When Do States Say Uncle? Network Dependence and Sanction Compliance

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Abstract

This article explores when and why states comply with sanctions. Previous literature has suggested a duration modeling approach is needed to adequately capture the time it takes for a sanction to "work." This approach, however, has failed to carefully account for important dynamics relevant to the modeling of sanction outcomes. Namely, present duration approaches fail to incorporate the network effects intrinsic to international sanction processes. At any given time, target states typically face both a network of sanctioners for an individual sanction case, as well as a general network of sanctioners including senders from multiple cases. We present a model that incorporates this interdependent nature of the international system by including network effects within the duration model. In addition, we are able to test whether traditional conditions that the literature claims as critical for predicting sanction compliance, such as domestic institutions, are still influential once network dynamics are adequately modeled. In doing so we are able to test two key hypothesis: (1) does dependence between the target state and its sanctioning network increase the probability of target compliance; and (2) do domestic institutions condition network effects?

Introduction

Economic sanctions are a frequently used foreign policy tool in the realm of international relations. Typically, one or more states initiate sanctions against another state when they perceive the target state as non-cooperative. The trigger for economic sanctions can occur in many contexts: the target state breaks a previous agreement, the target state openly disobeys international law, or the target state engages in behavior that is simply unfavorable to the political preferences of another state. Take for example, in November of 2012 when the Obama administration imposed sanctions on the Iranian government for blocking Internet access, mobile-phone lines and satellite television channels from the public.

Policymakers continually engage in heated debates over the use of sanctions as a means to avoid war while still taking a stand. The motivations for sanction initiation are cross-cutting, spanning across a diverse and interdependent mix of policy issues and political actors. While the concept of sanctions – the idea that countries can put pressure on their economic ties to other countries in order to influence policy – is relatively straightforward, the study of when and why sanctions work is complex. While earlier research on sanctions argued that sanctions have little influence on targets (Lam 1990; Dashti-Gibson, Davis and Radcliff 1997; Morgan and Schwebach 1997; Drezner 1998) more recent research suggests that the effectiveness of sanctions is dependent on an interaction of several factors, namely: the number of senders acting as a part of the sanctioner group and the type of issue in dispute (Miers and Morgan 2002); the strength of domestic institutions within the target state; and the type of regime governing the target state (McGillivray and Stam 2004).

We agree with the theoretical and empirical literatures that suggest several different, interacting conditions are at work when predicting the outcome of sanctions. We argue, however, that political scientists have thus far failed to incorporate a key factor into their analysis: network dependencies. Drawing on the work in international relations on trade and conflict, we suggest that sanction cases are best conceptualized as a network phenomenon and must be modeled as such. In each and every sanction case, not only is there a network of sanctions (i.e., how many states in the international network are

sending or receiving sanctions in a given time frame) but there is also the micro-level network of the sanction case itself (i.e., there is typically a target who faces a network of sanctioners). We analyze the endogenous structures inherit to network dynamics–such as reciprocity– and argue that these structures must be accounted for in our study of sanction outcomes. Furthermore, we extend on previous work that suggests duration models as an the most appropriate approach for modeling sanctions outcomes by building network measures into the duration framework. In doing so we are able to then return to key hypotheses from the literature and assess whether conditions such as regime type and internal stability influence sanction outcome once network dynamics are adequately incorporated into the model.

We leverage the network modeling approach to produce an accurate test of when and why sanctions end. ETC / CLOSING PARAGRAPH

When do Sanctions End?

Previous work on the duration of sanctions, or when and why a target state will decide to comply with a particular sanction, has more recently focused on the role of domestic factors. Marinov (2005) argues that sanctions "work" by destabilizing the leaders of the governments that sanctions punish. This focus on internal state conditions echoes other work which suggests that sanction outcomes are dependent on domestic stability and the strength of domestic institutions. For example, if a regime is already experiencing a high level of internal conflict, such as protest or violent clashes, the onset of an economic sanction against trade would weaken the regime even more. This heightens the cost of resistance against the sanction (Dashti-Gibson, Davis and Radcliff 1997).

Similarly, (Dorussen and Mo 2001) suggest that domestic support determines the duration (or "ending") of sanctions whereby when the target state's domestic constituency supports resistance against the sanction, the leader has greater incentive to not comply with the sanction, which effectively increases the sanction's duration. Further supporting the idea that domestic institutions condition whether and when states comply with sanctions, Lektzian and Souva (2007) argues that because of differing institutional incentives,

economic sanctions are more likely to succeed against nondemocratic regimes than democratic ones. While all of these studies present empirical evidence for the general claim that domestic factors condition sanction outcome, none of them are able to also control for third party effects, or network level dependencies.

Research on compliance has historically utilized a logit or probit-estimation approach. However, some have demonstrated that a duration modeling approach more accurately captures the important time-variant dynamics relevant to understanding the sanction process. Bolks and Al-Sowayel (2000) point out that a duration-modeling approach is able to include variables that fluctuate throughout the tenure of an individual sanction case. Clearly, if the goal of research is to understand and predict when a target state is likely to comply to a sanction, then researchers have clear incentives to include time-variant data. Using a duration modeling approach allows for the assessment of whether over time a specific factor, such as political instability or regime type, increases or decreases the probability that a target country will comply with a sanction.

McGillivray and Stam (2004) employ a hazard model to analyze a data set of 47 sanctions cases. They find that leadership change does strongly influence the duration of sanctions, but only in the case of non-democratic states. Similarly, Bolks and Al-Sowayel (2000) consider the determinants of economic sanction duration using a duration model approach. These authors also look inside the target state to define domestic conditions that influence sanction outcome. They suggest that the "decision-making" environment can either hinder or help the leader take countermeasures against the sanction. This "decision-making" environment is affected by factors such as a lack of coordination between government actors and local instability.

Clearly, domestic conditions seem to matter for predicting sanction compliance. While researchers have been gone to test this with duration approaches, the literature can be improved on in two main ways. First, it remains unclear whether external factors also influence duration compliance. It is likely that external conditions, which often influence internal processes also matter for sanction compliance. It is important to consider whether network of sanctioners for each sanction case are critical trade partners, allies, or neighbors

with the target state. Each relationship between the sanctioner and the sanctioned takes on a slightly different form dependent on these factors. If a neighboring state is greatly dissatisfied with the target's behavior, this conflict of interest could have more serious repercussions that a sanctioner who is geographically removed from the target. These types of external factors are housed within the network of sanctioners for each and every sanction case. Such factors have been incorporated into previous analysis as largely dyadic or monadic variables, but this approach fails to capture and account for the complex interdependence structure that international politics inherently exhibits. Take, again, for example international trade dynamics.

While it is intuitive to many researchers that trade dependence between target and sender states likely influences the duration of economic sanctions, in order to adequately measure trade interactions, one has to analyze the trade *network* relevant to each sanction case, which accounts for the fact that trade between dyads is not an independent process. By avoiding these network attributes, researchers miss a wealth of structural information that is critical to understanding the ebb and flow of international cooperation and conflict. The insight that the international system is inherently a network and must be studied as such, is by no means original to this project, but has gained increasing support in the literature; most prominent is the work on trade networks (Hoff and Ward 2004) , conflict (Dorff and Ward 2013), alliances (Warren 2010) and intragovernmental organizations (Cao 2009; Greenhill 2010).

Second, current duration approaches are unable to account for the history of dependencies between countries over time, and thus ignore previous cases of compliance and sanction interdependence between target and sanctioning states. Over time, complex interdependencies likely emerge and drive behavior between states, where if country i complies often to country j, country j might also be more likely to comply to country i. This process is typically known as reciprocity, and is one of the network attributes we account for in our analysis below. Importantly, Cranmer, Heinrich and Desmarais (2014) also argue that the sanction literature has not yet accounted for network dynamics. In their work they model the sanction network itself, and demonstrate that onset of sanction

cases are best predicted by modeling the way in which the network complex interdependencies, such as reciprocity, evolve over time and influence the future decisions made by states. Critical concepts like these are currently ignored in the research on sanction compliance. This paper aims to fill this gap.

Accounting for Network Effects

In this section, we present our argument for incorporating features of the sanction network into models for predicting the time until sanction compliance and describe our approach for capturing these features. In focusing primarily on domestic factors, as much of the extant literature has done, alternative explanations that incorporate external factors relating to the sanctioning network have been ignored. The two explanations that we focus on are, first, the types of influential relationships senders have to receiver states and, second, the network pressures created at the aggregate network level, across all sanctions in any given year.

To illustrate the network characteristics essential to our argument, we begin with an illustration of the year 1984. Figure 1 depicts the network of sanction cases, and threats thereof, ongoing and initiated by 1984. Nodes represent states and the directed edges denote the sender and receiver of sanctions. This figure is complex, demonstrating that numerous states are involved in mulitple sanction cases during this one year.

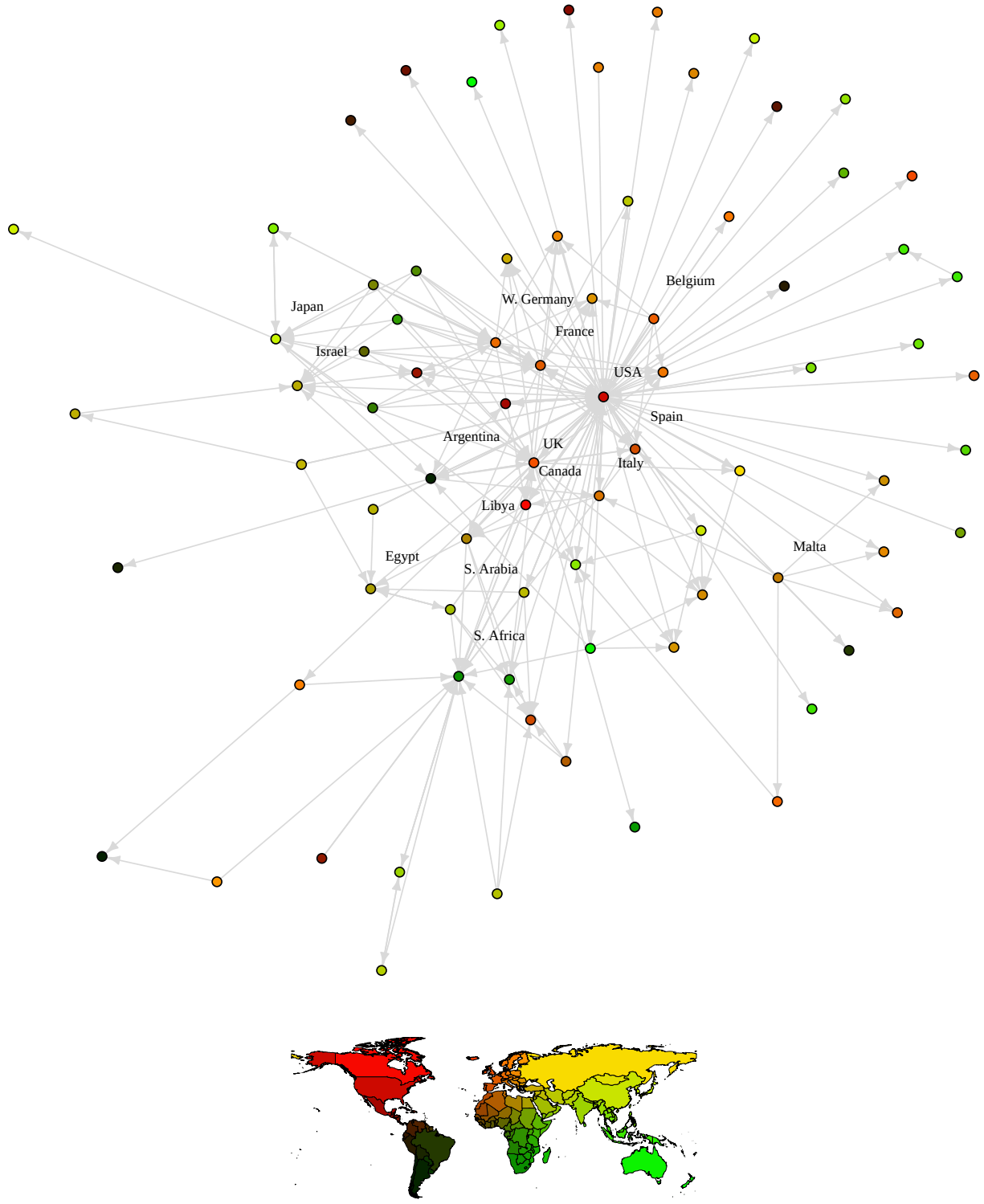


Figure 1: Here we show the sanction network in 1984, nodes are colored by geographic coordinates of countries.

Next, we deconstruct this network and narrow our focus to observe the indivdual country case of South Africa in 1984. In this case, South Africa is the target of multiple sanctions, as shown in Figure 2. Because of this, we construct a sanction network that represents each sanction South Africa faces during this year. As one can easily see, in most cases during 1984, South Africa faces more than one sanctioner, and these sanctioners vary across each sanction case. For example, in the first network graph, in the top left of Figure 2, we see that South Africa faces a sanction from India, Pakistan, and Jamaica. Yet in the top right network graph, we see that South Africa also faces a sanction from Canada, Sweden, the USA, Finland, and Austrialia.

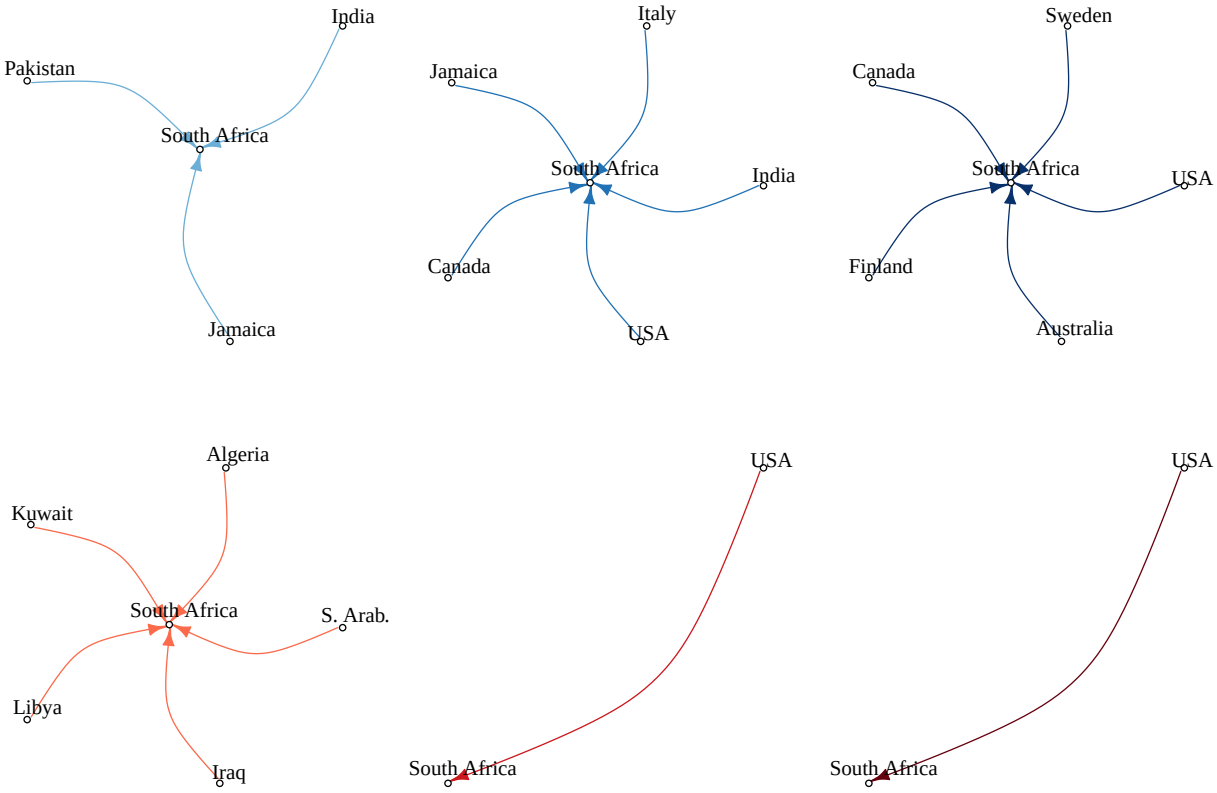


Figure 2: Here we show a separate network for each sanction case that South Africa faced in 1984.

Clearly these two networks are composed of a diverse set of unique actors, all of which have a specific relationship with the target state. We conceptualize these relationships as composed of "pressures" which likely influences the behavior of the target state. We present two hypotheses which focus on the sanction case network. First, it is intutitive that the number of senders likely influences the willingness of the target state to comply because as the number of senders increases, the more constraints through multple relationships the

target faces. The essential idea is that handling the demands of ten relationships is more influential than one. However, we also expect that these relationships must be meaningful not juste plentiful. Just as one would imagine that a person is less swayed by the demands of 10 strangers than the demands of a few close friends, we conceptualize senders as most influential when they interact with the target state on a number of dimensions. Thus, for each sanction case we determine the number of senders. We also calculate and control for the average number of other sanctions being sent by the senders of each particular sanction case.

> **H1**: As the number of sender states increases for any given sanction case, the time to compliance will decrease.

> **H2**: Sanction cases where relationships between sender(s) and receiver(s) are more proximate will be more quickly resolved.

Next, we describe what exactly is meant behind our concept of "proximity." In figure 2, we show the six sanction cases faced by South Africa in 1984.[1] For the most part, each sanction case involves a variety of actors with whom South Africa has differing cultural, geographic, diplomatic, and economic relationships. Within any individual sanction case we hypothesize (H2) that the proximity, (i.e. the ways in which the sender and target interact on a number of dimensions) of relationships between sender(s) of a sanction and a receiver influence whether a target state complies. To test this idea that the normative closeness, or general "proximity"of relationships between sender(s) and receiver(s) in predicting sanction compliance we construct a number of covariates.

We focus on five key measures of the "proximate" nature of relationships First, we measure the average distance between sender(s) and reciever. Next we utilize the Correlates of War (COW) data to construct variour measures. Our second covariate relating to proximity is trade, which we measure as the total share of trade that sender states accounts for. Third, we measure alliances as the proportion of sender(s) that are allied with the receiver. Forth, we measure the average number of common IGOs that the sender(s)

[1]Data for sanction cases is from Morgan, Bapat and Krustev (2009).

and target state belong to. And Last, also using COW, we create a measure of similarity in relgiion across sender relationships. We construct this measure using the COW data.

Thus far we have explained how the relationships between sanctioners and target states matter for predicting compliance. This view has focused on the individual sanction case. However, the six separate sanctions that South Africa faced in 1984 can also be thought of as a yearly sanction case network. In figure 3, we aggregate the six sanction networks into one where each separate sanction is denoted by a differing color. Here we hypothesize that states under the pressure of a multitude of sanctions will more quickly resolve sanction cases than those facing only a few.[2]

> **H3**: States facing the pressure of a multitude of sanctions will more quickly resolve any one of those sanction cases.

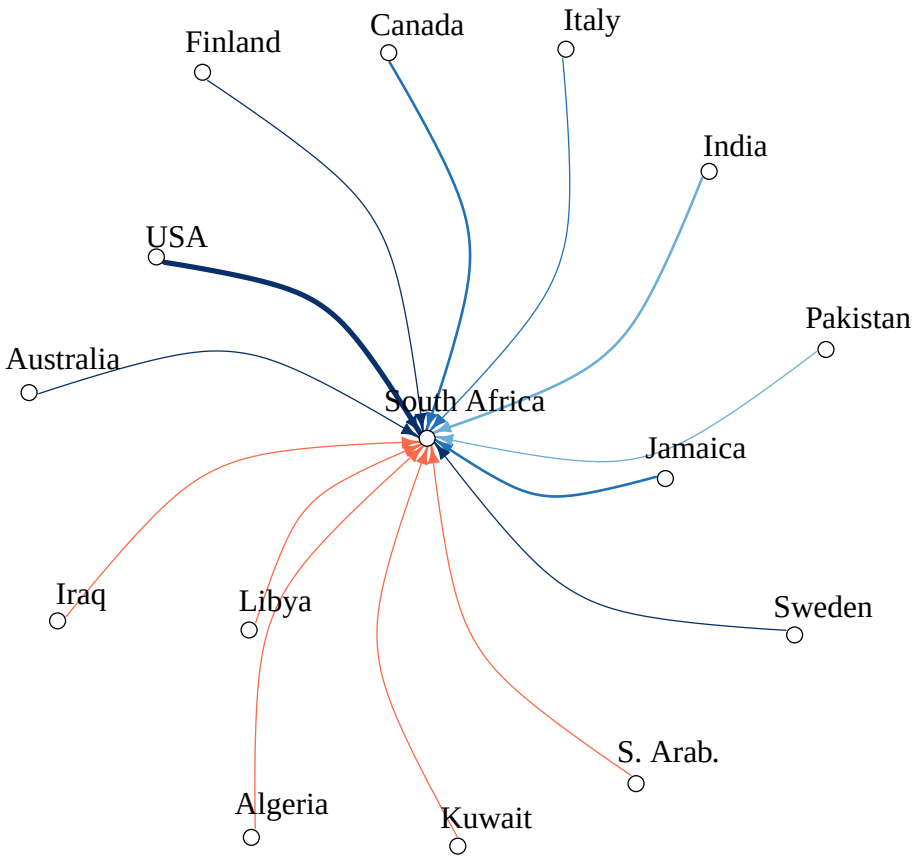


Figure 3: South Africa 1984 Sanction Case Network

[2]Our next step in this project is to include measures of reciprocity over time. This will allow us to test the argument presented in the earlier half of the paper where we suggest accumulated dependencies over time will influence the likeilhood of compliance (e.g. reciprocity: if country i often complies with country j, will country j be more likely to comply with country i?

Data and Analysis

To test the effects of network pressures on sanction compliance we use the Threat and Imposition of Sanctions (TIES) Database developed by Morgan, Bapat and Krustev (2009). This database includes over 1,400 sanction case threats and initiations from 1945 to 2013.[3] Our focus here is restricted to threats and sanctions that are prompted as the result of an economic issue. The TIES database categorizes the issue(s) involved in the threat or impositions of sanctions, we focus on three:

- Expropriation/seizure of citizens, property, or material
- Trade practices
- Implement economic reform

Restricting our analysis to threats or sanctions stemming from these issues during the period of 1984 to 2005 leaves us with 272 cases. Our unit of analysis is the case-year, providing us with a total of 1,920 observations. For each case in the TIES database a final outcome is recorded to describe how and if the case has been resolved. The purpose of our analysis is to assess the time until a state complies to a threat or sanction and we consider a case to have been resolved in compliance if any of the follwing conditions are met:

- Complete/Partial Acquiescence by Target to threat
- Negotiated Settlement
- Total/Partial Acquiescence by the Target State following sanctions imposition
- Negotiated Settlement following sanctions imposition

In using this definition of compliance, approximately 37% of cases in our dataset end with a state complying by 2013 while 42% remain ongoing. The remaining 21% of cases were terminated for other reasons show below in table 1.

[3]Only sanction cases threatened and initiated up until 2005 are included but outcomes for cases are recorded up until 2013.

Outcome	Frequency
Capitulation by Sender in Threat Stage	29
Capitulation by Sender After Imposition	19
Stalemate after Sanctions Imposition	2
Stalemate in the Threat Stage	1

Table 1: Outcomes of threat and sanction cases no longer ongoing where compliance was not achieved.

Modeling Approach

Next we discuss our modeling approach. To estimate the effect of network pressures on the ability of a threatened or sanctioned states to resist compliance, what we will refer to as sanction spell, we use Cox proportional hazard (PH) models of the length of threat or sanction periods. Specifically, the dependent variable is the number of years that a state has not complied to a threat or sanction at time t. We model the expected length of sanction spells as a function of a baseline hazard rate and a set of covariates that shift the baseline hazard. The Cox PH specification that we employ is

$$\log h_i(t|\boldsymbol{X}_i) \;=\; h_0(t) \times \exp(\boldsymbol{X}_i)\beta),$$

where the log-hazard rate of compliance in a sanction case, i, conditional on having not complied for t years is a function of a common baseline hazard $h_0(t)$ and covariates $\boldsymbol{X}$. In employing this approach, we assume no specific functional form for the baseline hazard and instead estimate it non-parametrically from the data. The covariates $\boldsymbol{X}$ operate multiplicatevely on the hazard rate, shifting the expected risk of compliance up or down depending on the value of β (Crespo-Tenorio, Jensen and Rosas 2013).[4]

Providing no specific functional form for the baseline hazard necessitates testing the proportional hazard assumption. Keele (2010) notes that not inspecting this assumption in the covariates can lead to severely biased parameter estimates. To address this issue, we first fit smoothing splines for all continuous covariates. After ascertaining that none of the continuous covariates in our model required modeling with splines, we carried out tests of

[4]To ensure against bias in our parameter estimates we also included a vector of case-level shared frailties to account for variations in unit-specific factors. However, we found similar results with and without the shared frailities, so we report results without the inclusion of this additional term.

non-proportionality. For those covariates where the non-proportional effects assumption does not hold, we include interactions between the covariate and spell duration (log scale). The only covariate showing evidence of non-proportionality is the average similarity of religious profiles.

$$\begin{aligned} Compliance_{i,t} = & \, No.\ Senders_{j,t} + Distance_{j,t} + Trade_{j,t} + \\ & Ally_{j,t} + IGOs_{j,t} + Religion_{j,t} + \\ & Sanc.\ Rec'd_{i,t} + \\ & Constraints_{i,t} + GDP\ Capita_{i,t-1} + \\ & Internal\ Conflict_{i,t} + \\ & Constraints_{i,t} * No.\ Senders_{j} + \epsilon_{i,t} \end{aligned}$$

- i represents the target of the sanction
- j represents the relationship between the set of sender(s) for a particular sanction case and i
- t the time period

Results

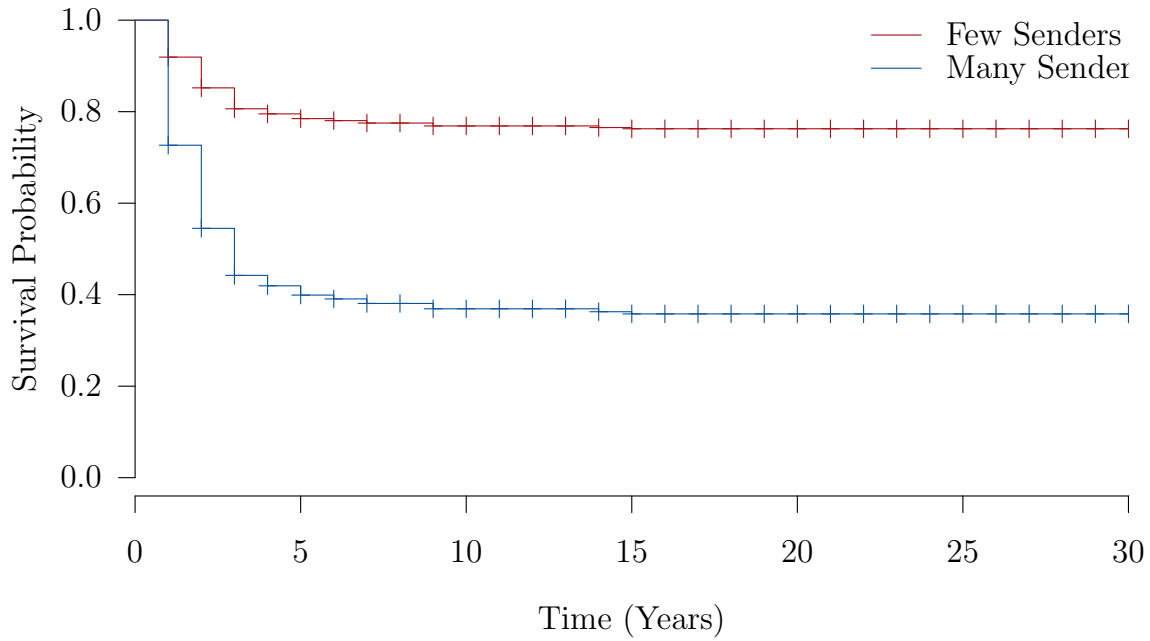
Table 2 displays the results from our model. As expected, we find support for hypothesis one, which states that as the number of sender states increases for any given sanction case, the time to compliance will decrease. We also find support for our second hypothesis, that more proximate relationships between sender and recievers result in quicker compliance by the target state. However, support for this hypothesis is limited to the type of relationship or proximity that is measured. Our findings reveal that distance and religion are influential for predicting compliance. This suggests that target states are most sensitive to sanctions by those states whose are both neighbors and share cultural similarities. We also find support for hypothesis three, that states are more likely to comply to one sanction when they are simultaneously facing a number of others.

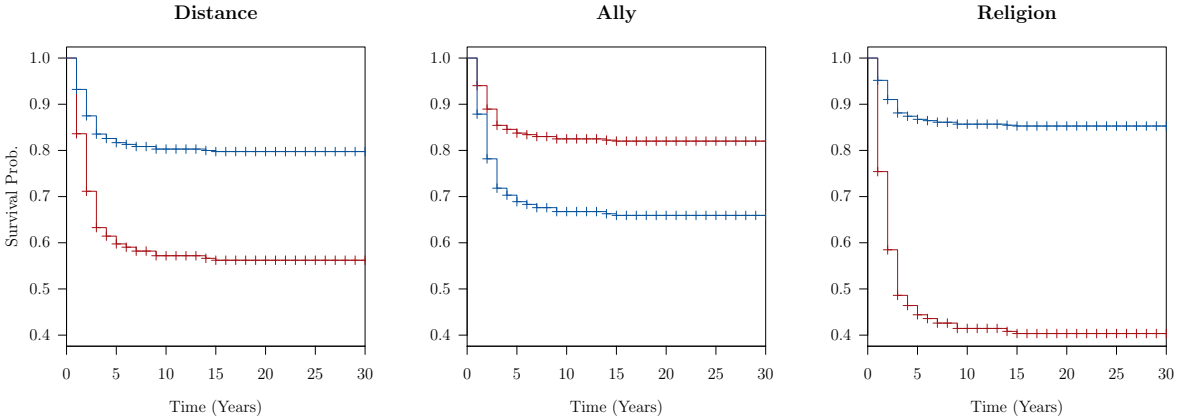
We control for the prominent idea from the literature that domestic factors influence sanction compliance. We find that while our measure of internal stabiity does not play a role, domestic institutions do matter. Interestingly, we find little support for trade and alliances having an influence on compliance. Because it is difficult to interpret the effect of point estimates on the hazard function in tabular form, we present a graphical interpretation below.

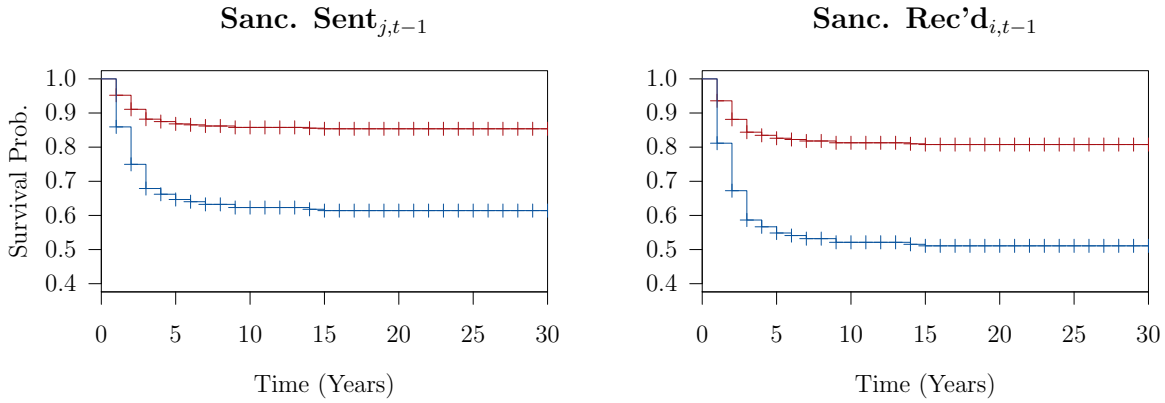
Variable	Model 1
Number of Senders$_{j,t}$	0.333**
	(0.117)
Distance$_{j,t}$	−233.547**
	(85.357)
Trade$_{j,t}$	22.089
	(14.259)
Ally$_{j,t}$	0.742*
	(0.387)
IGOs$_{j,t}$	-0.013
	(0.012)
Religion$_{j,t}$	−1.562**
	(0.491)
Sanc. Sent$_{j,t-1}$	0.013**
	(0.005)
Sanc. Rec'd$_{i,t-1}$	0.115*
	(0.059)
Constraints$_{i,t-1}$	−0.004*
	(0.002)
Ln(GDP per capita)$_{i,t-1}$	-0.001
	(0.001)
Internal Stability$_{i,t-1}$	0.002
	(0.006)
n	1438
Events	54
Likelihood ratio test	74.82 (0)

Table 2: Duration model with time varying covariates estimated using Cox Proportional Hazards. Standard errors in parentheses. ** and * indicate significance at $p < 0.05$ and $p < 0.10$, respectively.

Figure 4: Survival Probability by Number of Senders in a Sanction Case







Conclusion

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