether they began a militarized dispute in either of the two previous years; the time since their last militarized dispute; whether either was a major power; whether they were military allies; the similarity of the countries' levels of democracy; the

[8] We applied the instrumental variables procedure only for the aggregate IGO connectedness variable and not its social, economic, minimalist, and structured subcomponents. Applying instrumental variables to the subcomponents would result in the awkward specification of including in the same model two or more covariates that rely on substantially the same instruments. In supplementary analyses, we reestimated four versions of our full model, substituting instrumented versions of the four subcategories of IGO connectedness one at a time. Results of those regressions were comparable to those reported in model 13.

total number of IGOs existing in the world system; and an interaction of the distance between the countries, on the one hand, and the total number of IGOs, on the other, to reflect the fact that IGO connections tend to be regionalized. These variables are taken from the Correlates of War Data Sets. We used predicted values from that regression as a proxy for IGO connectedness in model 13 in table 4. Consistent with our theoretical arguments, the instrument for IGO connectedness had a positive and significant influence on bilateral trade, and the effects of other variables are largely unchanged. Thus, we conclude that endogeneity does not undermine our claim that increases in IGO connectedness effect increases in bilateral trade.

DISCUSSION

Why has the literature generally failed to turn up consistent evidence that IGOs promote trade? We argue that analysts have not captured the structure behind the efficacy of IGOs. The institutions that IGOs enact are not disembodied influences on international relations, but rather operate within a social structure formed by the simultaneous memberships of countries in IGOs. By identifying the network of bilateral connections that IGOs forge between countries, we discover substantial effects on trade. For example, a doubling of the level of connection between two countries across all IGOs is associated with a 58% increase in trade. The shift to the network of IGO connections also highlights the indirect influence of structural configurations that affect trading patterns, such as the disequivalencies that facilitate flow-through trade.

While the basis of our analysis of IGOs is an integration between network and institutional theories, our context also allows us to develop and test two ideas that are central to those theories, but have so far been the subject of more speculation than systematic analysis. The first concerns the distinctly social influence of relationships on economic exchange. The division of IGOs into economic and social/cultural categories allows us to separate features of ongoing economic relationships that are typically confounded, and thus gives us rare insight into this issue, which is critical to the relevance of economic sociology. Although we expected to find a trade benefit from SCIGO connections, the results are stark in their magnitude, with those connections (when braced by organizational structure) doing even more to promote trade than connections through EIGOs. This is a victory for arguments that the economic impact of relationships depends, to an important extent, on social mechanisms. The relevance of SCIGO connections is still more interesting in light of recent arguments that identify limitations of economic connections between states. Recent

work makes clear that preferential trade agreements, in particular, are struck by states looking to increase their bargaining power in multilateral trade rounds (Mansfield and Reinhardt 2003). This "defensive" integration is likely to be more cyclical, and perhaps less robust, than integration realized through social/cultural IGOs, which may be more palatable domestically.

The second contribution to theory concerns the interdependence between different levels of institutions. Although few would dispute the idea that institutions operate through an interdependent hierarchy, it has fallen between the cracks of the division of labor between different schools of institutionalism in the social sciences. We hypothesized that the efficacy of the principles that IGOs infuse into their members' relations depends on the structures of the IGOs themselves. We found that both economic and social/cultural IGO connections were more beneficial when they were made through IGOs with effective bureaucratic structures as opposed to through minimalist IGOs. The efficacy of bureaucracy in this context is suggestive of the basis of institutional authority in international relations and injects organization into discussions of "order without law," which have so far emphasized interpersonal relations (Macaulay 1963; Ellickson 1991). And while we are confident that structured IGOs matter more for trade than minimalist ones, we realize that we have only scratched the surface of this issue. We would like to see more case studies examine the efficacy of specific IGOs (e.g., Fligstein and Mara-Drita 1996; Busch and Reinhardt 2002), leading to a more comprehensive categorization of IGO structure than the one we use here.

Our focus on IGOs is not meant as a slight to other mechanisms of international connectivity, such as nongovernmental organizations (NGOs) and multinational corporations (MNCs). On the contrary, the influence of NGOs on world culture, for example, is the subject of an active research program in sociology (eg., Boli and Thomas 1999; Guillen 2001). Evidence from that program indicates that NGOs may serve a purpose analogous to that we ascribe to SCIGOs, in terms of knitting together national cultures, creating empathy, sympathy, and trust at the seams. This observation suggests a second-order influence of the linkage between NGOs and world culture to trade. Strange (1996) suggests a direct symbiosis between IGOs and NGOs, where NGOs get funding, and IGOs (or IGO bureaucrats) get flexibility to pursue interests in ways their mandates may preclude. The possible interdependencies between IGOs and MNCs are likewise worthy of further study.

Despite the impressive gains in trade that can result from IGO membership, the decisions of states to join them may not be easy. There are costs associated with IGO membership, and these must be weighed against any expected gains. Most obviously, there are the direct costs of operating

IGOs, which are often assessed to members using various formulas (i.e., based on GDP). These direct costs may typically pale in comparison to the benefits of increased trade, but they are not always trivial, as evidenced by the ongoing battle between the United States and the UN over dues to that organization.

The second cost is the risk that IGOs may be diverted from their original purposes, or the will of their members, by powerful bureaucrats. Michel's "iron law" represents a threat not only to the effectiveness of IGOs, but also to the very autonomy of their member states (Strange 1996). Cox and Jacobson (1973) present case studies of decision making in eight IGOs. They identify a trend to bureaucratization, and citing UNESCO and the International Labor Organization as specific examples, claim, "The existence of a large organization is itself a potentiality and a pressure for the expansion of tasks" (p. 424). Indeed, goal displacement and unjustified budgetary growth were among the criticisms the United States made when withdrawing from UNESCO in 1984. Cox and Jacobson begin the process of identifying features of an IGO's structure and mandate that affect whether it is likely to be more subject to the influence of the individual participants (bureaucrats, consultants, member representatives) or of its member states. This distinction is an important one for extending our research and fully specifying its policy implications. A clear understanding of what preserves member influence in IGOs would be useful for (1) identifying which IGOs are most useful for promoting trade and other desired outcomes, (2) helping countries decide which IGOs to join, and (3) guiding the designers and managers of IGOs.

Another contributing factor to the U.S. decision to withdraw from UNESCO, that organization's perceived anti-Westernism and anti-Semitism, is useful for illustrating the third, and perhaps greatest, cost of IGO connections. The sociological literature on embeddedness makes clear that there is a dark side to relational constraints (Uzzi 1996). They bind related parties for better or for worse. To this point, we have concentrated on the advantages of relational constraints to smooth trade. In the IGO context, relational constraints may also subject states to unwanted economic, political, and ideological dictates. It is not possible to mitigate this risk fully through careful design of the structure and scope of IGOs—any relationship from which the parties derive benefit opens the door to normative influence on a range of issues (Homans 1950).

These potentialities suggest that a given IGO connection may be a panacea or a devil's compact, depending on the IGO's structure and mandate, and the cultures, histories, economies, and polities of the connected countries. At the same time, we do not want to slight the benefits to trade of IGO connectedness merely because they are only part of the equation of benefits and costs. The gains to trade from IGO membership

are substantial, and their pattern sheds important light on the interdependence between economy and society.

APPENDIX

Coding of IGO Function and Structure

Information on the functions and structures of IGOs comes mainly from the listing for each IGO that appears in the *Yearbook of International Organization*, braced by various other sources. A research assistant who was unfamiliar with our hypotheses performed the coding. It was not practical to have multiple coders because the coding effort required extensive archival work, which involved a learning curve for finding information on IGOs that were sometimes obscure. For both function and structure, the coder initially applied a fine-grained coding scheme. We then collapsed fine-grained subcategories into the categories we used in the actual analysis. This process allowed us to be more precise about the exact nature of each IGO and therefore more confident in the aggregate categories that we use for our analyses. The coder also identified her confidence in each coding, based on the quality of the evidence that supported it. We used those confidence measures in supplementary analyses to insure our results were robust to the data quality supporting the coding.

IGO Function

IGOs have specific functions that are outlined in their mandates. We began with the four-category coding of IGO functions (general purpose, military, economic, and social/cultural) that Jacobson (1996) provides for IGOs in 1981 and 1992. By comparing Jacobson's coding to the available information on each IGO, we identified the criteria for each category. We then broke down the criteria for economic and social/cultural codings into subcategories to produce the nine-category scheme presented in appendix table A1, which we applied to all IGOs in our data. In the analysis, IGO connectedness is calculated using IGOs from all nine categories. EIGO connectedness is calculated using the 241 IGOs categorized under EIGO in table A1. SCIGO connectedness is calculated using the 167 IGOs categorized under SCIGO in table A1. We also examined in preliminary analysis the effects of the economic and social/cultural subcategories of IGOs. These were comparable to those using the aggregate categories, although IGO connectedness measures using the subcategories tended to be highly correlated.

TABLE A1
CODING SCHEME FOR IGO FUNCTION

Function	Description of Organizations	Examples
General purpose (59/497 IGOs)	Umbrella organizations that focus on communication between and the administration of governments; perform multiple functions of standardizing, harmonizing, monitoring, and administering international agreements.	UN, Nordic Council, African Civil Service Observatory, Organization of American States
Military/political (30/497 IGOs)	Regional political or military alliances; any organization created for military alliance/defense/security purposes.	Imperial Defense Committee, Warsaw Treaty Organization, NATO
EIGO:		
Monitoring, surety, and general economic (105/497 IGOs)	Perform multiple trade-related functions, monitor and enforce international economic transactions, establish international trade agreements, help process international transactions, protect property rights.	European Patent Office, East Caribbean Currency Area, East African Common Market, WTO
Standardization and harmonization (36/497 IGOs)	Promote standards and conventions that smooth communications and transportation.	Organization for Cooperation of Railways, Universal Postal Union, International Bureau of Weights and Measures
Cooperation and development (67/497 IGOs)	Promote development or manage international public goods.	Caribbean Development Bank, Indian Ocean Commission, Economic Cooperation Organization
Industry specific (33/497 IGOs)	Address issues regarding the international structure and operation of specific industries.	International Wheat Council, International Pepper Community, Inter-American Federation of Cotton
SCIGO:		
Environmental (33/497 IGOs)	Engage in activities related to conservation/environment.	International Fund for Saving the Aral Sea, International Coral Reef Initiative
General (67/497 IGOs)	Address health, disease, disaster; also social welfare, cultural organizations, humanitarian organizations.	Arab Labor Organization, International Exhibitions Bureau, Nordic Children's Film Council, International Labor Organization
Education and research (67/497 IGOs)	Educational, scientific, research, and technology organizations.	Commonwealth Science Council, European Space Agency, University of the South Pacific

IGO Structure

To identify IGOs as minimalist or structured, we began with the three-category coding of IGO structure that appears in Gartzke (2002, p. 22):

1. *Minimalist*.—IGOs that contain plenary meetings, committees, and possibly a secretariat without an extensive bureaucracy beyond research, planning, and information gathering.
2. *Structured*.—IGOs that contain structures of assembly, executive (nonceremonial), and/or bureaucracy to implement policy, as well as formal procedures and rules.
3. *Interventionist*.—IGOs that contain mechanisms for mediation, arbitration, and adjudication, and/or other means to coerce state decisions (such as withholding loans or aid), as well as means of enforcement of organizational decisions and norms.

We applied this categorization scheme using a "coding sheet" we obtained from Erik Gartzke and Charles Boehmer, which breaks down the above categories into specific roles, structures, and policies. We checked our categorizations against those that Gartzke (2002) supplies for IGOs up to 1970 and reconciled any differences.

In preliminary analysis, we used all three categories and broke up our connectedness measures into those through minimalist, structured, and interventionist IGOs. This worked well when applied to the full set of IGOs, with results showing a moderate impact on trade of connections through minimalist IGOs, a bigger impact for structured IGOs, and a still bigger impact for interventionist IGOs. When we applied the three categories of structures to the economic and social/cultural subcategories of IGOs, the results were not as clean. Particularly, results for connections through interventionist IGOs were unreliable. This is probably because relatively few EIGOs are interventionist, and even fewer SCIGOs are. When we include small categories in the analysis, the results are overly sensitive to what we add to zero connections before logging them. To avoid this methodological problem, we aggregated the second and third categories to create a single structured category, which we compare to the minimalist category to test hypothesis 3.

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