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"Clubs of Clubs": A Networks Approach to the Logic of Membership in Intergovernmental Organizations

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Abstract

Political scientists are paying increasing attention to the effect that shared membership in intergovernmental organizations (IGOs) has in international politics. A number of studies have examined the role that shared membership in IGOs has on dependent variables such as conflict, trade, interest convergence and the diffusion of human rights norms. More recently, scholars have turned their attention to explaining the variation that exists in the extent to which states join IGOs in the first place. In this paper we advance this literature by adopting a network theoretic perspective of IGO membership. Rather than considering the IGO network as simply a collection of ties between states, we consider the ways in which the IGO network can be conceptualized as a number of distinct *communities* that consist of states and IGOs. We posit that accounting for membership in these communities allows IR scholars adopt a more nuanced understanding of the causes and effects of IGO membership. Our argument is that, depending on the logic of IGO joining, we would expect these "clubs of clubs" or IGO communities to be defined on differing grounds. In the empirical part of the paper we use the network analytic tool of modularity maximization to detect the IGO communities in the global network for the period 1950-2000. We describe how the IGO communities have developed over time and test the extent to which factors such as development, geography, regime type, alliance ties, language, religion and colonial ties explain the IGO community structure.

1 Introduction

International institutions constitute a key area of research in international relations (IR). An important literature has grown around explaining why states create institutions and when institutions can have effects on state behavior (Keohane and Martin, 1995; Simmons, 1998; Barnett and Finnemore, 2004; Checkel, 2005). Equally important is the scholarship that explains the different forms of institutional design states use to address differing problems (Mitchell, 1994; Koremenos, Lipson and Snidal, 2001; Abbott and Snidal, 1998). Yet questions of institutional design and effects are intertwined with the related question of membership in institutions (Downs, Rocke and Barsoom, 1996). Thus, a crucial component of this research agenda is the question of why states vary so widely in the extent to which they participate in international institutions. Scholars have therefore studied the logic of joining with respect to a wide range of institutional forms, including human rights agreements (Hafner-Burton and Tsutsui, 2005; Vreeland, 2008), environmental agreements (von Stein, 2008), international courts (Simmons and Danner, 2010), and alliances (Morrow, 1991).

The more formal types of international institutions – i.e., those that have a permanent staff and secretariat and are usually referred to as Intergovernmental Organizations (IGOs) – have received particular attention from IR scholars in recent years. Examples of such organizations include prominent IGOs such as the United Nations, the European Union, the Organization of American States, as well as many less well-known organizations such as the International Telecommunications Union or the Arab Monetary Fund. Much of the existing scholarship has focused on the *effects* that IGO membership has on various aspects of international relations. This is most notable in the study of conflict (Oneal and Russett, 1999; Gartzke, Li and Boehmer, 2001) – where shared membership in IGOs is thought to constitute the third leg of the "Kantian tripod" (Russett, Oneal and Davis, 1998) – although more recently a number of studies have examined the effects that IGO membership has on other variables such as democracy (Pevehouse, 2002), trade (Ingram, Robinson and Busch, 2005), domestic economic policies (Cao, 2009) and human rights (Greenhill, 2010*a*).

Despite these developments, what seems to have attracted much less attention is the question of what explains the variation in the IGOs states decide to join. If joining decisions are tightly connected to institutional design and compliance then it is crucial to understand which factors explain why states join some IGOs and not others and why some states tend to cooperate with each other through IGOs more so than others. Among the factors that scholars argue affect states' decisions to join IGOs are economic development (Jacobson, Reisinger and Mathers, 1986; Shanks, Jacobson and Kaplan, 1996; Beckfield, 2003), regime type (Boehmer and Nordstrom, 2008), and cultural factors such as language and colonial ties (Greenhill, 2010*b*:Ch. 6). For the most part, these studies have examined IGO memberships either using a simple monadic approach (where the dependent variable is simply the total number of IGOs to which each state belongs), or a dyadic approach (where the dependent variable is the number of shared IGO ties).[1]

In this paper we attempt to advance the study of the formation of IGO ties by applying a network analytic approach. In so doing, we build on existing studies that argue that the structure of the IGO network, and states' different locations within that structure, has a significant impact on international relations (Hafner-Burton and Montgomery, 2006; Dorussen and Ward, 2008). At the core of our approach is the argument that whatever logic drives IGO joining decisions is best observed by analyzing the IGO network as a whole rather than by disaggregating these decisions into separate observations. Specifically, we seek to measure and define the clusters of states within the IGO network that have relatively more IGO memberships in common. Using the network-analytic tool of modularity maximization, we construct dynamic measures of these "IGO Communities." In turn, we use these measures

[1] (Greenhill, 2010*b*:Ch. 6) uses a latent space model of IGO ties to account for transitivity among the dyads.

to analyze which factors appear to best explain the structure of the IGO network and, by extension, the logic of IGO joining.

2 IGO Communities

The number of IGOs active in the international system has increased dramatically since the mid-1960s. As is shown in Figure 1, by the end of the 20th century states belong, on average, to almost twice the number of IGOs that they belonged to in the 1960s.

Figure 1: Median number of IGO memberships per state, 1945-2000

Yet, while IGO membership has grown overall, there remains significant variation among states' IGO joining decisions. Some states appear to be much more interested in cooperation with others through IGO than others. For instance, in the year 2000 France belonged to a total of 125 IGOs, whereas Turkey belonged to only 78. Likewise, while some IGOs have near universal membership (e.g., the United Nations), others are exclusive clubs consisting of a handful of states (e.g., NAFTA). Finally, while some pairs of states appear to work together through a wide range of different IGOs, others pairs engage in much narrower forms of cooperation. For example, the Netherlands shared a total of 102 common IGO memberships with France in 2000, whereas in that same year the Netherlands shared only 21 common IGO memberships with Vietnam.

What explains this variation? Scholars of institutional design have pointed out that states often create IGOs with highly restricted membership in order to ensure a uniformity of interests among members and thereby increase the likelihood of compliance with institutional rules (Downs, Rocke and Barsoom, 1996; Koremenos, Lipson and Snidal, 2001). Yet such arguments do not fully explain the variation in IGO joining behavior. If states try to minimize distributional and enforcement problems by restricting IGO membership, then this leads to the question of which types of states are best able to do so in concert. That is, if the answer is that states with homogenous preferences tend to work together best, we still have not explained which types of states will tend to have similar preferences. The question then becomes which dimensions of state characteristics are the most important in creating the preference similarity needed to sustain deep international cooperation through IGOs. Sociologists often make reference to the concept of homophily, or the tendency of similar actors to associate and form connections with each other. Yet homophily can take on different meanings in different settings. In a sense, our aim is to determine the meaning of homophily in the context of IGO joining by analyzing which dimensions of state characteristics are the key determinants of these choices.

Others have analyzed IGO joining decisions and have provided competing explanations for this behavior. Early studies of IGO membership operationalized IGO membership as a monadic variable – in other words, they measured the total number of IGOs to which each state belongs in each year – and tried to explain variation in membership levels. These studies found evidence of a sharp divide among states' membership levels based upon their level of economic development. Generally, richer states belong to a significantly greater number of IGOs than poorer states. (Jacobson, Reisinger and Mathers, 1986; Shanks, Jacobson and Kaplan, 1996; Beckfield, 2003). This has been interpreted as providing some support for a functionalist theory of international integration. In this view, economic development pushes states towards greater levels of international cooperation in order to satisfy the growing material demands of their citizens (Shanks, Jacobson and Kaplan, 1996:617). Beckfield (2003) also finds that, in addition to the effect of differences in economic development, states that belong to what Huntington (1997) has defined as a "Western" civilization appear to belong to a significantly larger number of IGOs. More recently, scholars have turned to the question of what explains joint membership in IGOs – in other words, they have asked what features of the state-state dyad can explain co-membership in IGOs. Consistent with the functionalist hypothesis discussed above, Boehmer and Nordstrom (2008) find that pairs of states that are richer, more democratic and have greater levels of trade tend to belong to a larger number of shared IGOs. In a recent study of the decisions of states to form *new* IGO ties with one another, Greenhill (2010*b*:Ch. 6) finds that cultural ties such as a shared language or a common colonial history is especially important in explaining common membership in IGOs.

The traditional approach to analyzing state decisions to join IGOs would is to treat them as separate observations. Yet such an approach requires a strong assumption that these decisions are independent and overlooks the ways in which individual decisions to join IGOs can be analyzed collectively to reveal broader structural patterns. As others have shown, we can gain significant additional insights by conceiving of IGO memberships as a network(Hafner-Burton and Montgomery, 2006; Dorussen and Ward, 2008). This may be best explained by use of a hypothetical example. Consider States A and B, which are joint members of relatively few IGOs. An analysis that only looks at individual state-IGO memberships would likely indicate that whatever joint characteristics States A and B have are not associated with cooperation through IGOs. Now consider a second pair of States, C and D, which are joint members of the same small number of IGOs as are A and B. Yet C and D are joint members of IGOs with many other states that cooperate with each other through other IGOs. In network terms, they have few first-order connections, but many second-order connections. They do not cooperate with each other extensively through IGOs, yet they cooperate with others that do join many IGOs in common. Should we assume that such second-order connections always have a significant impact on international relations? Not necessarily. Yet by only looking at direct dyadic connections we would be assuming that these second-order connections have no significance, which is a questionable and unnecessary assumption. By analyzing IGO memberships as a network, we can examine the ways in relationships such as those between States A and B differ from those between C and D.

To analyze why states join IGOs, the notion of clusters within networks is particularly useful. As scholars have shown in the international relations context and elsewhere, actors within networks have a common tendency to structure themselves into clusters, or groups with relatively dense connections between them (Lupu and Voeten, 2011; Lupu and Traag, 2011; Porter, Onnela and Mucha, 2009). Hafner-Burton and Montgomery (2006) show that clusters exist within the IGO membership network and that these structures affect the propensity of military disputes. We refer to these clusters as "IGO communities" and define them as groups of states that have significantly more IGO memberships in common with each other than they do with states in other IGO communities. Some dyads within an IGO community are joint members of many IGOs. Yet other dyads within an IGO community may have few joint memberships directly, but tend to have many second-degree connections by working with similar other states through other IGOs.

The concept of an IGO community is useful in part because it can shed light on individual decisions to join IGOs. The logic behind individual state decisions to join IGOs should reveal itself in the pattern of IGO communities. Suppose, for example, that rich states join a particular type of IGO, while poor states join a wholly different set of IGOs. In the network, we would observe a cluster of poor states and a cluster of rich states, so analyzing the IGO communities would reveal that they are defined based on state income. Alternatively, suppose states joined IGOs with other states that share a common language. In such a world, we would observe IGO communities defined based on the language of their members.[2] In these simple hypothetical worlds, we could likely reach the same conclusions relying on more traditional, dyadic, forms of analysis. The data-generating process in the real IGO network is likely far more complex, however, as states join IGOs for competing and sometimes overlapping reasons. We therefore analyze these decisions as a complex network structure in order to understand which underlying reasons for IGO joining are more significant than others.

3 Research Design and Results

The empirical portion of this paper proceeds as follows. Section 3.1 describes the data used to build the IGO network. Next, Section 3.2 applies the network analytic concept of modularity maximization in order to identify communities in the IGO membership network, while Section 3.3 describes the variation in community structure over time. We then run a series of regression models to determine which factors best explain the structure of the IGO network. We begin in Section 3.4 by determining which factors explain which of the specific communities individual states belong, and then in Section 3.5 move on to a dyadic analysis of the factors affecting states' co-membership in a common IGO community .

[2]For a similar argument, see (Lupu and Voeten, 2011).

3.1 IGO Network Data

The network we use in this analysis is a bipartite network that has as its nodes 495 IGOs in addition to 213 states that have been in existence over the period from 1815 to 2000. In this network, ties (or "edges") denote the membership of a state in an IGO, and therefore only exist between the two different types of node. Moreover, these edges are binary (indicating either the presence or absence of a tie between a state and an IGO), and undirected (in other words, no meaningful direction can be assigned to the relationship between a state and an IGO).

Data on states' membership in IGOs was obtained from the Correlates of War 2 International Governmental Organizations Data (Pevehouse, Nordstrom and Warnke, 2004). This uses data on state-IGO ties collected from the annual editions of the *Yearbook of International Organizations*. Data are available in 5-year intervals for the period from 1815 to 1965, and annually from 1965 to 2000.

The Pevehouse, Nordstrom and Warnke data recognizes IGOs that meet all of the following criteria:

- The organization must consist exclusively of states. This means that organizations that consist of non-state actors (e.g., international business associations or organizations composed of individual actors such as Amnesty International) are not treated as IGOs.
- The organization must have a minimum of 3 states as members. Bilateral institutions are therefore excluded.
- The organization must have a minimal level of formal institutionalization. Specifically, it needs to have a permanent staff, secretariat, and/or headquarters.
- The organization must have been formed by a formal treaty signed by the founding member states. Organizations that are mere offshoots of existing organizations are not

recognized as independent IGOs.

Using these criteria, Pevehouse, Nordstrom and Warnke identify a total of 495 separate IGOs over the period 1815-2000, of which 330 were active by the year 2000.[3]

3.2 Identification of IGO Communities

The next step in our research design is defining the communities within the IGO membership network. Methodologists have developed several methods for detecting clusters within networks, including hierarchical clustering, spectral clustering, blockmodeling, LS-sets and clique percolation (cf. Porter, Onnela and Mucha, 2009; Fortunato, 2010). The most promising method, however, is that of modularity maximization developed by Newman and Girvan (2004), which appears to detect communities that are substantively meaningful over a wide range of network types (Newman and Girvan, 2004; Blondel et al., 2008). Applied to the IGO network, modularity maximization attempts to maximize the extent to which states defined as being in a given community share IGO memberships and minimize the extent to which states in different communities share memberships. This method has recently been applied in several areas of political science research, including studies of Congressional roll-call voting (Waugh et al., 2009), the global trade network (Lupu and Traag, 2011) and judicial citation networks (Lupu and Voeten, 2011).

As explained in Porter, Onnela and Mucha (2009:9), the concept of modularity can be more formally described by the equation

$$Q = \sum_i \left(e_{ii} - b_i^2\right)$$

where the e_{ii} refers to the proportion of ties ("edges") that both originate and end in community i. The parameter b is defined as $\sum_j e_{ij}$, where e_{ij} refers to the proportion of

[3]Pevehouse, Nordstrom and Warnke also identify states that associate with IGOs in the capacity of observers or associate members. For the purposes of this analysis, however, we consider only full memberships.

ties that originate in community i but end in community j. As the structure of a network becomes more compartmentalized, the proportion of edges (e_{ii}) that span two nodes within a single community increases relative to the proportion of edges (e_{ij}) that span nodes that lie within different communities, therefore leading to an increase in the modularity score, Q.

Partitioning the nodes into a set of communities in a way that maximizes the modularity score is a computationally difficult task. We follow Lupu and Voeten (2011) and many other network analyses by using the algorithm described by Newman (2004) to maximize modularity and define the communities in the IGO network. The algorithm starts with a state in which each node is a sole member of a community – in other words, where the number of communities is equal to the total number of nodes in the network (Newman, 2004:2). In random order, it then joins these communities in pairs, choosing the pairs that increase modularity the most. This continues until the algorithm can no longer join pairs of communities in a way that further increases modularity. We used this algorithm on the IGO network for the years 1835-2000. The number of communities detected varies between 2 and 4 for each given year. Figure 2 shows the community structure of the IGO network in the years 1965, 1980 and 2000.

It should be noted that because we are dealing with a bipartite network (i.e., one consisting of two types of nodes), the community detection procedure assigns a mixture of states and IGOs to each of the communities. For the purposes of this paper, however, we focus only on the distribution of states among the various communities. In future work we intend to perform a similar analysis on the distribution of IGOs among the communities.

3.3 Continuity over time

Figure 3 below shows the number of distinct communities detected by the modularity maximization algorithm over all of the years covered by this sample. (Note that the years in this sample consist of every fifth year between 1835 and 1965, and each individual year

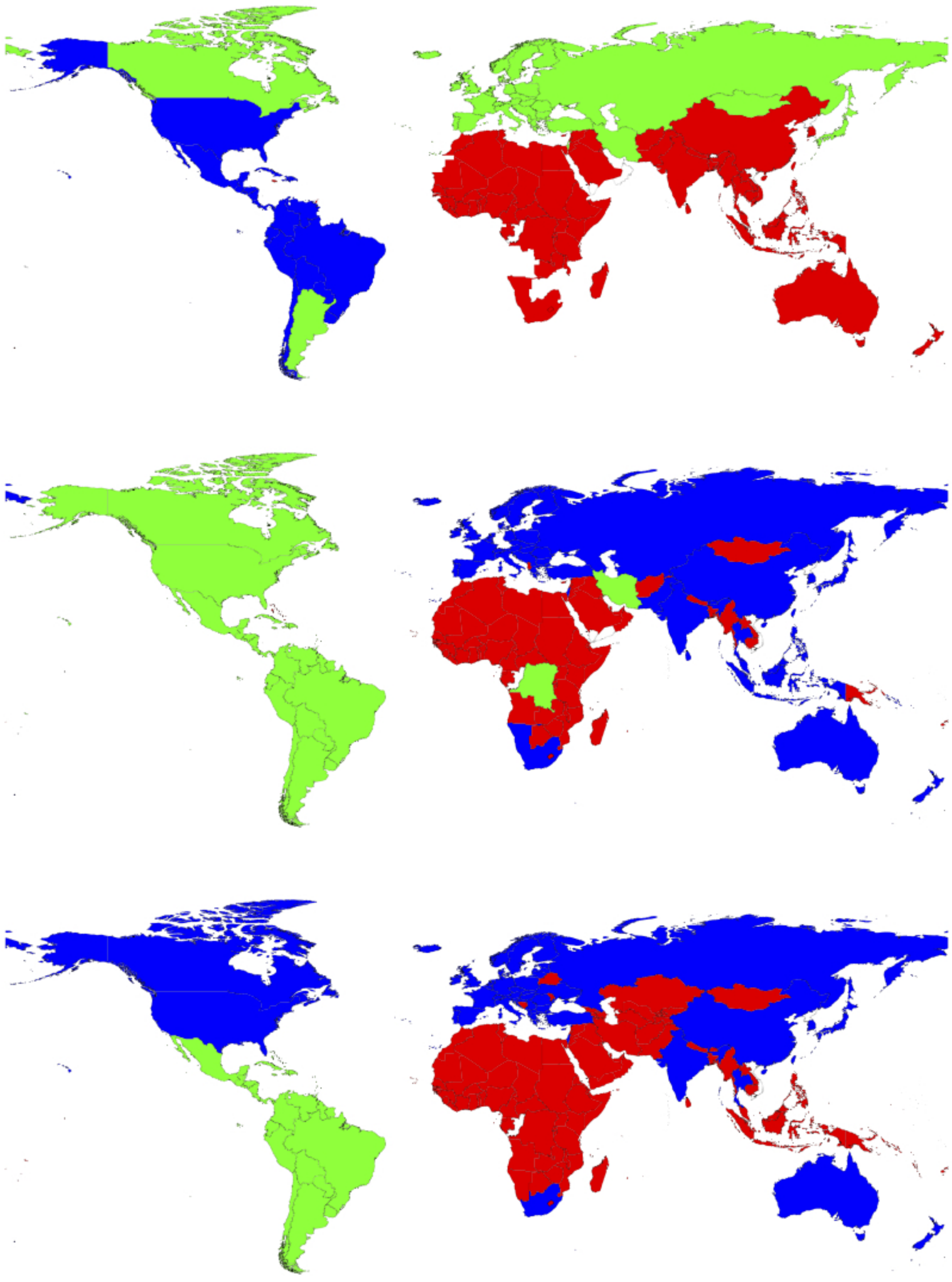

Figure 2: IGO Communities in (from top to bottom) 1965, 1980 and 2000.

from 1965 to 2000). As will be examined in more detail in the sections that follow, these communities appear to closely follow traditional regional boundaries.

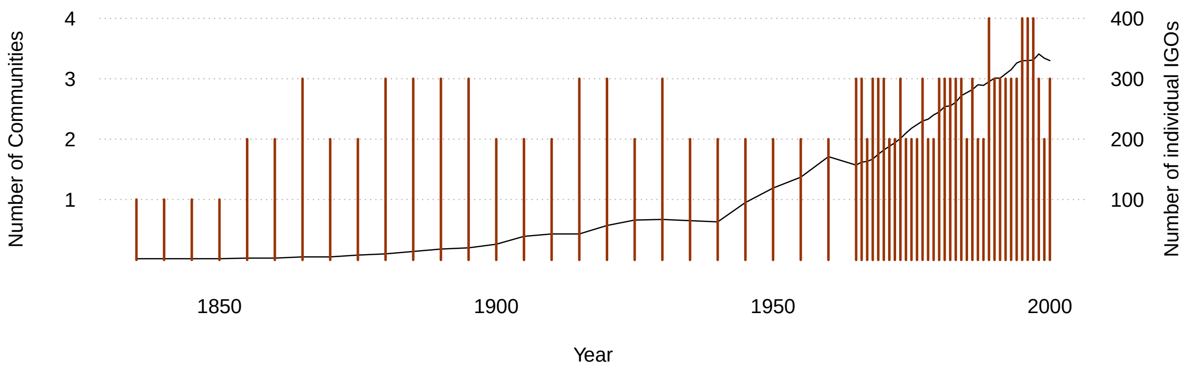

Figure 3: Number of distinct IGO communities (represented by the brown vertical bars) and number of individual IGOs (represented by the black sloping line), by year.

In the early part of the period covered by our analysis (1835 – 1850), the algorithm detects only a single IGO community. This corresponds to a period in which the total number of IGOs in the system is only 2 (namely, the Central Commission for the Navigation of the Rhine and the Superior Council of Health). Although two distinct IGOs exist, the network is still too sparse to allow for the identification of multiple communities.

In the remainder of the period the number of active IGOs undergoes a massive expansion, as shown by the sloping black line in Figure 3. The total number of IGOs increased from 3 in 1855 to 341 by 1998, but the number of distinct IGO communities remains at either 2 or 3, or, in a small number of cases, 4. Because the community detection exercise has to be performed separately for each year in the IGO data, the labels attached to each of the IGO communities are not comparable from one year to the other. We therefore have no reason to believe that a community that is labeled "Community 1" in a particular year is the same IGO community as one that is labeled "Community 1" the following year.

Nonetheless, we are able to determine whether any given pair of countries belong to the *same* IGO community in a given year. For example, we can ask whether the US and the UK belong to the same IGO community in 2000 (it turns out that they do). When we consider this question over the full range of years covered by the data, we can calculate the proportion of years in which the pair of countries share membership in the same IGO community. In the case of the UK-US pair, this proportion is 0.61, suggesting that in the period from 1835-2000, the UK and the USA belonged to the same IGO community 61% of the time. We can think of this as a continuity score for membership in common IGO communities.

In the case of certain country pairs, the degree of continuity among their memberships in IGO communities is especially high. For example, the Italy-Denmark, Chile-Bolivia and Venezuela-Mexico dyads share a common IGO community membership in more than 98% of the years for which data are available. On the other hand, a large number of dyads very rarely – if ever – share membership in the same IGO community. Examples of dyads whose rate of shared membership is less than 5% include Afghanistan-Belgium, Ethiopia-Netherlands and Russia-Saudi Arabia. Between these two extremes is a large number of dyads whose patterns of shared community membership is less stable; in some years they belong to the same IGO community and in many others they do not. Examples of these include Azerbaijan-Belarus, China-Sri Lanka, and Hungary-Indonesia, all of which have a continuity score of between 0.45 and 0.55.

What can we conclude about the general level of continuity among community memberships over time? Figure 4 shows the distribution of continuity scores (i.e., the proportion of years in which both members of the dyad share membership in the same IGO community) across all dyads in the data. As expected, this reveals a bimodal distribution; a large number of dyads are almost never members of the same IGO community and a similarly large number are almost always members of the same community. The extent to which this distribution is clustered around continuity scores of 0 and 1 therefore gives an indication of the degree of continuity in the structure of the IGO communities over time. Here we can see that, on the whole, the IGO communities show a significant degree of continuity over time.[4]

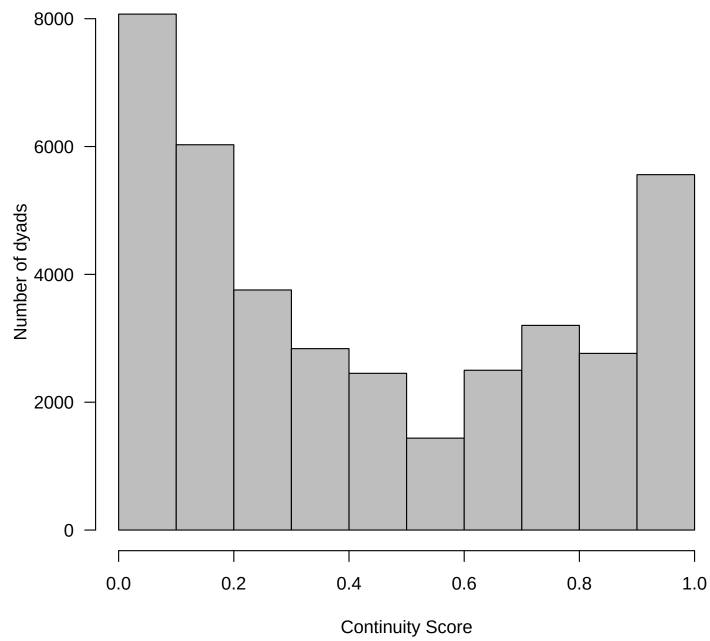

Figure 4: Histogram showing the distribution of continuity scores for all dyads. The continuity score is the proportion of years in which both members of the dyad share membership in the same IGO community.

3.4 Explaining membership in IGO communities

In this section we examine the factors that correlate with states' membership in each of the discrete IGO communities. We do this using a multinomial logit model where the dependent variable is membership in one of the IGO communities. Because the IGO communities cannot always be clearly matched when we compare across years – in other words,

[4]Another way of quantifying the stability of the IGO community structure would be to calculate the mean of the absolute differences between the dyads' continuity scores and 0.5 (the expected value of the continuity score assuming a uniform distribution). This value turns out to be 0.32, significantly greater than the expected absolute difference of 0.25 if these absolute differences followed a uniform distribution.

Community 1 in one year is not necessarily the same community as Community 1 in another (and, moreover, making these comparisons across years can be especially difficult when the level of membership turnover is high) – we estimate a separate multinomial logit model for each year in the data.

3.4.1 Model Specification

The covariates we include in the model aim to account for two possible explanations for broad patterns of IGO membership that have been developed in existing studies of IGO joining. We are interested in testing whether the same factors that explain states' decisions to join individual IGOs might also explain their patterns of membership in the larger IGO communities. The first of these explanations is based on the idea that states' patterns of membership in IGOs depends upon their level of economic development. This category can be subdivided into at least two different theoretical approaches make this same prediction. First, functionalist theory argues that as an economy develops, the potential gains from international cooperation increase. Because richer states will therefore stand to gain more from international cooperation than poorer states, the citizens of richer, more democratic states will put greater levels of pressure on their leaders to join IGOs (Shanks, Jacobson and Kaplan, 1996). Second, world system theory views states as occupying positions in either the "core" or "periphery" of the global economy. According to this view, the richer states that occupy positions in the core are able to maintain control over the institutions of the global economy in a way that is not possible for the less developed states occupying peripheral positions. All else being equal, economically developed states are therefore expected to join a larger number of IGOs than their less developed counterparts (Beckfield, 2003).

We operationalize the concept of economic development using data on real GDP per capita compiled by Gleditsch (2002). We also control for a country's level of political development by including the Polity 4 measure of the democratic/autocratic nature of a state's institutions (Marshall and Jaggers, 2009). Each state is coded on a 21-point scale that ranges from -10 in the case of the most autocratic regimes to +10 in the case of the most democratic regimes.

A second category of explanation reflects the fact that culturally similar states tend to be more likely to cooperate with one another, all else being equal. In addition to the lower transaction costs associated with doing business among states that have important cultural similarities, the presence of a shared culture may create shared identities (and therefore demands for cooperation) that otherwise wouldn't exist. For example, the Organization of the Islamic Conference (OIC) is a prominent IGO that seeks to advance the interests of Muslim states. Indeed, one of the goals states in its Charter is to "strengthen intra-Islamic economic and trade cooperation; in order to achieve economic integration leading to the establishment of an Islamic Common Market."[5] Moreover, studies of trade between states tend to find that, all else being equal, states that share a common language engage in a higher level of trade with one another (see, for example, Rose, 2004).

We account for these cultural factors in our regression models by including dummy variables that indicate whether a state belongs to various religious and linguistic groups, and whether they were previously a colony of one of the major European powers. These variables were coded using data from the CIA World Factbook.[6] We also include a series of dummy variables for five of the non-Western categories of civilization defined by Huntington (1997).[7] However, because these various measures of cultural identity closely overlap (e.g.,

[5]From Article 1.9 of the OIC Charter. Available online at http://www.oic-oci.org/is11/english/Charter-en.pdf (accessed May 22, 2011).

[6]The religion variables consisted of dummy variables for states that were predominantly Christian, Muslim, Buddhist or Hindu. The language variables consisted of dummy variables for states whose official language was either English, French, Spanish or Arabic. The colonial heritage variables consisted of dummy variables for states that had been colonies of Britain, France, Spain, Portugal, Russia, the Netherlands, Germany and/or Italy.

[7]Huntington (1997) refers to these civilizations as Islamic, African, Latin, Orthodox and Sinic. Countries were coded as belonging to one of these mutually-exclusive categories using the map provided on p. xx of Huntington (1997).

countries with a common colonial heritage often have a similar official language), we estimate separate models with each set of cultural dummy variables. Each of these models therefore consists of three core variables – GDP per capita, Democracy and Population – in addition to one of the four sets of cultural control variables (religions, languages, colonial histories, and civilizations).

3.4.2 Model Evaluation

Given that the individual coefficients of multinomial regression models do not have an intuitive interpretation, and that no single model can include all of the coefficients that are of interest to this study, we instead focus on evaluating the overall fit of each of the different models. This allows us to make a direct comparison of the contribution that each set of cultural dummy variables makes to the overall fit of the models.

The metric that we use to evaluate the fit of the multinomial models is the "expected Percent Correctly Predicted" (ePCP) statistic proposed by Herron (1999). This is a measure of the average of the probabilities that the model assigns to the correct outcome categories for a categorical dependent variable. If, for example, we are fitting a model of IGO communities that assigns each country in the sample a certain probability of belonging to one of four IGO communities, then the ePCP statistic is given by the formula:

$$ePCP = \frac{1}{N}\left(\sum_{y_i=1}\hat{p}_{i,1} + \sum_{y_i=2}\hat{p}_{i,2} + \sum_{y_i=3}\hat{p}_{i,3} + \sum_{y_i=4}\hat{p}_{i,4}\right)$$

where $\hat{p}_{i,1}$ is the probability that the model assigns country i to being in IGO Community 1, and $\hat{p}_{i,2}$ is the probability that the model assigns the country to IGO Community 2, etc. The key advantage of ePCP as a measure of fit over the more straightforward Percent Correctly Predicted (PCP) is that it does not depend on the user having to essentially discard a lot of useful information by classifying each individual observation as being either "correctly" or "incorrectly" predicted based upon the category that has the highest predicted probability.

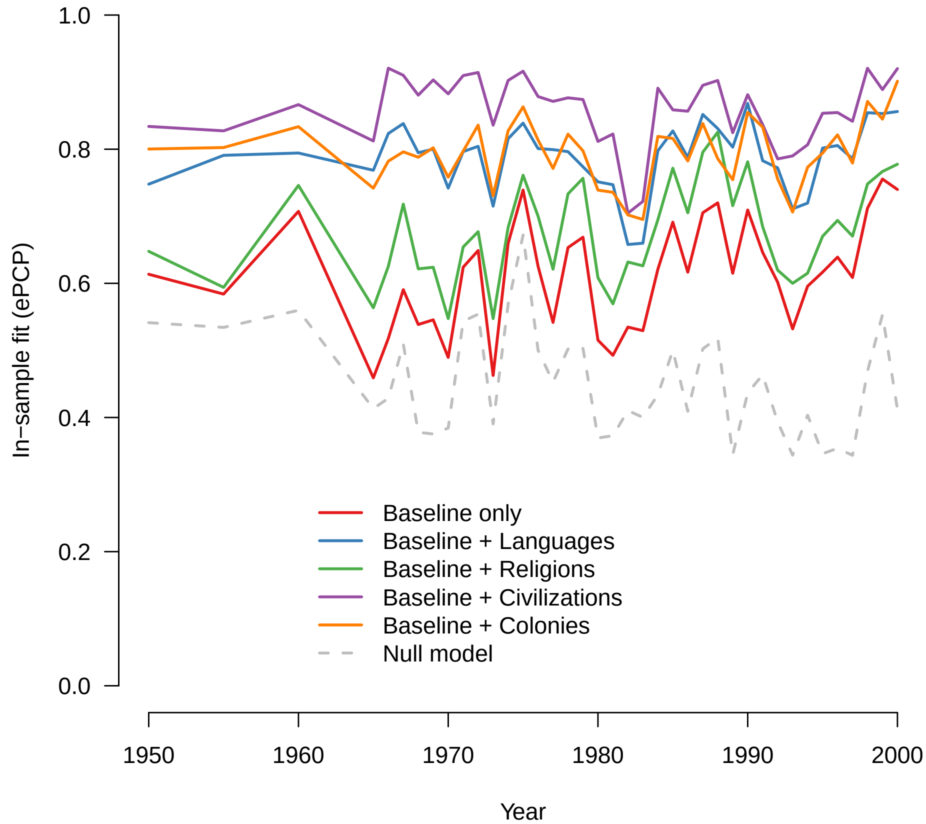

Figure 5: Comparison of the effect of the various cultural variables on the fit of the cross-sectional models.

Figure 5 shows the fit of each of the various model specifications estimated for each cross-section of countries over the period from 1950-2000.[8] (Limitations on the availability of data for GDP per capita prevented us from estimating these models for earlier time periods.) The "baseline" model refers to the multinomial logit model that has only three covariates – GDP per capita, Democracy and Population. For comparison, a "null" model is included

[8]The color scheme for the lines plotted on this graph was obtained from Harrower and Brewer (2003).

that contains only a constant on the right-hand side of the regression equation. As the lines in the figure show, while the baseline model performs better than the null model, it performs much worse than any of the models that include cultural control variables. This suggests that cultural factors play an important role in explaining states' membership in IGO communities. However, it appears that a clear hierarchy exists in the extent to which they contribute to the overall fit of the model. The model that best describes these data is the one that includes the civilizational dummy variables from Huntington (1997). This is followed by the colonies model, the languages model and finally the religions model (which appears to result in only a marginal increase in fit relative to the baseline model).

One obvious concern is that the apparent effect of civilizations is in fact only a reflection of the fact that most international cooperation takes place on a regional level. To control for this possibility, we re-performed the above analysis with a new baseline model that includes dummy variables for the following geographical regions: Asia, the Americas, Africa and the Middle East (with Europe serving as the reference category).[9] As the results in Figure 6 show, adding the regional dummy variables into our baseline model greatly improves the overall model fit. As a result, the marginal improvements in model fit that result from including the cultural dummy variables in the model is much lower. However, there is still a distinct improvement in overall model fit relative to the baseline that results from including the civilization or the colonies dummy variables. This suggests that even after controlling for the large regional component of IGO community formation, cultural ties remain an important predictor of community membership.

3.5 Explaining *joint* membership in IGO communities

While the multinomial models of community membership discussed in the previous section can only be carried out on individual cross-sections of the data, a dyadic analysis allows

[9] Regional classifications were obtained from the EUGene project.

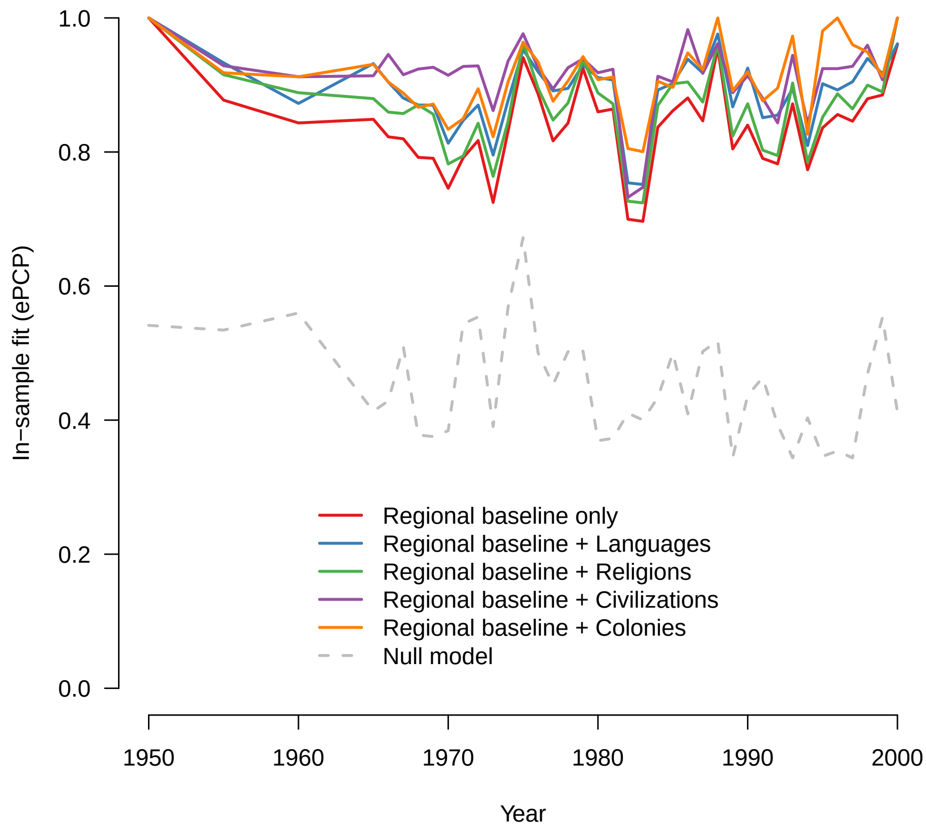

Figure 6: Comparison of the effect of the various cultural variables on the fit of the cross-sectional models when the baseline model incorporates the regional dummy variables.

us to pool the community data derived from the analysis of each temporal cross-section of the data. We can therefore ask whether state i belongs to the same community as state j for any year y. The unit of analysis is therefore the dyad-year. Our dependent variable is one that indicates whether each pair of states (in each year) belongs to the same IGO community (Same IGO Community). With the same data used to construct the monadic variables, we construct variables indicating whether the members of a dyad share a common official language (Same Official Language), religion (Same Religion), colonial background

(Same Colonizer), region (Same Region) and civilization (Same Civilization).

We also examine several additional factors that may make dyads more likely to belong to the same IGO community. Presumably, geographically proximate states will have a greater demand for cooperation and will therefore have a greater probability of belonging to a common IGO community. We construct a dichotomous variable coded "1" for dyads that share a land border or that are separated by less than 150 miles of water (Contiguity). Allied states may be more likely to join similar IGOs, so we include a dichotomous variable (Alliance) coded "1" for dyads that have concluded an entente, neutrality pact or defense pact based on the Correlates of War (COW) Alliance Data Set (Singer and Small, 1966; Small and Singer, 1990). States in conflict are unlikely to cooperate with each other, which would presumably limit their cooperation through IGOs. Indeed, this has been found to be the case in Boehmer and Nordstrom's dyadic analysis of shared IGO membership. We include a measure of dyadic conflict using Zeev Maoz's construction of dyadic militarized interstate disputes (MaozMID) coded as "1" for years in which there was a MID in the dyad and "0" otherwise (Gochman and Maoz, 1984; Jones, Bremer and Singer, 1996).

Dyads with similar regime types may have more common interests, leading them to join similar communities IGOs. We therefore include a measure of the absolute value of the difference between the dyad's Polity 2 scores (Marshall and Jaggers, 2009) (Polity Difference). Finally, economic ties may be associated with similar IGO joining. We account for this by using a measure of the difference between the dyad members' GDP's (GDP Difference) and a measure of the lower level of trade dependence in the dyad (Dyadic Trade Dependence Low) using the formula for dyadic trade dependence provided by Oneal and Russett (1997):

$$w_{t,ij} = \frac{x_{t,ij} + m_{t,ij}}{GDP_{t,i}}, \tag{1}$$

where $x_{t,ij}$ is the total exports from country i to country j in year t, $m_{t,ij}$ is the total imports to country i from country j in year t, and $GDP_{t,i}$ is the total GDP of country i for year t.

We tested the relationship between these dyadic factors and Same IGO Community using a series of logit regressions. In Model 1, reported in Table 1, we include only the data used in the monadic results. We iteratively include additional variables in the remaining models. In all models, we adopt the Beck, Katz and Tucker (1998) method of temporal spline variables to control for duration dependence. We also use robust standard errors corrected for data clustered by dyad in order to address panel heterogeneity.

Table 1: Logit Models of Same IGO Community

	(1)	(2)	(3)	(4)	(5)
Same Official Language	0.344***	0.329***	0.265***	0.218***	0.285***
	(0.029)	(0.029)	(0.036)	(0.037)	(0.040)
Same Religion	-0.348***	-0.378***	-0.368***	-0.400***	-0.469***
	(0.019)	(0.020)	(0.024)	(0.024)	(0.025)
Same Colonizer	0.636***	0.633***	0.685***	0.821***	0.742***
	(0.029)	(0.030)	(0.038)	(0.042)	(0.044)
Same Region	1.035***	1.036***	1.111***	1.102***	1.083***
	(0.027)	(0.032)	(0.037)	(0.041)	(0.043)
Same Civilization	1.083***	1.063***	1.017***	1.053***	1.079***
	(0.032)	(0.033)	(0.038)	(0.043)	(0.047)
Contiguous	—	0.101	0.029	-0.092	-0.239*
		(0.078)	(0.091)	(0.102)	(0.102)
Alliance	—	0.176***	0.395***	0.401***	0.466***
		(0.046)	(0.058)	(0.064)	(0.068)
Ongoing MID (Maoz)	—	-0.423*	-0.366	-0.527	-0.548*
		(0.215)	(0.233)	(0.283)	(0.239)
Polity Difference	—	—	-0.026***	-0.020***	-0.021***
			(0.001)	(0.001)	(0.002)
Trade Dependence (Low)	—	—	—	74.404***	87.923***
				(15.477)	(17.304)
GDP Difference	—	—	—	—	-0.000***
					(0.000)
Constant	0.095***	0.106***	0.267***	0.245***	0.242***
	(0.014)	(0.014)	(0.021)	(0.021)	(0.023)
N	389912	388874	291114	196712	161346

Robust standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

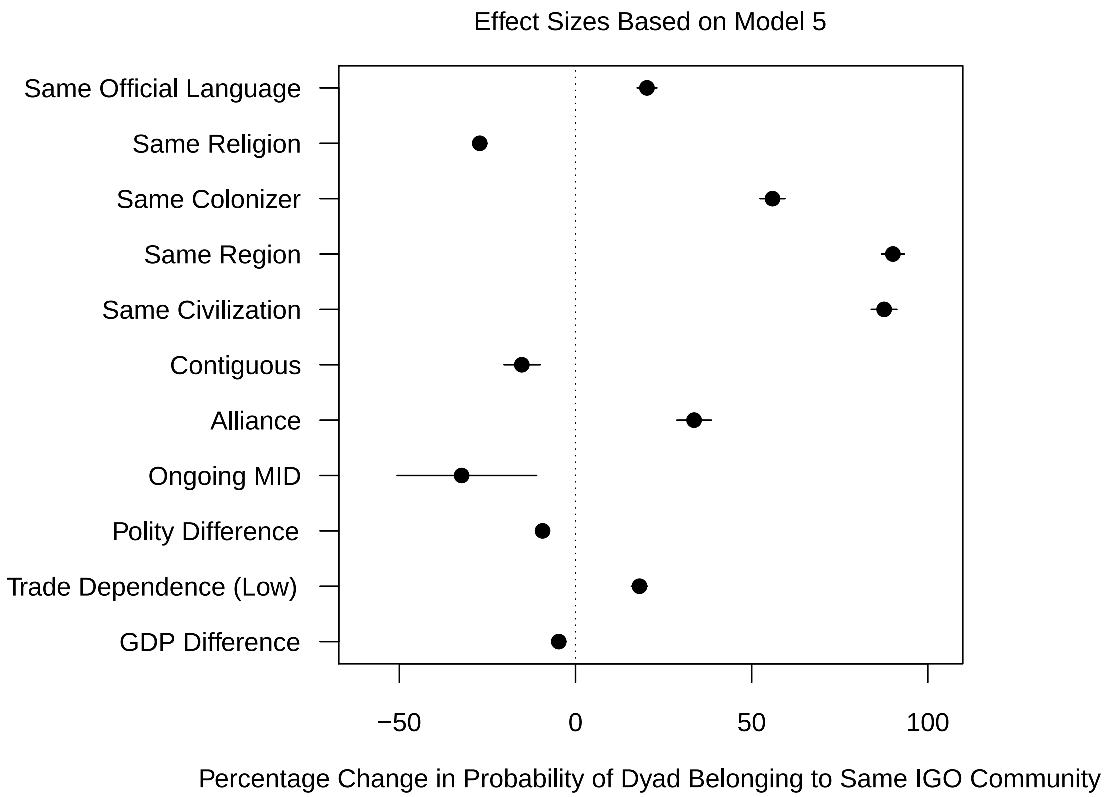

Figure 7: Marginal Effects on Same IGO Community based on Model 5. Effects for continuous variables are based on a one-standard-deviation increase in the value of the independent variable. Effect sizes are shown with 95% confidence intervals.

Because most of the variables in the models have significant associations with Same IGO Community, the results may be more readily interpretable in terms of marginal effects. Figure 7 shows the marginal effects of the independent variables in Model 5 on the probability of a dyad belonging to the same IGO community.

The covariates are all statistically significant at the 0.05 level and, with the exception of the dummy variables for shared religion and territorial contiguity, behave largely as expected.

States that share the same official language, have a similar colonial history, or belong to the same "civilization" or geographic region are more likely to belong to the same IGO community, all else being equal. Consistent with the results of the first phase of the monadic analysis, we find that the effect of a shared civilizational identity is stronger than the effect of a shared colonial history, which in turn is stronger than the effect of a common language. We also find that states that are members of an alliance, and that have higher levels of trade dependence, are more likely to belong to the same IGO community. States that are more similar with respect to their regime type and level of economic development are also more likely to belong to the same IGO community (as shown by the negative coefficients for Polity Difference and GDP Difference).

4 Preliminary Conclusions

The results of this analysis suggest the following preliminary conclusions and areas for future research. First, for most of the years in the sample, the IGO network can be meaningfully conceptualized as 2-3 distinct communities, or what might be called "clubs of clubs." The fact that the IGO network can be partitioned in this way provides further support for the claim made by Beckfield (2003, 2008) that the IGO network is fragmented in a way that places its structure at odds with the predictions made by proponents of the "world polity" school (see, for example, Meyer et al., 1997). In other words, international institutions are forming in a way that enables deeper cooperation among certain groups of states, but this integration occurs at the expense of more global forms of international cooperation. The international system is therefore evolving into a number of distinct blocs of (mostly regional) patterns of cooperation.

Second, our analysis has begun to identify some important correlates of membership in these communities. We have shown that not only do states' patterns of membership in these communities closely track similarities in the states' levels of economic and political development (as earlier studies of IGO membership had suggested), but that cultural similarities play an especially important role in predicting community membership. What is particularly interesting is that these cultural factors play such an important role even after controlling for many of the more obvious predictors of membership in a common community such as geographical proximity, regional identity and trade dependence.

Having established that the IGO network can be conceptualized as a number of distinct communities, the next task for this research project will be to determine to what extent shared membership in these communities – rather than merely the total number of shared IGO memberships – might help to explain many of the outcome variables (such as conflict) that have been examined in much of the existing literature on IGOs.

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