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Tell me who your friends are: an endogenous model of international trade network formation and effect on domestic political outcomes

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TELL ME WHO YOUR FRIENDS ARE: AN ENDOGENOUS MODEL OF INTERNATIONAL TRADE NETWORK FORMATION AND EFFECT ON DOMESTIC POLITICAL OUTCOMES

by

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ABSTRACT

What is the relationship between network- and unit-level outcomes, such as the international trade network among states and domestic rule of law or repression? Do these effects hold after accounting for actors' strategic selection of network ties? I explore these questions by building a multi-player game, in which players make two simultaneous decisions: (1) whether to form trade links and with who, and (2) whether to increase their trade benefits by improving their type, associated with the level of domestic economic risk factors. The model predicts an endogenous relationship between the number of direct trade partners and the probability of playing *High Type*: *High Type* states have more direct trade partners, and the number of trade partners has a positive effect on the probability of choosing *High Type*. A state's type is also affected by indirect trade connections–counter-intuitively, indirect trade has a negative effect on the probability of choosing *High Type*.

In Chapters 3 and 4, I test the general predictions of the theoretical model, by applying them to two distinct areas of international research. In Chapter 3, I conceptualize a state's type as the level of domestic rule of law enforcement. States with strong rule of law enforcement are regarded as *High Type* states, because they guarantee lower cost of operations within their borders, by enforcing property rights and contractual law. Weak rule of law states, on the other hand, can be thought of as *Low Type* states, as business operations within such states are constantly threatened by a risk of expropriations, inefficiencies associated with corruption within the judicial system, and other manifestations of poor business practices.

In Chapter 4, I recast the theoretical model by showing how a state's type can be conceptualized as a state's domestic respect for human rights. Highlighting the economic costs of repression, such as higher economic risk, negative publicity, and decreased quality of human capital, I argue that these costs are suffered by both the domestic economic elites and their international business partners. These business elites can, however, alleviate their losses resulting from such costs by either pressuring their government to embrace stronger human rights protections or, when this option is unavailable, by setting up channels for indirect economic transactions through states with more favorable political environments.

To test each Chapter's empirical predictions, model the simultaneity between network formation and effect, using a statistical estimator developed by Ripley, Snijders and Preciado (2012). This statistical estimator, referred to as a continuous Markov Chain exponential random graph model (MC ERGM), allows for a close mimicking of the theoretical model by simultaneously modeling two dependent variables: network formation and its effect on actors' behavior. The results of the statistical tests provide some support the theoretical predictions.

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CHAPTER 1
INTRODUCTION

International attendees of Euro 2012, who happened to pick up the in-flight magazine courteously provided by the Ukrainian National Airlines, crossed a truly fascinating article about the country of their destination. The article starts with a puzzle: despite its immensely rich natural resource and labor endowments, Ukraine attracts surprisingly little international business (Conlon, 2012). Upon closer inspection, of course, this lack of attention is easily explained by poor contract enforcement, the absence of property protections, and high corruption.

At this point, however, the article takes an unexpected turn—rather than lamenting the dire situation that Ukraine finds itself in, the author—a savvy connoisseur of the Ukrainian business world—suggested several ideas that would allow the international businesses to by-pass the seeming hurdles associated with Ukraine's lack of the rule of law. More specifically, the author points out, many international firms set up their businesses offshore—in countries like Cyprus, the Netherlands, or the Virgin Islands—so that if things go awry with their Ukrainian business partners, they can by-pass the corrupt Ukrainian legal system and resolve the matters in a functioning third-party court. Another advantage of working with Ukraine through a third-party state, Conlon (2012) argues, is that funds can be "channeled via countries which [...] have an appropriate bi-lateral investment treaty with Ukraine [...]", so that the investor avoids paying the unnecessary tariffs or taxes (Conlon, 2012, 29).

Conlon (2012) concludes by re-iterating the business attractions Ukraine has

to offer and a rather optimistic prognosis that, like other post-Soviet states, Ukraine will eventually overcome its political and economic hurdles. The theoretical model developed in this dissertation allows for evaluating the latter claim in a general and systematic way. In what follows, I explore the effects of international trade patterns of the likes described above, which I refer to as "indirect trade," on domestic rule of law enforcement in the states that find themselves as targets of such trade relationships.

What is the relationship between international processes and domestic outcomes? Known more broadly as the agency-structure or micro-macro problem, this relationship has long constituted one of the central problems and debates within social sciences. Attempts to draw the causal arrow between agents and structure can be traced throughout the history of modern sociology starting with the works of Marx, Durkheim, and Weber to the present day social science departments (Carlsnaes, 1992).

Giving preference to agents over structures reduces theoretical explanations to the decisions, actions and attitudes of individual actors. Prioritizing structures over agents, on the other hand, results in methodological holism, or the interpretation of agents' actions as pre-determined by the structure (e.g., resulting from socialization) (Carlsnaes, 1992). Within the study of international relations (IR), this debate has long provided the central dividing line between the neorealist camp, favoring the structure, and their critics, with the two IR camps often talking past each other. Proponents of systemic theorizing labeled domestic-level explanations as "reductionist," pointing out that system-level processes are not the same as the sum of foreign policies of individual states (Waltz, 1979). Neorealism's critics responded by questioning whether the effectively constant international anarchical structure can explain any

variation in foreign policy choices and outcomes (Lebow, 1994; Rosecrance and Stein, 1993).

The problem with picking a side is, of course, that either choice leads to either "upward" or "downward conflation"—or reducing one of the components from the actor-structure linkage to being explained in terms of the other (Archer 1988; Carlsnaes 1992, 249). A purely structural approach ignores actor-level causal factors, attempting to explain outcomes as they are enabled or prohibited by the setting. A purely agent-based approach commits the opposite error of interpreting an agent's actions and choices as unconstrained by the setting in which they operate. To paraphrase Dessler (1989, 443), the agent-structure debate has highlighted "two uncontentious truths about social life": first, that social actors are "the only moving force behind the actions, events, and outcomes of the social world," and second, that such agency is constrained by the systemic factors. Scientific explanations must acknowledge these truths by both recognizing the power of agents and the constraints of structures (Dessler, 1989). As a result, there has been a growing realization that the relationship between agents and social structures may not be zero-sum. Instead, the two may be inseparable in such a way that one cannot be accounted or defined without the other (Carlsnaes, 1992; Wendt, 1987). Rather than pulling towards the extremes, the philosophical agent-structure debate has shifted towards the middle.

Within the study of IR, this philosophical shift was precipitated by oil shocks of the 1970s, which highlighted the role of international interdependence, transnational and multi-national actors, and global forced such as technology, trade, and communications (Gourevitch, 1978; Keohane and Nye, 1977; Katzenstein, Keohane

and Krasner, 1998). This trend in the theoretical IR literature is reflected in the emergence of research at the intersection of the domestic and international levels of analysis, most prominently in the burgeoning theorizing on two-level games (Evans, Jacobson and Putnam, 1993; Putnam, 1988), democratic peace (Russett, 1993), and the effect of international institutions on domestic politics (Milner, 1997).

These theoretical advances in IR theory have, in turn, called for the appropriate empirical modeling approaches. Since the late 1990s, one of the most common modeling approaches has been the use of dyad-years or directed dyad-years as the primary level of analysis (Bennett and Stam, 2000; Green, Kim and Yoon, 2001; Reiter and Stam, 2003). Allowing for a simultaneous modeling of the agent-specific, dyadic, and systemic effects, the dyadic approach provides a great tool for accounting for strategic interactions (Ray, 2001).

The problem, of course, is that many types of interstate interactions, and social interactions more broadly, involve or affect more than two actors. Social actors are prone to group-oriented behaviors, such as friendships, collaboration, competition or fighting. Throughout their lifetime, individuals embed themselves in dense webs or *networks* of familial, professional, friendship, rivalry, and conflictual relationships. Many of the same group-oriented tendencies are common to other types of social actors, such as local softball teams gangs, universities, firms, political parties, government agencies, and even international states. Such social network embeddedness, of course, has important implications for actor-specific outcomes. Sociologists, for example, often posit a link between friendships or familial ties and individual habits, such as smoking or alcohol consumption. Epidemiologists link social networks, such

as travel and migration patterns, to contagion of infectious diseases. Scholars of American politics posit relationships between Congressional committee memberships or bill co-sponsorships and particular legislators' policy positions or votes. In the study of IR, social networks, such as states' shared memberships in international organizations (IOs), are sometimes viewed as channels for learning or the transmission of social norms.

More recently, several IR scholars have noted a natural fit between the theories positing the links between international and domestic processes and the modeling approaches offered by social network analysis (Cranmer, Desmarais and Menninga, 2012; Hoff and Ward, 2004; Maoz, 2009, 2010). Maoz and his co-authors, in particular, have been among the first IR scholars to recognize that many international processes, such as trade, alliance formation, joining of international organizations (IOs), and even international conflict can be effectively viewed and studies as networks. These studies typically proceed to identify the most important features of these networks (e. g., centrality,[1] polarization,[2] structural equivalence[3]), calculate the relevant measures, and use these measures as exogenous covariates to predict the outcomes of interest.

[1]Ward (2006, 152) defines a node's centrality as "the sum of the values on all edges incident on it." An edge is a connection between two actors.

[2]Polarization is a relative measure that ranges from 0, when all network nodes are directly connected to all other nodes, and 1, when the system is strictly bipolar—divided into two complete subgraphs with half of the nodes in each and no overlap between them (Maoz, 2006).

[3]Structural equivalence refers to a measure of similarity of the ties going out of i and j to any third node k on relation r, and $S^r\left(x_{ki}, x_{kj}\right)$ is a measure of similarity of the ties coming in from any node k to i and j, respectively. We can use this measure, for example, to assess similarity or dissimilarity of alliance portfolios, trade relations, or diplomatic missions (Maoz et al., 2006, 673).

Most existing SNA studies, however, tend to treat network effects and network formation as outcomes that are exogenous or independent of each other. Much like social networks of individuals, networks of states rarely form at random—an implicit assumption of an exponential random graph model (ERGM) estimation. Instead, both social and international networks as a result to two general types of causal effects: *homophily*— actor's self-selection based on pre-existing similarities—and *common exposure*—actors' exposure to the same factor (Franzese, Hays and Kachi, 2012; Hays, Kachi and Franzese, 2010). A theory that explains formation of an IO, such as the European Union, in terms of common political background of the member-states is positing homophily, while a theory that highlights the shared security concerns or economic interests of its members, on the other hand, is employing a common exposure argument. The difference between these effects is theoretically important: a theory that posits homophily as the causal mechanism behind network effect must rule out common exposure, and vice versa. Endogeneity of the independent variable can be thought of as a special type of common exposure, whose effect, if present, is especially detrimental for recovering unbiased estimates (Franzese, Hays and Kachi, 2012; Gawande and Li, 2009; Greene, 2000; Manski, 1993).

While network exogeneity may serve as a useful simplifying assumption, we know that international networks, such as trade networks, do not form randomly. Democracies, for example, are more likely to trade among one another than with non-democratic states (Bliss and Russett, 1998; Morrow, Siverson and Tabares, 1998; Lektzian and Souva, 2001) and that states with stronger property protections attract more trade (Souva, Smith and Rowan, 2008). Thus, studies examining the effect

of trade networks on a state's behavior without accounting for the trade network's formation may produce biased estimates. In other words, it is important to both recognize the effects of network embeddedness on actor-behavior while accounting for the possible non-random formation of social networks. Friendships form among individuals with similar interests, travel patterns are dictated by occupation and resources, legislative committees are formed based on congressperson's background and seniority. Likewise, states' IO memberships are determined by their geo-political and economic factors.

This dissertation makes the first attempt to relax assumption of network exogeneity and develop a model that treats network formation and effect as two simultaneous, strategic, and mutually inter-dependent processes. In doing so, I build a natural link between two broad literatures: the studies of trade ties formation (Bliss and Russett, 1998; Morrow, Siverson and Tabares, 1998; Lektzian and Souva, 2001; Souva, Smith and Rowan, 2008) and the literature that explore the effects of trade on domestic processes (Kant, 1795; Russett and Oneal, 2001; Schumpeter, 1942).

The goal of this dissertation is to explore the endogenous relationship between direct and indirect relationships and the unit-specific behavior of the social actor. I do this by developing a multi-player non-cooperative formal game, in which actors simultaneously choose their own type and the set of social ties they would like to form with other actors. The model is rather general and applies to the broad class of unit-specific outcomes, in which actors select into a network which in turn affects their type. One may think, for example, of the relationship between the network of the routes of a major international air line, such as Delta, and the amenities available

at the airports. A US-based company, like Delta, requires (or is required by US law) to provide its passengers with a certain level of services, such as handicapped access ramps or wheelchairs. An airline's ability to provide these services is, however, limited by the amenities provided by the airport (e.g. elevators or ramps). Hence, international airports must weigh the positive incentives associated with attracting large airlines (e.g., increased passenger flows) against the costs of investing in installing ramps and elevators.

Within the study of IR, the theoretical model provides an analytical tool for understanding various examples of complex interdependencies among international states, such as economic relationships, international treaties, IO memberships, or even conflict relationships. In this dissertation, I focus on the international network resulting from states' international trade linkages and explore how this network affects domestic-level behavior. Specifically, I examine the relationship between the choice of trade partners and a state's rule of law enforcement and its human rights practices. I find that states with strong rule of law and human rights protections are make more attractive trade partners and, as a result, form a greater number of direct trade relationships. I also find that, while direct trade relationships lead to positive improvements in each of these outcomes, indirect trade relationships—or trade through intermediary states—have a negative effect. Finally, there is some evidence that a state's domestic policies are affected by those of its direct trade partners.

The concept of *indirect trade*, defined as trade through an intermediary, is seldom explored by IR scholars, yet is rather common within the economics literature (for an exception, see Peterson, 2011). States are known to engage in indirect trade,

also known as *entrepôt trade*, when direct trade is too costly for either political or economic reasons (Antràs and Costinot, 2011; Fisman, Moustakerski and Wei, 2008; Lumenga-Neso, Olarreaga and Schiff, 2005). A vivid example of indirect trade due to a political contention can be found in the trade relationship between China and Taiwan, who direct most of their trade exchange through third-parties such as Hong Kong or Singapore (Feenstra and Hanson, 2004). Conlon's (2012) suggestions for international firms interested in establishing an economic relationship with Ukraine via a third-party state is a clear example of the second type of indirect trade—that due to economic reasons.

This dissertation advances our knowledge of international organization by problematizing the origin of international networks and developing a unified theoretical framework to study networks' formation and effect. Unlike the majority of the previous literature that either provides a functionalist account of network formation (for an overview, see Jacobson, Reisinger and Mathers, 1986) or simply takes the existing international organization as given, the theory developed here provides an account of network formation being endogenous to network effect. In doing so, this dissertation also makes an important contribution to research that employs social network analysis (SNA), making a move away from descriptive analysis towards developing explicit theoretical models of network formation and effects on their members.

1.1 The Roadmap

This dissertation proceeds in the following way. The goal of Chapter 2 is to lay out the main pieces of the theoretical model in a clear and intuitive way. I achieve this by employing a large number of empirical examples and, whenever possible, by conveying the results through intuitions rather than technical proofs, which are included in appendices. The formal model incorporates several important insights from the trade literature. One such key building block of the theory is that states' decisions to form trade relationships are usually endogenous to the subsequent effect of the resulting trade network on their domestic processes, such as the rule of law or corruption. In other words, states that are unwilling or unable to guarantee rule of law might also either self-exclude or get excluded by others from trade relationships that would require such enforcement on their part.

Another building block of the theory is that international trade is associated with economic benefits (GDP growth or foreign direct investment inflows) as well as costs (transportation, communications, social dislocation). In addition, trade is not equally beneficial for all states and not all states are equally beneficial as trade partners (Dowrick and Golley, 2004; Keohane and Nye, 1977). For example, states with larger markets or access to strategic resources, such as oil or rare minerals, may be more desirable trade partners. Yet primary exports specialization is consistently found to slow down domestic economic growth. Dowrick and Golley (2004), for instance, show that since 1980 trade benefits have disproportionately accrued to states with richer economies, with little benefit to less developed states. Some states are

more desirable trade partners because they are associated with lower costs of operation. Operation costs can be thought of as the factors that lower investment risks or political and economic guarantees and protections for investors (e.g., regime stability, contract enforcement) as well as general efficiency of operation (e.g., low corruption) (Li, 2006). States with high investment risks tend to have small and narrow capital markets and more limited and costly access to international capital (Porta et al., 1997; Sobel, 2002). As Simmons (2000, 821) so aptly put it, "Investors and traders can choose among a range of business venues, and they prefer to do business in venues characterized by a national commitment to the protection of property rights." An important nuance is that, while market size and resource endowment are largely exogenous, states usually have some control over their costs of operation, albeit at a price.

With this insight in mind, I allow the states in my model to adopt one of two domestic types: (1) a *High Type* trade partner is both a more beneficial trade partner to others and itself gains greater benefits from its trade relationships, but has to pay a fixed cost to enforce its domestic rule of law; (2) a *Low Type* trade partner pays no cost, yet its own trade benefits, as well the benefits gained by its trade partners are discounted. The choice of domestic type interacts with other model parameters to impact the number of direct and indirect trade relationships that a state will form.

The formal model leads to several empirical predictions. First, trade network formation is endogenous to trade network effect: on one hand, *High Type* states—states with stronger rule of law—attract more direct trade partners, and on the other hand, states with more direct trade partners face a stronger incentive to become a *High*

Type or improve domestic rule of law enforcement. Second, states' domestic outcomes are affected not just by their direct, but also by their indirect trade relationships. Counter-intuitively and contrary to Conlon's (2012) optimistic prognosis, the model predicts that, under some conditions, there is a negative relationship between the number of indirect trade partners and states' incentive to become a *High Type*, or enforce stronger rule of law. Finally, the model predicts that states' type or level of rule of law is positively affected by the average type of its direct trade partners.

In Chapters 3 and 4, I test the general predictions of the theoretical model, by applying them to two distinct areas of international research. In Chapter 3, I argue that one of the most important manifestations of a state's type as it is conceptualized in this dissertation is its level of domestic rule of law enforcement. States with strong rule of law enforcement are regarded as *High Type* states, because they guarantee lower cost of operations within their borders, by enforcing property rights and contractual law. Weak rule of law states, on the other hand, can be thought of as *Low Type* states, as business operations within such states are constantly threatened by a risk of expropriations, inefficiencies associated with corruption within the judicial system, and other manifestations of poor business practices. I, therefore, argue that domestic economic elites recognize the benefits of strong rule of law enforcement and will either pressure their government to enforce rule or law or, when this option is unavailable, set up indirect trade channels for conducting international trade through intermediary states.

The first prediction of the theory, then, is that strong rule of law helps attract a greater number of direct international trade partners. Second, the types and number

of international business partners a state is able to attract also determine its rule of law. States with a larger number of direct trade partners will have a greater incentive to enforce domestic rule of law. Conversely, states who primarily rely on indirect channels for their international transactions have a lower incentive to improve their domestic rule of law. Finally, a state's rule of law will be positively affected by the average rule of law of its trade partners.

I test these predictions using Correlates of War (COW) data on international trade (Barbieri, Keshk and Pollins, 2008) and the International Country Risk Guide (ICRG) dataset on domestic rule of law. I model the simultaneity between network formation and effect, using a statistical estimator developed by Ripley, Snijders and Preciado (2012). This statistical estimator, referred to as a continuous Markov Chain exponential random graph model (MC ERGM), allows for a close mimicking of the theoretical model by simultaneously modeling two dependent variables: network formation and its effect on actors' behavior. The results of the statistical tests provide some support the theoretical predictions.

In Chapter 4, I conduct a second test of the theory, recasting the theoretical model and applying it to a completely different area of study—the relationship between international trade and domestic respect for human rights. The chapter focuses on the economic costs of repression, such as higher risks, negative publicity, and decreased quality of human capital, arguing that these costs are suffered by both the domestic economic elites and their international business partners. These business elites can, however, alleviate their losses resulting from such costs by either pressuring their government to embrace stronger human rights protections or, when this option is

unavailable, by setting up channels for indirect economic transactions through states with more favorable political environments.

Consistent with the networks theory, a state's choice of strategy dictates the type and number of international business partners it can attract. States with better human rights practices attract more direct international business partners, as well as a greater number of businesses from less repressive states. In contract, repressive states attract less international business in general, and less business from states with strong human rights laws, in particular. Finally, the types and number of international business partners a state is able to attract affects its own incentives for respecting human rights. States that are forced to rely on indirect channels for their international transactions have a lower long-term incentive to improve their existing human rights practices than states with a large number of international business partners.

I test these empirical predictions, by measuring domestic human rights using the *Physical Integrity* variable of the Cingranelli-Richards (CIRI) Human Rights Dataset (Cingranelli and Richards, 2010). The results provide some support for the empirical predictions and suggest a number of directions for future research.

Chapter 5 discusses this dissertation's main findings and contribution and concludes by outlining a number of policy implications and directions for future research.

CHAPTER 2
A FORMAL THEORY OF NETWORK FORMATION AND EFFECT

2.1 Introduction

This chapter provides an overview of the formal model's central theoretical assumptions, supplemented with substantive empirical illustrations (please see the appendices for more technical derivations of the model's equilibria, predictions, and proofs). In this model, the actors—states in the international system—make two decisions: they choose a set of trade links that they would like to form with other states, and their own domestic type (*High* or *Low*), which can be though of, for example, as the level of domestic rule of law enforcement. The Predictions section contains several of the model's deductions stated as hypotheses, described in terms of general intuitions rather than formal proofs.

IR scholars have long recognized the relational or multi-lateral nature of many international outcomes, such as trade, IO memberships, conflict, alliances, or international treaties. Rather than affecting a single isolated actor, these types of outcomes create a sort of a "domino effect" and involve a set of additional actors. While economic sanctions, for example, are often studied as bilateral or isolated acts, sanctions initiation by one actor significantly increases the probability that additional actors will follow suit and issue additional sanctions against the target (Cranmer, Heinrich and Desmarais, 2013). Importantly, each of such subsequent sanctions initiations do not constitute independent events, as they are effectively triggered by the first instance of sanctions. Until recently, however, the modal empirical approach to such dependent

events has been to treat them as independent events or reduced form dyadic relationships, largely ignoring their multi-lateral and strategic nature (Cranmer, Heinrich and Desmarais, 2013; Poast, 2010).

Recent developments in the use of social networks analysis provided a more accurate way for modeling these relationships, by treating multi-lateral behaviors or outcomes as networks. For example, a number of existing studies has used the network framework to study international conflict (see, for example Dorussen and Ward, 2008, 2010; Hafner-Burton and Montgomery, 2006; Maoz, 2001, 2006, 2009, 2010; Ward, Siverson and Cao, 2007). Regarding inter-state conflictual relationships as a network whose nodes are represented by states and edges as conflict occurrences, Dorussen and Ward (2008), for example, investigate the pacifying effects of inter-governmental organizations (IGOs). They argue that IGOs help create inter-state network ties that provide not only direct, but also indirect channels of communication, which enhance the likelihood of peaceful resolution of disagreements. The importance of indirect links is corroborated by empirical evidence. Dorussen and Ward (2010) and Ward, Siverson and Cao (2007) incorporate several networks measures in the Russett and Oneal (2001) triangulating-peace model. Dorussen and Ward (2010) find evidence of a pacifying effect of both direct and indirect trade links. They also find that as the global trade network becomes denser over time, the importance of indirect links declines. While the findings of Ward, Siverson and Cao (2007) support the Kantian peace thesis, they also show that this effect if significantly weakened, once we account for the effects of geographic proximity, the conflict network, and the higher order network dependencies in the data. Others examine the pacifying effects

of network polarization, strategic interdependence, and structural equivalence (Maoz, 2006; Maoz et al., 2006; Maoz, 2009).

In addition, Maoz (2006, 2009) shows that alliance network's polarization and strategic interdependence have a positive effect, while trade network's polarization and economic interdependence have a pacifying effect. Maoz et al. (2006) find empirical evidence for the pacifying effect of structural equivalence in both trade and IGO networks. Maoz (2010) extends upon these studies by providing a more holistic examination of the interaction between the networks insights and the predictions of the three major theoretical paradigms—realism, liberalism, and constructivism. Of course, the IR applications of the networks approach have not been limited to the study of international conflict. Ward (2006) investigates the effects of network centrality in environmental regime networks on different aspects of environmental sustainability. Von Stein (2008) illuminates the relationship between international networks, the strength of domestic nongovernmental organizations (NGOs) and ratification of United Nations (UN) Framework Convention on Climate Change (FCCC) and the Kyoto Protocol. Metternich (2011) examines the effect of anti-government network characteristics of the likelihood of government repression.

By recognizing and modeling non-independence among international outcomes, these studies make an important advance to the IR literature. Most of such studies, however, still treat network effects and network formation as outcomes that are exogenous or independent of each other. Although network exogeneity often serves as a useful simplifying assumption, we know that in actuality networks are results of careful and strategic actor self-selection. Democracies, for example, are

more likely to trade among one another than with non-democratic states (Bliss and Russett, 1998; Morrow, Siverson and Tabares, 1998; Lektzian and Souva, 2001) and that states with stronger property protections attract more trade (Souva, Smith and Rowan, 2008). Modeling network effects, such as the effect of trade on domestic democracy, therefore, would be incomplete without first accounting for the nonrandom processes associated with the formation of the trade network. The advantages of the formal theoretical approach adopted here is that it allows for accounting for both (1) the non-independence among international outcomes and (2) actor strategic selection into networks.

2.2 The Networks Game

2.2.1 Players

Let $N = \{1, ..., n\}$ represent the states in the international system. Network relationships among these states are formally represented by a network graph (g) whose nodes are identified with the states and whose arcs capture their pairwise relations. Let ij denote the subset of N containing i and j and is referred to as the relationship between actors i and j. The interpretation is that if $ij \in g$ (alternatively written as $ij = 1$), then nodes i and j are directly connected, while if $ij \notin g$, then nodes i and j are not directly connected.

For example, if the network graph g represents the network of international trade relationships, the ij^{th} cell entry of this graph would equal to 1 if there existed a positive flow of goods between state i and state j. If states i and j did not exchange any goods, then the ij^{th} cell would be coded as 0. Analogously, one may think about

other types of networks among international states, such as an alliance network, a network of IO memberships, a conflict network.

2.2.2 Actions

Each actor has to make two simultaneous decisions: (1) what trade links to form, if any, and (2) whether to adopt a *Low Type* or pay a fixed cost σ to become a *High Type*. The rules for making each of these decisions are described below.

2.2.3 Decision 1: Formation of Trade Networks

This decision involves each state simultaneously announcing the set of states to which it wishes to form trade links. The links that are formed are those in which both of the states involved in the link named each other. More formally, for the first decision made in the game, the action space of player i is a vector $S_i = [s_{i1}, \ldots, s_{in}]$, where $s_{ij} = 1$ if i chooses to form a link with j, and $s_{ij} = 0$ otherwise. If $S = S_1 \times \ldots \times S_n$ is the profile of actions played, then link ij forms if and only if both $\{s_{ij} = 1\} \in S_i$ and $\{s_{ji} = 1\} \in S_j$. The network that forms is

$$g(S) = \{ij | s_{ji} = 1 \text{ and } s_{ij} = 1\}.$$

2.2.3.1 Decision 2: Choosing Domestic Type

In this part of the game, each actor chooses its type: *High* (action "1") or *Low* (action "0"). An actor's type refers to its individual characteristics that make it a more of less attractive network member. For a sociologist interested in the relationship between friendship networks and individuals' drinking habits, for example, actors' type would be represented by the daily number of alcoholic drinks consumed by each

individual. For a study of relationship between the network of passenger flows and airport amenities, one may think of actor type as the level of amenities available at a given airport or its size.

For the international trade application of the game, explored in this dissertation, an actor's type captures the factors that improve a state's trade benefits and attractiveness as a trade partner, which may be thought of and operationalized in numerous ways. Some of the trade literature, for example, associates investment risks with regime type (Jensen, 2008; Olson, 1993). Democracies, characterized by constraints on the chief executive, have been found less likely to expropriate foreign direct investment (Li, 2009), set lower trade barriers for one another (Mansfield, Milner and Rosendorff, 2000), and to be more likely to remove capital controls (Quinn, 2000). Thus, implementing tighter constraints on the chief executive, strengthening the rule of law, creating working democratic institutions, facilitating capital mobility, decreasing tariff rates, or investing in domestic infrastructure may all constitute ways to decrease one's operations' costs. The action space of player i for the type decision is

$$D_i = \{0, 1\}.$$

2.2.4 Payoffs

2.2.4.1 Decision 1: Trade Network Formation

States derive trade benefits from their direct trade links, such as the ability to sell goods on their markets and access to their goods (Dreher, 2006; Ricardo,

[1817] 2004; Smith, [1776] 2003; Wolf, 2005).[1] States also derive benefits from the indirect links connecting them to the trade partners of their trade partners, such as Germany's indirect link to Ukraine through Cyprus. Indirect links, for example, may allow for movement of goods that are unavailable through direct trade for political or other reasons. A vivid example of advantages from indirect trade can be found in the arms trade literature, which shows how products made in the US find their way to countries that the US does not trade with directly (e.g., Iran) (Curwen, 2007; Smith and Udis, 2003; Strazzari and Tholens, 2010). Indirect trade may also allow for movement of goods that are undesirable by the direct trade partners. For example, Russian manufactures that are unable to compete with European goods on their domestic market may be able to sell their goods on less competitive markets, such as in Belarus, taking advantage of the absence of a strong direct trade relationship between Germany and Belarus. German manufacturers, in the meantime, also benefit from the additional openings on the Russian market.

The trade benefits that state A obtains from state C, however, are diminishing with the number of links through which goods have to travel to get from A to B. Transporting goods through numerous trade links results in efficiency loss associated with relying on middlemen (e.g., see Fars News Agency, 2013). To capture this, I

[1]Some scholars express concerns with the state-level aggregation of trade. After all, it is the firms that trade, not states. Though firms are indeed international trade's primary agents, they are not its only beneficiaries (or losers). Trade does not benefit (or hurt) just individual firms, but also states' national economies as a whole. While individual firms seek profits, states benefit (or hurt) from firms' successes (or losses), and in some cases the state may benefit even regardless of how each individual firm fares. As a result, both states and firms respond to trade's costs and benefits, sometimes in different ways. Since my primary interest here lies in state-level behavior, state-level analysis is appropriate.

denote the benefits that state A would derive from a direct trade relationship with state B by δ, whose values are restricted between 0 and 1 ($0 < \delta < 1$). If the two states are not directly connected, however, but instead trade through at least one intermediary, then indirect trade benefits are calculated by raising δ to the power that is equivalent to the number of states on the shortest path between them. For example, in case of a trade network depicted in Figure 2.1, A's indirect trade benefit from its trade with B would be calculated by raising δ to the second power, as A is trading with C through one intermediary B (the shortest path between A and C consists of two links: AB and BC). Note that restricting δ between 0 and 1 ensures that trade benefits decline with the number of intermediaries, as raising δ to higher powers results in lower values.

The concept of indirect links and indirect international trade links, in particular, has received very little attention within the study of IR. Barbieri, Keshk and Pollins (471 2009) mention it only in passing, when making a distinction between *special* trade—i.e., trade that flows directly from point A to point B—and *general trade*—i.e., trade that includes both special and transit trade. Peterson (2011) argues that third-party trade aggravates dyadic relationships by creating power imbalances. In contrast, a number of studies employing SNA find that indirect trade may have a pacifying effect on systemic conflict (Maoz, 2009; Dorussen and Ward, 2008). Lektzian and Biglaiser (2012) speak to a related subject of foreign direct investment (FDI), arguing that by decreasing FDI flows between the sender and the target, bilateral economic sanctions lead to increases in non-sender states' FDI in the target state. The concept of indirect trade is more common to economics research, which typically

conducts case-studies of particulr indirect trade relationships, such as the intermediated trade between China and Taiwan via Hong Kong or Singapore (Feenstra and Hanson, 2004, e.g.,). This paper builds and extends upon these studies by exploring the effects of a state's strategic decision to rely on indirect rather than direct trade relationships—a question that has not been raised by previous research.

International trade is also associated with certain costs. Apart from the transportation and communications' costs associated with moving goods across borders, international trade requires acquiring the legal expertise to successfully draft contracts, pay foreign taxes, etc. The literature also shows, for example, that trade may hurt domestic producers by lowering the prices for their goods (Hiscox, 2002; Mukherjee, Smith and Li, 2009; Rogowski, 1989). The costs of forming direct trade relationships with each state are captured in the model by a homogeneous parameter $c > 0$.

In summary, let $u_i(g)$ denote the "net value" of trade with j to state i and c denote the cost to i of maintaining the link ij. The utility of each player i from graph g is then a function of the number of i's direct trade partners k_i, or i's *degree*, multiplied by the cost of forming a link c, and the sum of i's benefits from each direct or indirect trade link that it is involved in, $\delta^{t_{ij}}$, where t_{ij} is the number of links in the shortest path between i and j. The shortest path from i to j is defined as the path

involving the lowest number of links that connects i and j.[2] More formally:

$$u_i(g) = f\left(\sum_{j \neq i} \delta^{t_{ij}}, ck_i\right). \tag{2.1}$$

Note that t_{ij} is set to ∞ if there is no path between i and j.

Finally, the value of $u_i(g)$ depends on the action the players take in the second part of the game.

2.2.4.2 Decision 2: Choosing Domestic Type

The second decision involves each state's choice of its domestic type: *High* or *Low*. *High Type* states pay a fixed cost $\sigma > 0$ to provide more favorable business environments than *Low Type* states by engaging in stronger enforcement of domestic rule of law. The cost of choosing *High Type*, σ, however, may be compensated by the increases in trade benefits, associated with a more favorable domestic business climate.

To distinguish the costs of business operations in a given country from the transaction costs associated with moving goods through indirect channels (discussed earlier), this dissertation refers to the former as *Operations Costs* and to the latter as *Transaction Costs*. *Operations Costs*, therefore, capture domestic impediments to conducting business operations. The state's type (*High* or *Low*) is determined depending on the government's choice of the level of *Operations Costs* that it is going to enforce. Although not explicitly formalized, the idea that a government chooses a state's domestic type that either facilitates or impedes the formation of international

[2]If there are two or more paths of equal lengths, I assume that i selects the one with the greatest number of links of *High Type*. In case of a tie, i randomly decides to use one of the paths with the same length.

economic relationships is not new to the interdependence literature. In the words of Souva, Smith and Rowan (2008, 385), for example:

> [...I]t is important to clarify the role of politics in promoting trade. The policies governments choose make it more or less difficult for trade to occur. Facing any government is a menu of choices. If a certain set of policies are chosen, the political barriers to trade will be nonexistent, and trade can occur in the frictionless environment found in economics texts. However, if another set of policies are chosen, trade will be choked off. Government chooses first, and then firms must make choices within the policy environment that has been determined by the government.

The literature identifies a number of factors affecting domestic business climate, which are sometimes referred to as transaction costs. According to Souva, Smith and Rowan (2008, 385), "the most important institutions affecting [operations costs] are [...] domestic institutions that protect private property, establish banking and insurance laws, and create common standards of measurement," or the rule of law institutions. States with stronger respect for the rule of law are found to derive greater trade benefits (Borensztein, Gregorio and Lee, 1998) and are themselves more beneficial trade partners for other states (Li and Resnick, 2003). As shown by Li and Resnick (2003), states with stronger rule of law attract more foreign direct investment, which is a known determinant of trade (Aizenman and Noy, 2006).[3]

The human rights literature identifies compliance with international treaties as another mechanism for improving one's investment risks(Simmons, 2000). The argument is that compliance is a costly, and thus credible way to signal commitment to the rule of law and protection for investors. The *Costs of Operations* are also

[3]Note that trade and foreign direct investment are directly related, especially in more recent years. For example, 64.7 percent of US trade constituted intra-firm trade in 1999 (Borga and Zeile, 2004).

affected by domestic social stability. Civil unrest destabilizes important domestic institutions. Disruptions to infrastructure increase the costs and decrease the reliability of communications and transportation. Transported goods may become easy prey for rebels, especially since law enforcement funding and human capital is likely to be diverted to the military. As a result, even in the absence of a direct concern for traders' physical safety, investment risks increase in the presence of civil strife (Bayer and Rupert, 2004; Collier, 2000). Settling domestic grievances, then, may constitute another mechanism of improving domestic *Operations Costs*.

Although exploring every single domestic issue that may translate into *Operations Costs* is beyond the scope of this dissertation, it is worth mentioning that one can easily extend the logic of Operations Costs to such areas of research as domestic fiscal capacity, capital tax rates, the level of constraints of the chief executive, etc.

To model *Operations Costs* and their effect on international trade relationships, suppose α represents the benefit that state i gains from trade or i's attractiveness as a trade partner, where $0 < \alpha \leq 1$. This benefit α may vary depending on a set of exogenous factors, such as domestic market size or resource endowment. In the next chapter, I focus on the variation in i's level of domestic rule of law enforcement, while in Chapter 4 I will recast the theoretical argument to explain the level of domestic respect for human rights.[4] As a result, states with with higher values of α (e.g., strong rule of law, respect for human rights) both make more attractive trade

[4]Note that more broadly, both exogenous and endogenous factors that make i a more attractive trade partner can be thought of in terms of operations costs. For example, large markets decrease operations costs by allowing for economies of scale. Oil endowment may decrease operations costs by lowering the costs of transportation.

partners and derive greater benefit from international trade. Indirect trade through states with stronger rule of law (high α) provides more benefits than indirect trade through a state with low rule of law (low α).

Thus, α enters i's utility function in three ways: (1) as α_i or i's benefit from engaging in trade given i's rule of law, (2) as α_j or i's benefit from trading with j, given j's type (high or low rule of law), and (3) as α_l or the discounting factor of having indirect trade through other states, which depends on the rule of law in the states that form the shortest path from i to j. To capture the diminished benefits of trade by, with and through states with low rule of law, α takes on the value of 1 if state i is a *High Type* ($d_i = 1$). For all states i, $0 \leq \alpha \leq 1$, and $\alpha_i \in \{\alpha, 1\}\, \forall i$. With this in mind, u_i's utility function takes the following form:

$$u_i\left(g|d_i, d_1, ..., d_n\right) = \alpha_i \sum_{j=1}^{n} \prod_{l \in P} \alpha_{ij_l} \delta - \sigma d_i - k_i c, \tag{2.2}$$

where $P = \{l_1, \ldots, l_j\}$ is the shortest path between i and j, or the set of links that make up the path with the lowest number of links between i and j. So α_{ij_l} is the type of each state l, which is a link on the shortest path from i to j.

Figure 2.2 provides a simple illustration. Let the white and blue nodes represent *High* and *Low Type* states, accordingly. Then Figure 2.2.a presents a network made up of *High Type* states or states that chose to pay a fixed cost of enforcing their domestic rule of law. The utility to state A from this network consists of $\delta - c$, its net benefit from a direct trade link with state B, plus four times δ^2 for four indirect links through B to C, D, E, and F. Finally, we must subtract σ, the fixed cost of

High Type. More formally, state A's utility can be written out as:

$$u_A\left(g|d_A=1,d_B=1,d_C=1,d_D=1,d_E=1,d_F=1\right)=\delta+4\delta^2-c-\sigma \quad (2.3)$$

The corresponding utility to state A in the network presented in Figure 2.2.b consists of $\alpha^2\delta-c$, its net benefit from a direct trade link with state B, plus four times $\alpha^3\delta^2$ for four indirect links through B to C, D, E, and F or:

$$u_A\left(g|d_A=1,d_B=1,d_C=1,d_D=1,d_E=1,d_F=1\right)=\alpha^2\delta+4\alpha^3\delta^2-c \quad (2.4)$$

Note that the two networks depicted in Figure 2.2 differ only in the types of states they are made up of. Comparing Equations 2.3 and 2.4, we see that two trade-offs in the payoff function that stem from this difference: (1) *High Types* must pay σ, while *Low Types* have no cost, and (2) *Low Types*' utilities are discounted by α. Importantly, the value lost due to this discounting increases with the number of both direct and indirect links in the network.

2.3 Predictions

The game has a large number of equilibria (see Table 3.6.1 of Appendix A on p.137). This dissertation's interest in endogeneity is best pursued by focusing on classes of equilibria rather than any equilibrium in particular. The cost of link formation, c, separates equilibria into several main classes distinguished by the shapes of the networks that form.[5] When the cost of link formation c is greater than the total direct and indirect benefits of forming any links, the equilibrium is an *empty*

[5]Note that while this dissertation focuses on the symmetrical network shapes, other equilibria shapes are possible. See, for example, Jackson and Wolinsky (1996).

network—or a network in which no player is connected to any other player (see Figure 2.3.a).

As the cost of link formation, c, decreases, however, there is a threshold, c_c^*, at which actors are indifferent between forming an empty network or a *circle*—a network in which each actor has exactly two direct links (see Figure 2.3.b). In a circle network, the cost of link formation, c, is still greater than the benefit from any single direct link $\alpha_i\alpha_j\delta$, or $c > \alpha_i\alpha_j\delta$, yet this cost is made up by the additional benefits from the indirect links (recall that indirect links are free). A prominent example of a circle network comes from the literature on nuclear proliferation, which commonly refers to the "rings" of non-nuclear developing countries with varying technical capabilities trading knowledge in attempts to enhance their nuclear potential (Braun and Chyba, 2004).

As the cost of link formation, c, decreases even further, it reaches the second threshold $c_b^* = \alpha_i\alpha_j\delta$, at which the cost of forming a link is made up by the benefit derived from this link. When the cost of link formation c is below this threshold, the equilibrium network configuration also depends on the difference in benefits between a direct and an indirect link or the relationship between c and $c_a^* = \alpha_i\alpha_j\delta - \alpha_i\alpha_l\alpha_j\delta^2$. When the difference in benefits is low or $c_a^* < c_b^*$, which means that the gain in benefits from forming a direct link rather than an indirect link does not outweigh the cost of link formation c, states predominantly rely on indirect links. Within this cost range of c, we will observe *star-shaped* equilibrium networks (Figure 2.3.c). A *star-shaped* or a *hub–and–spokes* network is a network in which all players are linked to one central player—*the hub*—and there are no other links: $g \subset g^N$ is a star if $g \neq \emptyset$ and there

exists $i \in N$ such that if $jk \in g$, then either $j = i$ or $k = i$. State i is the center of the star. The star-shaped equilibria persist within the link formation cost range c, under which the benefits from direct links outweigh the cost of forming them, yet indirect links still yield greater net benefits than direct links (as indirect links are free).

Empirical examples of star-shaped networks include colonial trade networks with the colonizer as the center of the star and the colonies as the *vertices* or *spokes*(the British Empire, France and its colonies, etc.). The existing ballistic missile and nuclear proliferation networks provide another example of star-shaped networks, with North Korea and Pakistan as the hubs or the central nodes (Montgomery, 2005, 171). Montgomery (2005, 171) finds no confirmation of any transactions between Iran, Libya, and North Korea—the spokes of the nuclear proliferation network—as of mid-2005.

Finally as the link formation cost, c decreases to $c \leq c_a^*$, the discounted benefits associated with indirect links no longer justify the "saving" in cost and all actors choose to form direct links to one another, which results in a *complete* network (Figure 2.3.d). A *complete* network or a *clique* is a network in which each player has a link to each other player: $g \subset g^N$ is a complete network if $\forall i \in g, j \in g : ij = 1$. An empirical example of a complete trade network is a trade union, such as the European Union (EU) or the North Atlantic Free Trade Agreement (NAFTA).

This can be summarized in Proposition 1.

Proposition 1 (See Table 3.6.1 of Appendix A)**.** *There exist threshold values of link formation cost c, such that:*

1. *when $c < c_a^*$, actors form a complete network;*

2. *when $c_a^* < c < c_b^*$, there exists an equilibrium in which actors form a star-shaped or a circle network;*[6]

3. *and when $c_b^* < c$, there exists an equilibrium in which actors form a circle or an empty network.*

Although characterized by a rather high degree density, the contemporary trade network is not a complete network (i.e., each state within the contemporary trade network is not directly connected with each other state). Hence, the equilibria of interest in this paper fall between the two cut-off points of link formation cost c, $c_a^* < c < c_b^*$. As a result, the rest of the paper focuses on describing the star-shaped equilibria, deriving predictions related to them, and testing these predictions.

Treating trade network as a star is, of course, a simplifying assumption that helps limit the large number of equilibria. This assumption, however, is not unrealistic. In particular, the star-shape equilibrium is characterized by the shortest average path between the players, which has been shown to be the general property of dynamic network games' equilibria. The intuition is that, since the benefit from a network connection is discounted with additional intermediaries, players gain greater utility from equilibria with shorter average paths, even if multiple equilibria are possible (Galeotti, Goyal and Kamphorst, 2006).

[6]Note that other equilibria, such as circles, are also possible in this cost range.

2.4 Star-Shaped Equilibria

Within the link formation cost range of $c_a^* < c < c_b^*$ or, more precisely, $\alpha^2\delta - \alpha^3\delta^2 < c < \alpha^2\delta$, the game has n pure strategy star-shaped equilibria, in each of which one actor serves as the *center* of the star and others act as *spokes*. An interesting property that results from the asymmetry of this equilibrium class is that the center and the spokes obtain different payoffs, and hence have different incentive structures for their type decisions (see Figure 2.4). Specifically, the center of the star obtains the net benefit of:

$$U_c = (n-1)\left(\alpha^2\delta - c\right). \tag{2.5}$$

Actors located at the spokes of the star, in the meantime, obtain:

$$U_s = \alpha^2\delta + (n-2)\,\alpha^3\delta^2 - c. \tag{2.6}$$

This difference in utilities comes into play, because actors' type decision depends on the cost of *High Type*, σ, as actors will choose *High Type* when its cost σ is compensated by the additional benefits that can be accrued as a result of increasing one's own type α_i. The center player will choose *High Type* when:

$$\sigma \leq \alpha\delta\,(1-\alpha)\,(n-1) = \sigma_c^*. \tag{2.7}$$

A player located at the spoke, on the other hand, will choose *High Type* when:

$$\sigma \leq (1-\alpha)\left(\alpha\delta + \alpha^2\delta^2\,(n-2)\right) = \sigma_s^*. \tag{2.8}$$

Since σ_c is always greater or equal to σ_s^*, star-shaped equilibria can be further grouped into three sub-classes, based on the values of σ. When $\sigma > \sigma_c^*$, all states will

play *Low Type* or will choose not to enforce domestic rule of law. As the cost of rule of law enforcement, σ, decreases and falls within the range of $\sigma_s^* \leq \sigma \leq \sigma_c^*$, we will observe heterogeneous networks with a law-enforcing *High Type* center, but weak rule of law or *Low Type* spokes. If the cost of rule of law enforcement, σ becomes even cheaper and falls within the range of $\sigma \leq \sigma_s^*$, all states in the network will choose to enforce rule of law or become *High Types*, independent of their position.

This can be summarized in Proposition 2.

Proposition 2 (See Table 3.6.1 of Appendix A)**.** *Within the range of link formation cost $c_a^* < c < c_b^*$, there exist threshold values of High Type cost σ, such that:*

1. *when $\sigma < \sigma_s^*$, the star-shaped equilibria will consist of High Types;*
2. *when $\sigma_s^* < \sigma < \sigma_c^*$, the star-shaped equilibria will consist of a High Type center and Low Types spokes;*
3. *and when $\sigma_c^* < \sigma$, the star-shaped equilibria (and all equilibria) will consist of Low Types.*

Type heterogeneity within star-shaped equilibria allows for deriving predictions related to the endogeneity between network formation and effect. More specifically, direct and indirect links to *High Types* yield higher utility to other players, which means that (1) in all equilibria, *High Type* states will have the same or higher direct degree, and (2) in equilibria that allow for heterogeneous types, *High Types* will have higher degree than *Low Types*.

Proposition 3 (For proof, see p. 154 of Appendix B)**.** *Within the range of link formation cost $c_a^* < c < c_b^*$, High Type states have weakly higher direct degree.*

The intuition behind Proposition 3 is that, all else equal, any direct or indirect benefits that accrue from a trade link with a *Low Type* are discounted by α: conducting business in states with weak rule of law or high corruption is associated with an efficiency loss. Thus, all else equal, when choosing between a *Low* and a *High Type* trade partner, any state will always prefer the *High Type* trade partner, irrespective of its own type. Or, in less technical language, states prefer to make a trade link with a state with more rather than less favorable domestic business climate. As highlighted by the opening example, German firms protect themselves against the poor legal practices in Ukraine by setting up transaction flows through third-party intermediaries with sound legal systems, such as Cyprus (until its recent economic crises).

Proposition 3, therefore, describes the first outcome of the endogenous formation of trade network in the presence of heterogeneous trade partners. Heterogeneity of incentives observed in the star-shaped equilibria also allows for exploring the second of the simultaneous outcomes—actors' tendencies to choose *High Type* in the face of differing network incentives created by the number of their direct and indirect trade partners. Specifically, equilibrium analysis of star-shaped equilibria leads to Propositions 4 and 5:

Proposition 4 (For proof, see p. 155 of Appendix B)**.**

Within the range of link formation cost $c_a^* < c < c_b^*$, states with greater direct degree

have a weakly greater incentive to become High Type than states with lower direct degree.

Proposition 4 is derived from a comparison of incentives to choose *High Type* for the center of a star, σ_c^* (Equation 2.7), to those of the spokes, σ_s^* (Equation 2.8). Since the center's incentive to choose *High Type* is always greater than that of the spokes ($\sigma_c^* > \sigma_s^*$), as the cost of choosing *High Type* σ decreases, the forgone benefits of not investing in *High Type* grow faster for the center than they do for the spokes. As the center has more to gain from choosing *High Type* than the spokes at all values σ, centers will choose *High Type* for greater range and higher values of σ.

In less technical language, this means that states with more direct trade relationships have more to gain from improving their domestic business environment than states with few direct trade relationships. States such as Cyprus or the Netherlands that choose to become major hubs of entrepôt trade are interested in attracting even more trade, which is best achieved through lowering investment risks (i.e., strengthening rule of law enforcement). States that are less reliant on direct trade relationships, such as Ukraine, have a lower incentive to strengthen their domestic costs of business operation, as their foreign economic transactions are structured in an indirect manner that allows investors to by-pass risks.

Next, let us turn to the prediction regarding this paper's greatest effect of interest—that of indirect links. The prediction linking the effect of indirect links in star-shaped equilibria is formulated in Proposition 5.

Proposition 5 (for proof, see p. 157 of Appendix B)**.**

Within the range of link formation cost $c_a^* < c < c_b^*$ and $c < \alpha\delta - \alpha\delta^3$ (star-shaped networks with the maximum shortest path of two), states with greater indirect degree have a weakly lower incentive to become High Type than states with lower indirect degree.

Proposition 5 is counter-intuitive. At first glance, it seems that increases of any type of trade partners—direct or indirect—would increase a state's incentive to choose *High Type*. The equilibria analysis, however, leads to the opposite prediction. The logic is that within the star equilibria, no player can increase its number of indirect links without decreasing its number of direct links. In fact, within the star equilibria, each player's numbers of direct and indirect links have a perfect negative correlation: the center has exactly $n-1$ direct links and no indirect links, while each spoke has exactly 1 direct link and $n-2$ indirect links. Since each direct link is associated with a greater incentive to choose *High Type* than each indirect link (Proposition 4), states with more indirect links will have a lower incentive to choose *High Type* than states with fewer indirect links. This relationship only holds, of course, for a fixed number of players N, which ensures that that players cannot gain in indirect links without losing in direct links. This assumption is reasonable for the study of the international states, whose number remains roughly the same throughout the time-period covered in this dissertation.

In less formal language, states with less favorable business conditions, such as Ukraine in the opening example, intentionally select themselves into indirect trade relationships—relationships that, while yielding slightly lower trade benefits, also put

less pressure on their domestic affairs, such as governments' commitment to enforcing the rule of law or respecting human rights. All else equal, indirect trade is a conscious choice and a viable alternative to states that do not wish to improve their domestic business conditions. States that choose indirect trade do this strategically, trading in the lost benefit associated with trading through an intermediary for the benefit of avoiding outside influences on their domestic affairs. While the Ukrainian government is well aware of the efficiency losses associated with conducting business through more reliable third parties, such as Cyprus or the Netherlands, it chooses to pay this calculated cost in the face of a larger cost associated with enforcing domestic rule of law, respecting human rights, lowering its corporate taxes, building up its administrative capacity, etc. States that rely on a larger number indirect trade relationships, moreover, have a lower incentive to invest in improving their domestic business conditions. Given the game equilibrium they are in, the cost of making domestic changes is too prohibitive and would not be offset by the resulting improvements in trade benefits. Hence, as the number of a state's indirect trade relationships increases, its incentive to play *High Type* goes down.

Note that Propositions 3 4, and 5 point exactly to the endogeneity problem that motivated this research. Mainly, while *High Type* states tend to have more direct and fewer indirect trade partners, having more direct and fewer indirect trade partners also increases state's incentive of becoming a *High Type*. *Low Type* states, on the contrary, select themselves into having fewer direct and more indirect trade relationships, and such trade network positions, in turn, are associated with weaker incentives to improve domestic type.

Finally, equilibria analysis leads to the following rather mathematically straightforward yet empirically interesting prediction.

Proposition 6 (for proof, see p. 158 of Appendix B)**.** *Actors' incentives to choose High Type weakly increase with the number of their direct trade partners that choose High Type.*

Since an actor's utility is from each trade partner is weighted by that trade partner's type, so is an actor's incentive to play *High Type*. Specifically, an actor's incentive to become *High Type* increases as more of its direct trade partners play *High Type*, as trading *High Type* yields a greater benefit than trading with *Low Type* trade partners. One can think of this as the positive net benefit from each additional *High Type* vs a *Low Type* trade partner as a slightly higher contribution to covering state i's own cost of playing *High Type*.

Trade relationships with other states with poor business climate, such as Russia, do not create a strong incentive for the Ukrainian government to enforce its own business climate. To be more precise, Ukraine could certainly gain in trade benefits from improving its property rights or contract protections (avoiding some inefficiency on the Ukrainian side of the transactions), but these gains might not outweigh the costs of such an improvement. Trading with states with more favorable business conditions, such as Germany, on the other hand, creates a greater incentive for the Ukrainian government to improve its own business incentives, as such an improvement would lead to greater economic gains (e.g., increased trade volumes with Germany) that could help outweigh the cost of the domestic improvements.

Figure 2.1: Direct vs. Indirect Links: An Illustration

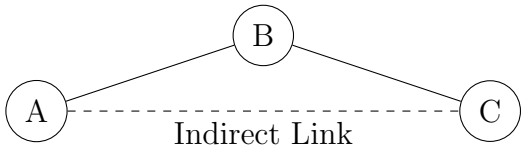
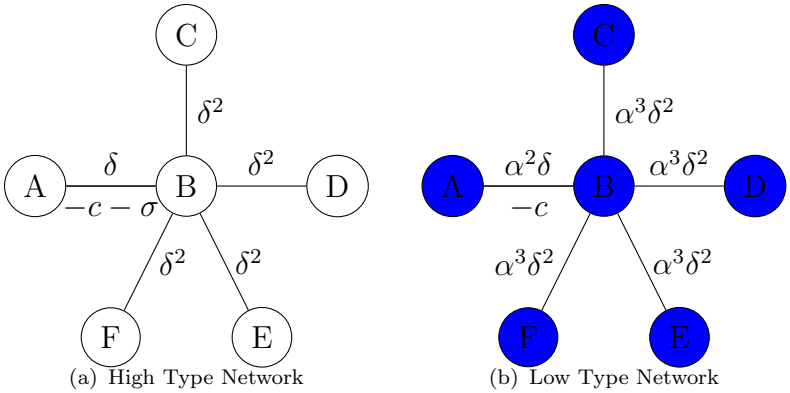
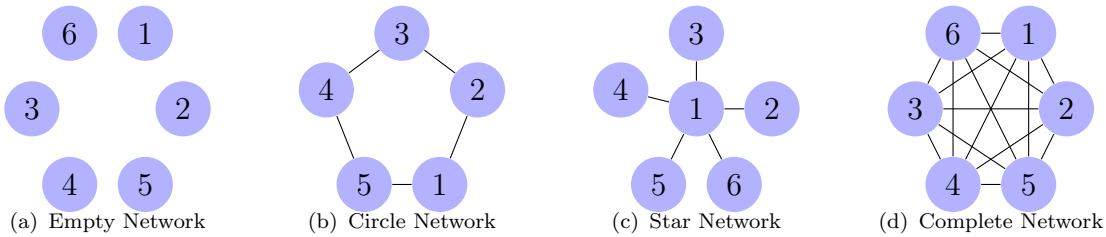


Figure 2.2: Calculating Players' Utilities: An Illustration



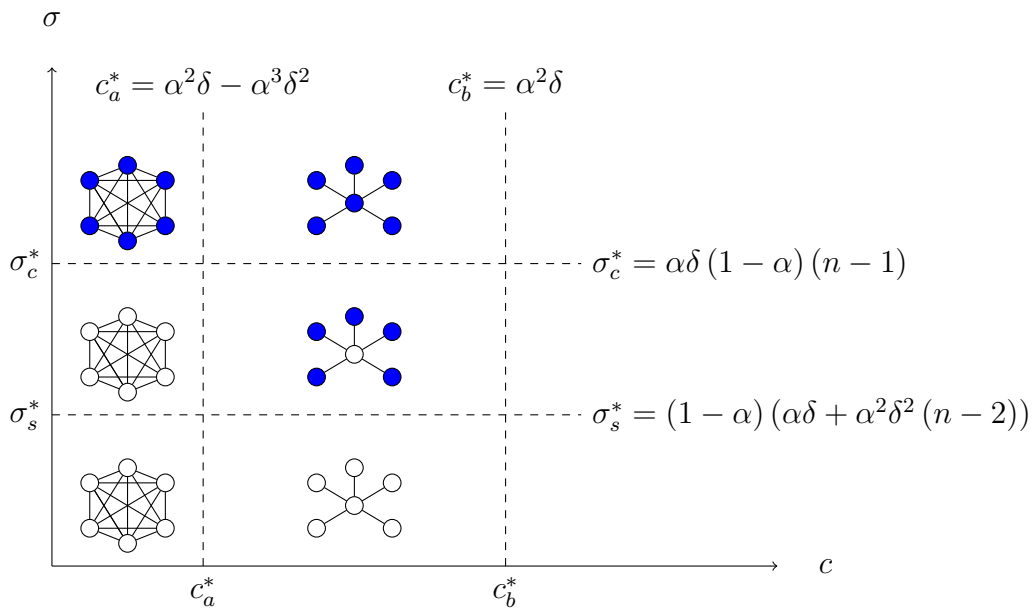
(a) High Type Network (b) Low Type Network

Figure 2.3: Network Shapes



(a) Empty Network (b) Circle Network (c) Star Network (d) Complete Network

Figure 2.4: Complete and Star-Shaped Equilibria



Note: Blue nodes represent *Low Type* and white nodes represent *High Type* states.

CHAPTER 3
TRADE NETWORK AND DOMESTIC RULE OF LAW

3.1 Introduction

The theoretical model developed in Chapter 2 explains a particular type of multi-player interaction—those in which a player's choice of its individual characteristics determines its interactions with other players. This dissertation focuses on evaluating the model's predictions by applying it to explain the formation and effects of the international trade network among states. International trade—or international economic interdependence more broadly—constitutes one of the most important types of inter-state interactions, what making it one of the main areas of interest to the scholars of IR. The central questions within the economic interdependence literature concerns its effect on domestic outcomes, such as economic growth and inequality. International trade and its facilitators, such as low tariff barriers and relative exchange rate stability, have long been linked to domestic economic growth (Dollar, 1992; Krueger, 1998; Wacziarg and Welch, 2008). International economic integration, moreover, has been shown to equally benefit all domestic social groups (Dollar and Kraay, 2002; though see Meschi and Vivarelli, 2009). Economic growth, of turn, is known to affect a number of domestic political outcomes, such as regime type and domestic institutions (Boix and Stokes, 2003; Burkhart and Lewis-Beck, 1994; Epstein et al., 2006).

What makes the international trade network particularly suitable for testing this dissertation's theory is that trade relationships are not exogenous. The degree of

a state's participation in international trade depends, in part, on its domestic factors, such as its physical and political characteristics (Rodríguez and Rodrik, 2001). While a number of these characteristics, such as a state's size, GDP, or factor endowment are exogenous, a state's participation in international trade—i. e., both its own willingness to participate in international trade and its attractiveness to potential trade partners—also depends on a host of endogenous characteristics, such as the strength and interests of domestic lobbying groups, regime type, rule of law, capital tax laws, and human rights. These endogenous characteristics, or the set of domestic policies that affects a state's attractiveness as an international trade partner, constitute the *Operations Costs* that I referred to in the previous chapter.

While the concept of *Operations Costs* captures a large number of domestic factors, most scholars agree that the level of domestic rule of law enforcement stands out as one of the most important domestic determinants of international trade (Borensztein, Gregorio and Lee, 1998; Souva, Smith and Rowan, 2008). Domestic rule of law institutions, such as those associated with protection of property, contract enforcement, as well as banking and insurance laws, are crucial for a state's ability to attract and retain international business (Souva, Smith and Rowan, 2008). In contrast, the weakness of such institutions is associated with economic risks, which lowers the economic interest in the country.

The endogenous relationship between the international trade network and domestic rule of law, therefore, constitutes an empirically relevant and theoretically appropriate test for the networks theory developed in this dissertation. Building on the existing study of institutional development, and rule of law in particular, this

dissertation approaches the relationship between international trade and domestic rule of law in a new way. Unlike the previous literature that often credits domestic institutional development and maintenance to an outside enforcer (e.g., the colonial power), the networks theory highlights the role of domestic economic groups, who stand to benefit from sound domestic institutions. Viewing domestic rule of law as one of the factors that affects the cost of conducting business operations within a country, I argue that domestic economic elites will use one of two strategies to alleviate this cost. The first strategy is to lobby or pressure the domestic political elites to improve the level of domestic rule of law. The first prediction of the theory, then, is that, when successful, improvement in domestic legal conditions helps attract a greater number of direct international trade partners. When the first strategy is unavailable, however, economic elites will resort to the second alternative—setting up channels for conducting indirect international trade through intermediary states.

As emphasized in Chapter 2, trade relationships and domestic rule of law are endogenous to each other. As a result, the types and number of international business partners a state is able to attract also determine its rule of law. States who primarily rely on indirect channels for their international transactions have a lower long-term incentive to improve their domestic rule of law than states with a lower number of indirect business partners.

Importantly, while the theoretical model is deterministic, i. e. actors are always expected to make the choices that maximize their utilities, I translate the model's empirical predictions in probabilistic terms. Although international states certainly attempt to maximize their utilities, they always have some probability of

making a mistake.

The chapter proceeds in the following way. The next section situates the chapter within the broader literature on domestic rule of law. Then I proceed to recast the general theoretical model developed in Chapter 2 to fit the particular empirical application explored in this chapter. The section that follows uses the theoretical propositions developed in Chapter 2 to state a number of testable hypotheses regarding the relationship between a state's participation in the international trade network and its domestic rule of law. In the Research Design section, I describe the estimator, the specifications of the empirical models and the way the variables are measured. Next, I test the hypotheses, describe the results, conduct a series of robustness checks, and conclude.

3.2 International Trade and Domestic Rule of Law

The study of domestic rule of law falls within a broader research on domestic political institutions—one of the largest areas of interest for both IR and comparative politics scholars. A number of studies identified the commitment problem related to governments' incentive for building domestic legal institutions: the government may be tempted to forgo the long-term reputational benefit as property rights enforcer for the immediate benefit of taking advantage of individual merchants (Greif, 1993; Greif, Milgrom and Weingast, 1994; Milgrom and North, 1990). The commitment problem becomes especially perverse in conditions of poor information and a short shadow of the future on the part of the government. The solutions proposed by such studies highlight the need for an outside enforcer, such as an international institution

that would act as check on the local government. Such enforcers may alleviate the commitment problem by gathering information regarding the respect for commercial law, mediating disputes, or enforcing judgments. For example, merchant courts and the Champagne fairs have fulfilled such functions during the 12^{th} and 13^{th} centuries (Milgrom and North, 1990).

Relatedly, there is also a long theoretical tradition of linking domestic institutions and international processes or influence. Some research, for example, has pointed out that the role of an institution-builder and enforcer within colonies has been performed by European powers during the period of colonization (Acemoglu, Johnson and Robinson, 2001; Ferguson, 2002; Lange, 2004). In particular, this theoretical argument helps explain the variation in institutional development among former colonies, based on climate and other factors that made certain areas more attractive for European settlements (Acemoglu, Johnson and Robinson, 2001; Lange, Mahoney and Vom Hau, 2006).

While effective, the solution provided by an outside enforcer is temporary (and issue-specific) rather than long-term and general. The literature so far has struggled to explain how and why the institutions that are established and maintained with the help of an outside enforcer persist over time, even if the enforcer is no longer present. Most existing explanations of institutional persistence invoke arguments of norm creation, sunk costs and path dependence (Acemoglu, Johnson and Robinson, 2001). While normative and path-dependence arguments allow for explaining the cross-sectional institutional variation, they have much less to say in regards to the variation over time.

Finally, scholars have argued that the commitment problem may be solved even in the absence of an enforcer, as states may choose to honor international contracts out of long-term reputational considerations (Eaton and Gersovitz, 1981; Albuquerque, 2003). Theoretically, this argument is sometimes modeled as a repeated game in which actors play a "grim trigger strategy," i.e., a violation of international contract is deterred by a threat of a permanent exclusion from future contracts (Axelrod, 1984).

The reputational solution has been critiqued on the grounds that the "grim trigger" may not constitute a credible threat, as it punishes the "punisher"-state by excluding it from all future gains (Tomz and Wright, 2010). As a result, all actors other than the target of the transgression are tempted to continue trading with the transgressor, undermining the idea of a punishment

The networks theory, developed in Chapter 2, approaches the question of institution-building and institutional change from a different angle. Rather than crediting institutional development and maintenance to an outside enforcer, the networks theory highlights the role of domestic economic groups, who benefit from sound domestic institutions. Viewing domestic rule of law as one of the factors that affects the cost of conducting business operations within a country—*Operations Costs*—this dissertation argues that domestic economic elites, especially the ones interested in participating in international trade, will use one of two strategies to alleviate these costs. The first strategy consists in pressuring their domestic political elites to improve the level of domestic rule of law. When successful, improvement in domestic legal conditions has two important effects: it increases the net trade benefits of con-

ducting business with the state, and as a result attracts a greater number of direct international trade partners. When the first strategy is unavailable, however, economic elites will resort to the second alternative—setting up channels for conducting indirect international trade through intermediary states.

The types and number of international business partners a state is able to attract, in turn, determine its current and future incentives for continuing to enforce a favorable business environment. States who primarily rely on indirect channels for their international transactions have a lower long-term incentive to improve their domestic rule of law than states that are less reliant on indirect trade. The logic of the network theory as it applies to explaining the level of domestic rule of law enforcement is elaborated in further detail in the next section.

3.2.1 Who Benefits from International Trade

Let us start with the premise that, within each state, there exists a set of firms for whom engaging in international trade is associated with positive benefits (for a detailed discussion of what types of firms engage in international trade, see Bernard and Jensen, 1999; Bernard et al., 2007). We can formally think of these benefits as a positive parameter δ, $0 < \delta < 1$. The internationally trading firms constitute a very low proportion of the total number of firms operating within a country: for example, only 4 percent of the 5.5 million US firms in 2000 engaged in exports, with the top 10 percent accounting for 96 percent of total US exports (Bernard et al., 2007, 2). Although the interests of these firms are certainly not in perfect harmony, it is not unreasonable to assume a fairly large overlap in the interest

of such firms, especially given their relatively small number and shared orientation towards international trade.

Similarly, while the interest of internationally trading firms is certainly not equivalent to the national interest of their state of origin, it is reasonable to assume a fairly large overlap in interest between the state and its largest firms. It would be difficult to deny that such landmark companies as Maersk shipping of Denmark or Nokia of Finland play important roles in their countries' economies. The most famous example is perhaps the 1953 testimony by the General Motors (GM) chairman Charles Wilson at his Senate Armed Services Committee confirmation hearing to become US defense secretary, stating that keeping his current position at GM poses no conflict of interest, because "what is good for the country is good for General Motors, and vice versa" (Fogel, Morck and Yeung, 2008). While the accuracy of Wilson's claim is certainly debatable, the trading firms' size, productivity, lobbying budget, and access to political elites allows them a substantial say in their country's economic policies. Since this dissertation does not focus on either the relationships among the trading firms or the relationships between such firms and the government, it is safe to make these two simplifying assumptions.

3.2.2 The Economic Costs of Poor Rule of Law Enforcement

Domestic rule of law has been long linked to international economic processes. Olson (1993) identifies property rights enforcement as a necessary condition for economic development, arguing that the fear of expropriation or unfair taxation stifles

productivity and business initiative. Echoing this argument, Souva, Smith and Rowan (2008) maintain that international firms choose their overseas operation venues with the goal of maximizing their expected profits. An important determinant of profits, in turn, is the transaction costs or barriers to trade associated with conducting business in a given country, such domestic institutions. The most important domestic institutions that affect transactions costs, in their opinion, are the institutions that protect private property, establish banking and insurance laws, and create common standard of measurement, for example, protect private property (see also Aizenman and Noy, 2006). The literature offers a similar argument regarding rule of law as the key determinant of foreign direct investment (Ahlquist, 2006; Li and Resnick, 2003).

3.2.3 Two Strategies for Weak Rule of Law States

In their search for venues of operations, international economic elites strive to minimize transactions costs, and hence, prefer to conduct business in and with countries characterized by strong rule of law enforcement (Hirschman, 1970). Understanding this incentive, domestic economic elites have two strategies for attracting international business: lobby their government to enforce the rule of law or circumvent the domestic transaction costs by setting up indirect channels for international transactions.

The lobbying strategy is not always available. First, even if domestic groups are able to successfully pressure the government, credible reputation takes time to establish (Büthe and Milner, 2008). Second, improving domestic rule of law is an economically and/or politically costly option. Economically, a state wishing to enhance

its domestic rule of law must direct resources towards drafting the necessary legislation and building an administrative body to oversee and enforce compliance (in the theoretical model, this cost is captured by the σ parameter). This cost may be paid in three ways: taxing, borrowing, or printing money (Schultz and Weingast, 2003). Both taxation and domestic borrowing, however, hinge on domestic administrative strength—precisely the feature often lacking in states with weak rule of law (Migdal, 1988). Weak rule of law states are also likely to lack access to cheap international credit, as international lenders may view poor rule of law in terms of an additional risk factor (Schultz and Weingast, 2003). Finally, the money-printing policy offers a short-term rather than a long-term solution to paying for additional domestic expenses. Most importantly, expanding money supplies is known to cause inflation, which, in turn, undermines business confidence (Pindyck and Solimano, 1993; Sobel, 2002).

Moreover, in some states, weak rule of law enforcement and corruption may constitute a political choice rather than a forced outcome: i.e., a government may rely on corruption and redistribution of rents to stay in power. For such governments, enhancing domestic rule of law would also impose a political cost of losing supporters, which makes these regimes the least amenable to changes in legal practices.

When the lobbying strategy is unavailable, economic elites resort to the second strategy of decreasing domestic operations costs associated with weak rule of law, which consists of setting up a small number of reliable indirect trade channels. Such indirect channels may take on a number of forms. The most straightforward way to conduct indirect trade is by physically shipping goods to a third-party intermediary

who is then responsible for delivering them to their final destination. The Coca-Cola, for example, has relied on this strategy for selling its product to Burma through the neighboring states, as a temporary solution before it was able to set up its official offices within Burma (New Zealand Herald, 2012). In other instances, firms may choose to ship the goods directly, yet selecting an intermediary solely for signing and registering their agreement, as described in the opening example of Ukraine. This is done for the purposes of legal protection as well as possible tax benefits (e.g., in cases when the intermediary is chosen based on its favorable treaty status with the country of destination). The idea is that consistently doing business through the same intermediaries allows for saving the cost of meeting conditions required from direct trade relationships with each individual business partner. Rather than negotiating a tax treaty with every European Union member-state, for example, Ukraine has long benefited from negotiating favorable treaties and channeling its transactions through select few intermediaries, such as Cyprus (until its recent economic collapse) and the Netherlands.

In any case, indirect trade involves working through an intermediary—a state with lower transaction costs due to stronger rule of law enforcement, more strategic location (e.g., a seaport), favorable tax treaty, etc. The central idea is that, although indirect trade is associated with some efficiency loss due to working through an intermediary, this loss is compensated as a result of the "savings" in transaction costs associated with negotiating the terms of direct trade with only the intermediary state and leaving it up to the intermediary to set up direct channels with additional trade destinations. While the intermediary benefits from the additional trade volume that

is passing through its borders (e.g., tax revenues), the two states forming an indirect relationships benefit from "importing" the intermediary's legal institutions, strategic location, or neutral political position (in the case of economic sanctions).

3.3 Empirical Predictions

In this section, I rely on the Propositions 4-6, derived in Chapter 2, to develop testable hypotheses regarding the relationship between a state's number of direct and indirect trade partners and its incentives to enforce strong domestic rule of law. Proposition 3 suggests that for given the density of the trade network, we can expect that states of High Type will have a higher average number of direct trade partners that states of *Low Type*. If we think of the *High Type* action as the choice to enforce strong rule of law and, correspondingly of the *Low Type* action as the choice to enforce weak rule of law, we can state the following testable hypothesis:

Hypothesis 3.1. *There is a positive relationship between the strength of domestic rule of law enforcement and the number of direct trade partners.*

The logic behind Hypothesis 3.1 is that states with strong business protections attract a larger number of international trade partners than states that cannot ensure a similar level of protection, as international businesses prefer to operate within low risk business environments, that minimize their costs of operations. Consistent with Souva, Smith and Rowan (2008), Hypothesis 3.1 extends their argument, by highlighting that states with market protections are viewed as attractive business environments not just by other states with market protections, but also by states with weak market protections as well. Being more attractive trade partners, how-

ever, states with strong market protections can choose among different type of trade partners. And since trade with other market protecting states yields greater benefits than trade with weak market institutions, we are more likely to observe greater trade flows within dyads that consist of two market protecting states—Souva, Smith and Rowan's (2008 empirical finding.

Next, in accordance with Proposition 4, given the density of the trade network, we should observe a weak positive relationship between an actor's number of direct trade links and its incentive to play *High Type*. This can be re-stated as Hypothesis 3.2:

Hypothesis 3.2. *States with more direct trade partners have a greater incentive to enforce domestic rule of law than states with fewer direct trade partners.*

To understand the intuition behind Hypothesis 3.2, it helps to think of domestic rule of law enforcement as a costly action. As explained above, enforcement of domestic rule of law is associated with administrative costs of developing and training personnel that would oversee the enforcement, as well as possible political costs of forgoing corruption as a tool of resource re-distribution among one's supporters. Since rule of enforcement is costly, a state will choose to enforce rule of law, only if this cost is offset by a sufficient increase in benefits, such as an increase in trade benefits resulting from eliminating the *Operations Costs* of conducting business with a weak rule of law state. If we think of each additional direct trade relationship as contributing to "offsetting" the costs of enforcing rule of law, then we can expect that states with more direct trade partners will have a greater incentive, and hence,

a greater probability of enforcing higher levels of domestic rule of law.

Hypothesis 3.2 fits within the broader economic literature, linking states' locations within the trade network to its domestic processes (Bhattacharya1 et al., 2008; Snyder and Kick, 1979). Smith and White (1992), for example, use state's trade network degree to predict domestic economic growth. Mahutga (2006) also calculates a measure of trade network equivalence which is used to explain domestic levels of industrial innovation.

Next, Proposition 5 posits that, given the density of the trade network, there will be an inverse relationship between a state's number of indirect trade partners and its incentive to play *High Type*. This leads to Hypothesis 3.3

Hypothesis 3.3. *States with more indirect trade partners will have a lower incentive to enforce domestic rule of law than states with fewer indirect trade partners.*

This prediction is counter-intuitive. When thinking about the effect of additional indirect trade partners, the first impulse is to extend the same logic as outlined above regarding the effect of the direct trade partners and to conclude that states with more indirect partners will have a greater incentive to enforce domestic rule of law than states with a lower number of indirect trade partners, perhaps with the caveat that each additional indirect link will have a smaller marginal effect than that of a direct link. Equilibria analysis, however, helps identify an important flaw in such a thinking process, highlighting the importance of the link formation thresholds c_1^* and c_2^*, which separate the networks into different shapes and "densities" of links. While the thinking process described in this paragraph would apply to a network

with lower link "densities" ($c > c_2^*$), the networks with higher "densities," like the trade network analyzed here, have an important property, that is highlighted by the equilibria analysis. This property is that, in such high "density" networks (referred to as "star-shaped" networks in chapter 2), direct and indirect trade links cannot be independently acquired. In other words, in networks in which each state is either directly or indirectly linked to each other state, the action of adding an indirect link may only be accomplished by removing a direct link, and vice versa. The implication is that, in dense networks, states with a larger number of indirect links will also be the states with a lower number of direct links. And since it has already been established that direct links has a greater marginal effect on trade benefits than indirect links, it follows that states with a larger number of indirect links will have a lower incentive, and hence a lower probability, to enforce rule of law.

Note that in contrast to the bulk of the literature relying on centrality measures, this dissertation's theoretical model dictates that indirect links are treated as *substitutes* for direct links (e.g., Ward, 2006).[1] In other words, the theoretical causal mechanism posited here comes into play only when indirect links act as substitutes for direct links. The indirect link between A and C through B in Figure 2.1 is only theoretically important in the absence of a direct link between A and C (see Research

[1]Centrality measures are intended to capture the total connectedness of an actor in a network, typically by adding up the total number of its direct and indirect links, sometimes weighting direct links more heavily. By doing so, centrality measures rest on an implicit assumption that indirect links are complements for direct links, or that direct and indirect links have the same effect. This dissertation challenges this assumption, arguing that the two types of links may have opposite effects, and that actors, aware of such opposing effects, may strategically choose to rely on indirect links to avoid the effect associated with the direct links.

Design for more details on the measure of *Indirect Degree*). In more substantive terms, a firm only resorts to shipping its goods through an intermediary when a direct route is too costly or unavailable. This is in contrast to existing studies that measure the total number of indirect links, whether or not they are also connected by a direct link (e.g. Dorussen and Ward, 2008). The decision to conceptualize indirect links as relevant only in the absence of a direct link is theoretically driven: since indirect relationships are less efficient than the direct ones, the model's actors will only resort to using the indirect channels when the direct channel is too costly. This difference in the theoretical conceptualization and measurement explains why this dissertation's theory predicts that direct and indirect links have opposing effects, while other studies, such as Dorussen and Ward (2008), view these effects as complementing each other.

Finally, Proposition 6 suggests a positive relationship between the number of High Type partners and the incentives to play *High Type*, which translates in the following hypothesis:

Hypothesis 3.4. *States have a greater incentive to enforce rule of law as more of their direct and indirect trade partners enforce rule of law.*

The logic behind Hypothesis 3.4 is rather straightforward. Since trading with high rule of law states results in greater benefits than trading with weak rule of law states, each additional high rule of law trade partner will have a greater marginal positive contribution to "offsetting" the costs enforcing rule of law than each additional weak rule of law trade partner.

More broadly, Hypothesis 3.4 is consistent with and speaks to the literature on policy diffusion, positing the spread of norms or policies among the geographically, ideationally, politically, or otherwise proximate states (Beck, Gleditsch and Beardsley, 2006; Hays, Kachi and Franzese, 2010; Gleditsch and Ward, 2006). While such spatial diffusion arguments have been previously applied to the study of democracy (Chyzh, 2011; Gleditsch and Ward, 2006), tax policies (Franzese and Hays, 2008), this dissertation posits diffusion of rule of law. In doing so, moreover, this dissertation's theoretical framework extends the existing literature by positing a innovative causal mechanism for policy diffusion—the mechanism that links domestic-level decisions to positive economic incentives provided by the network.

3.4 The Estimator

As suggested by the theoretical model, network formation and its effect on state behavior are endogenous to each other. An appropriate test of the hypotheses developed above, therefore, calls for an empirical model that would allow for a simultaneous estimation of these outcomes. Simultaneity as well as the network dynamics posited by the theory (spatial and temporal unit non-independence) is best captures by a *continuous Markov Chain Exponential Random Graph model* (MC ERGM) with two simultaneously determined dependent variables: the network links formed by the actors and actor-specific outcomes.

MC ERGM was originally developed by Snijders, Steglich and Schweinberger (2007), and expanded upon by Steglich, Snijders and Pearson (2010) for the purposes of modeling and separating the over-time effects of *co-evolution*, *homophily*, and *mu-*

tual influence in social networks.[2] The model has two simultaneously determined outcome variables that are observed in each time period: the network that forms and the actor behavior. The central premise of the model is that the actors—e.g., international states—are a part to the nxn network $\mathbf{g}$ and have control over their direct outgoing ties, i.e. actors can observe, evaluate, and change who they link with from one time period to the next. $\mathbf{g}_{ij}(\mathbf{t})$ denotes the value of the relationship between actors i and j at time t. In this dissertation, the network ties represent trade links among actors. For tractability purposes, this model assumes that $\mathbf{g}$ is *dichotomous*, i.e., that $\mathbf{g}_{ij} = 1$ represents a presence of a tie, and $\mathbf{g}_{ij} = 0$ represents a tie's absence. Finally, consistent with the logic of Markov-chain processes, actors make the decisions to change ties in the period $t + 1$ after observing the network in the current period t, without any memory of the network states in periods $t - 1$ or earlier.[3]

At the same time, in every period each player chooses a level of behavior—measured on an ordinal scale. This behavioral outcome is denoted by $\mathbf{d}$, where $\mathbf{d}_i(\mathbf{t})$ represents the score of actor i at time t. In the current application, the behavioral outcome variable captures states' level of domestic rule of law.

This model can be used to estimate the effects of actor-level, as well as dyadic-level, exogenous covariates, which are denoted $\mathbf{v}$ and $\mathbf{w}$, respectively, where $\mathbf{v}_i^{(x)}$ represents actor i's score on actor-level covariate $\mathbf{x}$, and $\mathbf{w}_{ij}^{(x)}$ stands for the dyadic covariate $\mathbf{x}$ measured for the pair ij. In the context of this dissertation, an actor-level

[2]For a detailed overview of the model, see Snijders, Steglich and Schweinberger (2007), Steglich, Snijders and Pearson (2010), and Ripley, Snijders and Preciado (2012).

[3]For a detailed overview of continuous Markov-chain models, see Gill (2006), Karlin and Taylor (1975), and Norris (1997).

covariate is, for example, state *GDP per capita* or *population*, while an example of a dyadic-level covariate is the *geographical distance* between two states.

The MC ERGM estimation is based on several assumptions. First, although the data on trade links and rule of law are measured at discrete intervals (yearly), the model assumes that the actual changes in the network ties or behavior happen in continuous time, which are decomposed into into a series of small steps or *micro-steps* for simplification (Holland and Leinhardt, 1977; Steglich, Snijders and Pearson, 2010). The continuous time assumption effectively means that no two decisions by the same actor or by two different actors can occur at the exact same moment in time, forbidding such arrangements as a binding contract of the kind "when you improve your rule of law, I will trade with you." Given the known commitment problems associated with states' international interactions (e.g., Powell, 2006), an assumption that states cannot credibly commit to such an arrangement seems reasonable. From a modeling perspective, continuous-time modeling significantly simplifies the estimation by relieving us from explicitly modeling simultaneous changes.[4]

Note that the model imposes no assumption regarding the *micro-steps* corresponding to the temporal unit of observation. In other words, despite the data on trade links and rule of law being available annually, the model allows for actors changing their links or rule of law at higher or lower than yearly rate.[5] The first

[4]Note that the estimator does not perfectly mimic the theoretical model, as in the model assumed simultaneous decision-making. Despite this slight inconsistency, the modeling approach behind the MC ERGM is the closest to the theoretical model developed here, compared to other available statistical estimators.

[5]The corresponding rate of change in network links or behavior are referred to as *rate parameters*. Each actor i is assumed to have two independent *waiting times* until it takes a

observations of network ties $\mathbf{g(t_1)}$ and behavior $\mathbf{d(t_1)}$ serve as the starting values of the Markov process, i.e., these values are not modeled themselves but used to condition the subsequent changes in network and behavior. The estimations begins with a draw of the network and behavior *micro-step lengths* or *waiting times* from two independent exponential distributions, and the time unit $\mathbf{t}$ being incremented by each of the drawn values. If the drawn values do not exceed the end time of the observed period, then the estimator determines whether the next change is a network change or a behavioral change and what actor is making the change. Finally, the estimator calculates the change to be made using a multinomial logit shape:

$$\frac{e^{\left(f_i^{net}(g',d)\right)}}{\sum\limits_{g''} e^{\left(f_i^{net}(g'',d)\right)}}, \tag{3.1}$$

or

$$\frac{e^{\left(f_i^{beh}(g,d')\right)}}{\sum\limits_{d''} e^{\left(f_i^{beh}(g,d'')\right)}}, \tag{3.2}$$

where (f_i^{net}) is the function of changes in actor ties, $\left(f_i^{beh}\right)$ is the function of changes is actor behavior, $\mathbf{g'}$ is the current network, $\mathbf{g''}$ is a set of possible networks that can be formed in the next micro-step. Analogously, d' refers to the current level of behavior and d'' denotes a set of possible behaviors in the next micro-step. This process is repeated until the end of the period is reached and for each of the subsequent time periods.

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network and/or a behavioral micro-step.

3.5 Dependent Variables

Since the theory posits simultaneity between network formation and effect on behavior, the empirical model has two dependent variables: trade network links and domestic cost of operation.

3.5.1 Network Formation

The Network Formation equation allows for testing Hypothesis 3.1, as well as correcting for the endogeneity in the second equation, which is necessary for testing Hypotheses 3.2, 3.3, and 3.4. The trade network is measured in two alternative ways. In the first model, I measure the trade network as a directed nxn matrix $\mathbf{g}$ whose $\mathbf{g}_{ij}\mathbf{(t)}$ cells are coded as 1 if state i exported any goods to j in time period t ($\text{export}_{ij} > 0$), else the cell entry is coded as 0. In the second model, I construct an analogous measure using the level of imports between 1 and j.[6]

Admittedly, there are some trade-offs with using such a binary export link measure, as the obvious computational advantage may come at the price of some information loss.[7] At a closer look, however, a binary measure of exports also has some advantages over a continuous one, as scholars have long struggled with the proper standardization of the continuous measure. Some advocate standardizing exports by GDP (e.g., Maoz et al., 2006), while others argue for using the raw amount (e.g., Keshk, Pollins and Reuveny, 2004). Each of these approaches, however, comes with

[6]The results are robust to using different thresholds, such as $\text{export}_{ij} > 1\%$ or 5% of i's total trade (see section 3.8).

[7]While the primary estimator used here requires a binary network measure, the results are robust to this measure. Specifically, a naïve OLS or logit model produces similar results, available upon request.

their own biases, as the export to GDP ratio measure will under-estimate and the raw measure will over-estimate the importance of trade for states with large GDP. The binary measure adopted in this dissertation, while less precise, has the advantage of bypassing this issue: it treats all trade links as equally important rather than forcing the analyzer to arbitrarily favor a standardization approach. Even more importantly, the binary trade link measure seems more appropriate, as the theory's predictions concern trade link formation rather than the amount of trade between two states. The export data are obtained from the Correlates of War Trade Data (Barbieri, Keshk and Pollins, 2009).

Figure 3.1 displays the distribution of network trade links, specifically the number of states' outgoing trade links (degree), in the data under analysis (1984-1999). Consistent with the inter-dependence literature, the trade network is indeed highly interdependent with approximately 75% of the links equalling 1. Fitting with the logic behind Hypothesis 3.3, trade network degree distribution exhibits over-time variation. A clear visual shift in trade degree distribution may be visually explored in Figure 3.2, which provides a side-by-side comparison of trade degree distributions in 1984 and 1994. Note that states' *direct trade degree* as well as *indirect degree* (or the degree of trade partners' who are one link removed from i) will also enter the model as the primary independent variables in the *rule of law* equation discussed below.

3.5.2 Network Effect: Rule of Law

As discussed earlier, states' attractiveness as a trade partner or *Type* is operationalized as domestic rule of law. Previous literature has shown that states with

stronger domestic rule of law constitute more attractive trade partners as such states can guarantee property rights and contract enforcement, and are generally associated with lower investment risks (Li and Resnick, 2003; Simmons, 2000). *Rule of Law*—the second equation's dependent variable—is measured on a 0 to 6 ordinal scale using the "law and order" variable from the International Country Risk Guide (ICRG) dataset.[8] The ICRG codes "law" and "order" separately, each on a 0 to 3 scale. The law measure assesses the "strength and impartiality of the legal system," while the order measure "is an assessment of popular observance of the law."[9] This data on this variable is available for 1984-2008, which imposes a lower limit on the temporal scope of this study. The *Rule of Law* variable also enters the *Network Formation* equation as the primary independent variable of interest.

3.6 Independent Variables

3.6.1 Network Formation: Direct and Indirect Trade Partners

In accordance with Hypothesis 3.1, domestic rule of law—the dependent variable from the second equation—is also the primary covariate of interest in the *Network Formation* equation. More specifically, states with strong rule of law are expected to have more trade partners. I test this hypothesis by including the *Rule of Law* variable—as a node-specific time-varying covariate. Note that I take advantage of the MC ERGM allowing for inclusion of both State A and B node-specific covariates,

[8]The dichotomous treatment of domestic type by the formal model was done for the sake of simplification. Since this assumption does not drive the predictions of the model, we can safely extend the predictions to the ordinal measure of rule of law employed elsewhere in the literature (Simpser and Donno, 2012; Staats and Biglaiser, 2012).

[9]Using each of these components separately does not significantly alter the results.

including *Rule of Law* for both the link "initiator" and "target."

In addition, I include a set of common control variables identified by the literature (Hegre, Oneal and Russett, 2010; Oneal and Russett, 2005). As previously mentioned, in modeling network formation, it is important to account for and separate two competing processes: homophily, or actors' self-selection based on pre-existing characteristics, and common exposure—or actors' concurrent exposure to the same treatment.

I account for homophily by controlling for a previous conflictual relationship, GDP per capita, population, distance, joint membership in a preferential trade agreement, and alliance portfolio similarity. The *Peace Years* variable measures the number of years passed since the last dispute and accounts for past conflict effects that might have made states less likely to form trade ties (Keshk, Pollins and Reuveny, 2004; Morrow, Siverson and Tabares, 1998).

I also include the traditional ingredients of the trade gravity model: each state's *GDP per capita*, *Population*, and *Distance* between each pair of states (Hegre, Oneal and Russett, 2010; Oneal and Russett, 2005). These variables are obtained from the Expanded Trade and GDP dataset (Gleditsch, 2002). *GDP*, *population*, and *Distance* variables are transformed using a natural logarithm to correct for skewness.[10]

Moreover, I include controls that account for possible trade and non-trade barriers, such as dyadic membership in preferential trade agreements ($PTAs$), and *Alliance Portfolio Similarity*. PTAs have been shown to facilitate trade (Goldstein,

[10]To account for the zero values' sensitivity of logarithmic transformations, I add 0.01 to values of *Distance* before taking a natural logarithm.

Rivers and Tomz, 2007; Martin, Mayer and Thoenig, 2008). Similarity of security commitments will promote trade by assuring investors that the states are unlikely to fight (Morrow, Siverson and Tabares, 1998). The data for PTA membership is obtained from Goldstein, Rivers and Tomz (2007) replication data, while *Alliance Portfolio Similarity* is measured using unweighted similarity scores (Cohen's κ) calculated on unweighted binary alliance data (Hage, 2011), which is a chance-corrected variation of the commonly used S-scores (Signorino and Ritter, 1999).

I account for common exposure to similar security conditions by controlling for *Ongoing Military Interstate Dispute (MID)*. The trade-conflict literature suggests that ongoing military conflict or might have a dampening effect on trade (Keshk, Pollins and Reuveny, 2004; Morrow, Siverson and Tabares, 1998). *Ongoing MID* is coded as 1 if the two states are parts of a an ongoing dispute with each other, according to the Correlates of War (COW) dataset (Ghosn and Bennett, 2003).

Note that *MIDs*, *Distance*, *Alliance Portfolios*, and *PTA* memberships are conceptualized and measured as networks. Although these alternative networks are not of substantive interest in this dissertation, the theoretical model developed here might provide insights as to the effects of these networks as well. I leave the exploration of these effects for future research.

Finally, the model contains a network-specific endogenous variable: *Degree Density*, which is estimated as the average number of outgoing ties across all actors. The *Degree Density* parameter can be thought of as the actor's overall tendency to form ties. If all other parameters are zero, an insignificant *Degree Density* parameter indicates that each tie in the network is formed at random or with probability of 0.5.

In the long run, such a network would have a density of 0.5, with actors forming 50% of all possible ties. Social networks, however, are typically characterized by much lower densities (Steglich, Snijders and Pearson, 2010, 360). I include this parameter to account for this effect, following the advice of Ripley, Snijders and Preciado (2012).

3.6.2 Network Effect: Rule of Law Equation

Hypotheses 3.2 and 3.3 expect that state i's domestic type—or *the Rule of Law*—depends on its number of direct and indirect trade partners, which in network terms are referred to as i's *Direct Degree* and i's *Indirect Degree*. According to the theory developed here, however, i's *Direct Degree* is endogenous to i's *Rule of Law*. Hence, recovering the unbiased effect of this variable on i's *Rule of Law* requires simultaneous estimation. Fortunately, the MC ERGM estimator allows one to do just that: by simultaneously estimating network formation and effect on actors' behavior, and by endogenously calculating the network-specific variables (*Direct Degree*), the estimator allows for isolating the effect of trade links on domestic rule of law that is unrelated to the states' original preference for trade partners with strong rule of law.

Interestingly, the second covariate of interest—i's *Indirect Degree*—is exogenous to actors' choice: while states can certainly act strategically in choosing their own trade partners, they have very little control over their indirect trade partners—who their trade partners will choose to trade with. Therefore, I calculate the measure of *Indirect Degree* exogenously to the model by adding the total number of unique trade links of i's trade partners who are removed by the shortest path of one link (i.e., the measure excludes indirect links to which A also has a direct link). The resulting

variable—*Indirect Degree* has a mean of 46, ranging from 0 to 121.

Finally, I include a *Partners' Rule of Law* variable, which is endogenously estimated by the model as the arithmetic mean of the rule of law of State i's direct trade partners, in order to test Hypothesis 3.4 that predicts a stronger effect of *High Type* trade partners.

Unfortunately, the previous literature on the determinants of rule of law is rather scant, with a notable exception of a study by Rigobon and Rodrik (2005), exploring the mutual effects of rule of law, democracy, and economic growth. I therefore rely on Rigobon and Rodrik (2005) for selecting the appropriate control variables.

First, some suggest that rule of law might depend on domestic enforcement capabilities: states with greater governing capacity might be more efficient enforcing law within their borders (Fearon and Laitin, 2003; Rodrik, Subramanian and Trebbi, 2002). I capture these effects by controlling for *GDP per capita*, and logged *Area* in thousands of square miles (Wimmer and Min, 2006).

Next, I capture the possible effect of democratic institutions by including a control for state A's *Polity* score, measured on a 21-point scale (from -10 to 10) (Marshall and Jaggers, 2008). Some literature suggests that domestic institutions, such as those established by former colonizers, are path dependent: long-established legal institutions are likely to persist over time (Mitchell and McCormick, 1988; Mitchell, Ring and Spellman, 2013). I control for this by including an indicator variable of whether a state is a former *British* colony. Finally, the MC ERGM accounts for temporal dependence by including a linear and a quadratic shape effects, which capture the basic drive towards higher values on the dependent variable over time.

3.7 Empirical Results

Table 3.3 presents the results of the empirical estimation. In Model 1, a trade link is coded based on the presence of positive exports from country A to country B in a given year, while in Model 2 all measures of trade links are based on import information.

3.7.1 Trade Network Formation

Let us first consider the network formation equation. Here, the primary parameters of interest—*Rule of Law A* and *Rule of Law B*—are positive and statistically significant in both models, indicating that states with stronger rule of law are both more likely to engage in trade themselves, as well as are more attractive trade partners "targeted" by other states. These results provide support for Hypothesis 3.1, that posited that states with strong rule of law have more trade partners. Although rather intuitive, this result is very important: consistent with previous literature (e.g., Rigobon and Rodrik, 2005), this finding provides credibility to the empirical model and its specifications.

All of the control variables act as expected, providing additional credence to the model specifications. First, conflict seems to have a negative effect on the probability of trade link formation (Keshk, Pollins and Reuveny, 2004). *Ongoing MID* is negative and statistically significant, indicating that states that are part of an ongoing military dispute are less likely to form a trade link. States with similar alliance portfolios are also more likely to trade, as they have a lower expectation of future conflict—the coefficient on *Alliance Similarity* is positive and statistically significant.

States are also more likely to form a trade relationship as the time since the last military dispute elapses: the coefficient on *Peace Years* is positive and statistically significant.

Consistent with the gravity model, trade decreases with distance, as the coefficient on *Distance* is negative and statistically significant. More affluent states are more likely to engage in trade, as the effects of *GDP/cap A* and *GDP/cap B* are both positive and statistically significant. Holding GDP per capita and other variables constant, states with larger populations are less likely to engage in trade—the coefficients on *Population A* and *Population B* are negative and statistically significant. Members of a preferential trade agreement are more likely to trade—the coefficient on *PTA* is positive and statistically significant (Goldstein, Rivers and Tomz, 2007; Hegre, Oneal and Russett, 2010).

Finally, *Degree Density* is positive and statistically significant, which indicates that observed trade network densities are high. According to the globalization literature, trade networks in the more recent time periods tends to have high empirical densities—a result mirrored in this dissertation. More specifically, the *Degree Density* parameter models actors' general tendency to initiate trade link formation. Disregarding all other parameters for a moment, the value of 0.849 on this parameter means that upon an opportunity for change, the odds for any tie to be present vs. absent are $e^{0.849}$ or $2.34 : 1$.

3.7.2 Network Effect: Rule of Law

Let me now turn to examining the actor behavior part of the table, which describes states' tendencies to invest in improving domestic rule of law. The central variables of interest here are *Direct Degree* (states' number of direct trade partners), *Indirect Degree* (states' number or indirect trade partners removed by 1 link), and *Partners' Rule of Law*, measured as the average rule of law of one's direct trade partners. The coefficient on *Direct Degree* is insignificant in both models. Note that due to the simultaneous estimation of network formation and effect, the coefficient on the *Degree* parameter represents the "value added" effect of trade partners or the effect "left over" after accounting for states strategic selection of trade partners with stronger rule of law. A significant effect on this variable would have indicated that an increase in the number of direct trade partners has an addition positive effect on domestic rule of law, even after accounting for network formation. The lack of significance on this effect suggests that, although a state's rule of law helps explain network formation, the reverse relationship does not hold: the number of direct trade partners has no additional effect on rule of law, in contrast to Hypothesis 3.2.

Indirect Degree is negative and statistically significant in both models. Consistent with Hypothesis 3.3, a negative effect on *Indirect Degree* indicates that states with more indirect trade partners have a lower incentive to enforce domestic rule of law. Returning to the motivational puzzle, this suggests that Ukraine's failure to enforce strong domestic rule of law and its resulting reliance on indirect trade may hamper its future prospects of improving its domestic rule of law, contrary to some experts op-

timistic predictions. More generally, this result indicates that domestic improvement may hinge on direct rather than inter-mediated participation in international trade relationships, fitting nicely into the broader "democracy from-outside-in" theoretical framework (Pevehouse, 2005).

Let us now turn to Hypothesis 3.4, which posits a direct relationship between state i's rule of law and that of its trade partners. *Partners' Rule of Law* is positive and statistically significant in both models, which provides support for Hypothesis 3.4. More broadly, this result points to the intriguing, yet largely unexplored, dynamic in which states' domestic processes are affected by international processes beyond their direct control (for exceptions, see Franzese and Hays, 2008; Gleditsch and Ward, 2006). Although state A has little direct control of its trade partners' domestic decisions, these decisions may have a noticeable effect on A's own domestic outcomes. Moreover, since the theoretical and empirical models account for the network formation processes—thus ruling out homophily as the causal mechanism—this network effect is attributable to diffusion and/or common exposure.

Next, let us examine the control variables. Consistent with the expectations, the coefficient on *GDP/cap* is positive and statistically significant, confirming a direct relationship between the level of economic development and rule of law. The positive and statistically significant effect of *British Colony* points that states with British colonial heritage are more likely to enforce rule of law (Mitchell and McCormick, 1988; Mitchell, Ring and Spellman, 2013). Finally, the *Quadratic Shape* parameter, modeling the shape of the long-term distribution of *Rule of Law*, is negative and statistically significant. This suggests that, all else equal, the growth in the rule of

law is characterized by a decreasing marginal return over time. This, of course, may simply be a result of the rule of law measure being upwardly bounded at 6.

3.7.3 Summary of Results

To summarize in more general terms, the empirical tests conducted in this chapter provide several pieces of evidence for the theoretical model developed in this dissertation. First, as expected by the model, social networks appear to be endogenous to actors' individual characteristics or type. More specifically, the empirical analysis has identified more dense network relationships among states' with stronger domestic rule of law. Moreover, the results show that, once this effect is empirically modeled, the direct network relationships have no additional effects on actor behavior: the number of direct trade partners has no effect of states' rule of law, once we include rule of law in the network formation equation. This underscores this dissertation's central argument—that an accurate estimation of network effects on actor behavior requires accounting for the non-randomness of network formation.

Second, consistent with the theoretical predictions, the empirical tests provide evidence for the indirect network effects: actors with a greater number of indirect network relationships have a lower incentive to choose *High Type*. Finally, actor's individual characteristics are affected by those of its direct network partners: a state's rule of law is positively related to the average rule of law of its direct trade partners.

3.8 Robustness Checks

Tables 3.5-3.9 provide a series of robustness checks on the main empirical results. Table 3.5 presents a model, in which a trade network link is operationalized

as the presence of either exports or imports between i and j in a given year (a trade link between i and j is coded as 1 if exports$_{ij}$+imports$_{ij} > 0$). We see that while the results of the *Trade Formation* equation remain unchanged in terms of direction and statistical significance, the coefficients in the *Rule of Law* equation are not so robust. The coefficients on *Indirect Degree* and *Partners' Rule of Law* are no longer statistically significant, and neither is the coefficient on *British Colony*.

The importance of these results depends on whether one accepts that total trade is an adequate measure of the theoretical concept of trade links developed in this paper. Although there is a significant over-lap between exports and imports flows, the two are obviously not theoretically identical. The same pair of states may have significant differences between import and export regulations, taxes, quotas, and laws. For example, states tend to tax imports more than exports (Barbieri, Keshk and Pollins, 2009; Clist and Morrissey, 2011). As shown in Table 3.4, measuring a trade relationship as exports$_{ij}$+imports$_{ij}$ results in a 9 percentage point change increase in the number of links in the data (from about 73% to about 82%).

Moreover, rather than engaging in both imports and exports, a large number of states in the dataset specialize on either one or the other. As shown in Table 3.2, while in 83% of the data i and j share both an export and an import link, the data also contains a large percentage of unreciprocated import and export links. This specialization is of theoretical importance, as a state specializing in imports cannot benefit from a direct or indirect export link, and vice versa. In other words, a state relying on imports derives little utility from an exports treaty, unless it is able to import enough of the good so that it can be re-exported.

To check the robustness of the empirical estimator, Tables 3.6 and 3.7 present the results of estimating two separate naïve models: a naïve model of trade network formation (Table 3.6) and a naïve model of the determinants of the rule of law (Table 3.7). These tables show that the main empirical results are fairly robust to the choice of the estimator, although the two sets of results are not (and cannot be) identical, as the MC ERGM estimator conducts a simultaneous estimation of the two outcomes, as well as allows for including of a set of network-level endogenous covariates, such as *Degree*, *Linear Shape*, and *Quadratic Shape*. Comparing Table 3.3 to the naïve models reveals very minor differences. Specifically, the coefficient on *British Colony* which was positive and statistically significant at 0.1 level in Table 3.3 is statistically insignificant in Table 3.7.

Finally, Tables 3.8 and 3.9 check the results for robustness to the choice of 0 as the conceptual threshold for dichotomizing trade links into 1s (presence of a link) and 0s (absence of a link). Although the literature provides no clear guideline, some previous studies have operationalized the trade network using other thresholds, such as 5% of a state's total exports (Maoz, 2006). Such a threshold, however, may be too restrictive given the research interest of this dissertation in indirect links. Given that the predominant share of trade is conducted between contigous neighbors, such a measure is likely to pick up only a few major partners and ignore the most theoretically intereting trade relationships, where a relatively small proportion of trade is re-directed to a third party who is unable to establish a direct trade relationship. Exports to North Korea, for example, hardly constitute a large share of Taiwan's total exports, yet the Taiwan-North Korea trade relationship is critical for capturing

North Koreas indirect trade to the US or European states.

As a result, I test my results for robustness to two less constrictive thresholds or exports from j to i constituting 1 and 5% of state i's total GDP. As shown in Table 3.4, the use of the 1% threshold results in a .2 percentage point decrease in the number of trade links in the data (from 72.9 to 72.7%), while the use of the 5% thershold leads to a slightly larger loss of about 2 percentage points (from 72.9 to 70.3). The results of these robustness checks are presented in Tables 3.8 and 3.9, accordingly. We can see that the results are somewhat robust to these specifications. In Table 3.8, all coefficients in both equations remain the same in direction and significance, with the exception of *Indirect Degree* and *British Colony*, which become insignificant in this specification. In Table 3.9 that uses a 5% threshold, *Average Partners' Rule of Law* also becomes insignificant. This dissapearance of the main results as we increase the trade threshold is not unsurprising. Except for a few cases of countries specializing on being intermediaries, such as Singapore, Taiwan, or the Netherlands, indirect trade with a particular state in unlikely to constitute a large percent of a country's total exports per GDP, as given the relatively cheap transportation costs in the current time period, most states rely on direct trade most of the time. Given these results, some possible directions for future research are to collect more precise data on indirect trade, its volumes, the types of states that take on the role of intermediaries, and to explore these aspects of indirect trade in greater detail.

3.9 Conclusion

This chapter applies the networks theory developed in Chapter 2 to explain the endogenous relationship between the formation of international trade network and its effect on the domestic rule of law of its members. I start by demonstrating that a state's domestic of rule of law enforcement can be regarded as a manifestation of *Operations Costs*, or the costs of conducting business in a given country. I argue that domestic economic elites will use one of two strategies to alleviate this cost. The first strategy is to lobby the domestic political elites to improve the level of domestic rule of law. When the first strategy is unavailable, however, the second alternative is to conduct international business through indirect channels.

This theoretical framework allows for generating a series of predictions. First, states with strong rule of law attract a greater number of direct trade relationships, as trading with such states is associated with greater trade benefits. Second, the reverse is true as well: states with more direct trade partners should be characterized by stronger rule of law. The third and the counter-intuitive prediction produced by the formal model is that states that primarily rely on indirect channels for their international transactions will have a lower incentive to enforce strong domestic rule of law than states that are less reliant on indirect trade. Finally, there is a positive relationship between the average rule of law of a state's trade partners and its own rule of law.

I test these predictions using the COW trade data and the ICRG data on the rule of law. To model the endogeneity between network formation and effect, I

employ an MC ERGM estimator (Snijders, Steglich and Schweinberger, 2007; Steglich, Snijders and Pearson, 2010). The empirical results provide some support for the predictions of the theoretical model. I find that rule of law has a positive effect on the probability of forming a trade relationship. The reverse relationship—the positive effect of the number of direct trade partners on rule of law—is unsupported by the empirical results. Consistent with the expectation, I find a negative relationship between the number of indirect trade partners and rule of law. Finally, I find support for the prediction that a state's rule of law is positively affected by the average rule of law of its trade partners. The results are fairly robust to alternative model specifications.

Table 3.1: Trade and Rule of Law: Descriptive Statistics

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
Trade Network Formation Equation (Dyadic)					
Export Links	0.736	0.441	0	1	152289
Import Links	0.729	0.444	0	1	152289
Rule of Law A	3.613	1.579	0	6	152289
Rule of Law B	3.711	1.567	0	6	152289
Ongoing MID	0.002	0.05	0	1	152289
Distance (logged)	7.915	2.21	-4.605	9.420	152289
GDP A (logged)	17.944	1.813	13.117	22.895	152289
GDP B (logged)	17.837	1.776	13.117	22.895	152289
Population A (logged)	9.605	1.403	6.492	14.039	152289
Population B (logged)	9.366	1.531	5.485	14.039	152289
PTA	0.203	0.402	0	1	152289
Alliance Portfolio Similarity	0.051	0.286	-0.252	1	152289
Peace Years AB	39.938	25.657	0	183	152289
Rule of Law Equation (Monadic)					
Direct Degree (exports)	106.946	44.088	13	183	152289
Indirect Degree (exports)	46.048	28.441	0	121	152289
Direct Degree (imports)	101.803	39.352	16	180	152289
Indirect Degree (imports)	50.708	24.829	0	115	152289
Area (logged)	12.719	1.544	9.132	16.655	152289
GDP/pc (logged)	8.339	1.115	5.639	10.377	152289
Polity 2	2.901	6.941	-9	10	152289
British Colony	0.303	0.459	0	1	152289

Table 3.2: Correlation between Exports and Imports Links

	Import Links		
Export Links	0	1	Total
0	279,968	103,310	383,278
	(73)	(17)	(38)
1	103,310	521,278	624,588
	(27)	(83)	(62)
Total	383,278	624,588	1,007,866
	(100)	(100)	(100)

Note: Numbers in parentheses represent column percentages.

Table 3.3: Trade Network Formation and Domestic Rule of Law
(A Continuous Markov Chain ERGM Estimation)

Equation 1: Trade Network Formation (Dyadic Level)				
	Exports		Imports	
Rule of Law A	0.119^{***}	(0.007)	0.094^{***}	(0.007)
Rule of Law B	0.082^{***}	(0.006)	0.117^{***}	(0.006)
Ongoing MID	-1.138^{***}	(0.122)	-1.138^{***}	(0.122)
Distance	-0.073^{***}	(0.005)	-0.073^{***}	(0.005)
GDP A	0.467^{***}	(0.010)	0.389^{***}	(0.010)
GDP B	0.362^{***}	(0.009)	0.420^{***}	(0.008)
Population A	-0.137^{***}	(0.010)	-0.147^{***}	(0.010)
Population B	-0.137^{***}	(0.010)	-0.103^{***}	(0.009)
PTA	0.703^{***}	(0.024)	0.682^{***}	(0.024)
Alliance Similarity	0.443^{***}	(0.030)	0.449^{***}	(0.030)
Peace Years AB	0.002^{***}	(0.001)	0.003^{***}	(0.001)
Degree Density	0.849^{***}	(0.008)	0.849^{***}	(0.008)
Equation 2: Rule of Law (Monadic Level)				
Direct Degree	0.003	(0.006)	0.004	(0.006)
Indirect Degree	-0.014^{**}	(0.006)	-0.013^{**}	(0.005)
Partners' Rule of Law	0.534^{***}	(0.207)	0.544^{***}	(0.202)
Area	-0.076	(0.065)	-0.079	(0.066)
GDP/cap	0.438^{***}	(0.114)	0.449^{***}	(0.115)
Polity	-0.001	(0.013)	0.001	(0.013)
British Colony	0.290^{*}	(0.171)	0.289^{*}	(0.171)
Linear Shape	0.134	(0.497)	0.051	(0.502)
Quadratic Shape	-0.261^{***}	(0.049)	-0.264^{***}	(0.048)
N(t)	130 countries (15 years)			

Note: Two-tailed: ***p< 0.01, **p< 0.05, *p< 0.1. Time Parameters are suppressed. Naïve models produce similar results, without allowing to account for network-specific measures and dynamics.

Table 3.4: Trade and Rule of Law: Additional Descriptive Statistics

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
Export Links	0.736	0.441	0	1	152289
Import Links	0.729	0.444	0	1	152289
Export+Import Links	0.818	0.386	0	1	152289
Exports/GDP> 1%	0.727	0.445	0	1	152289
Exports/GDP> 5%	0.703	0.457	0	1	152289

Table 3.5: Trade and Domestic Rule of Law
(MC ERGM, trade link coded as exports+imports> 0)

Equation 1: Trade Network Formation (Dyadic Level)		
	Exports+Imports	
Rule of Law	0.274^{***}	(0.014)
Ongoing MID	-0.908^{***}	(0.194)
Distance	-0.015^{***}	(0.007)
GDP	0.730^{***}	(0.020)
Population	-0.173^{***}	(0.022)
PTA	0.996^{***}	(0.046)
Alliance Similarity	0.477^{***}	(0.057)
Peace Years AB	0.004^{***}	(0.001)
Degree Density	1.379^{***}	(0.024)
Equation 2: Rule of Law (Monadic Level)		
Direct Degree	0.008	(0.013)
Indirect Degree	−0.001	(0.008)
Partners' Rule of Law	0.344	(0.256)
Area	−0.068	(0.062)
GDP/cap	0.444^{***}	(0.111)
Polity	0.008	(0.013)
British Colony	0.219	(0.160)
Linear Shape	−0.251	(1.070)
Quadratic Shape	-0.225^{***}	(0.043)
N(t)	131 countries (15 years)	

Note: Two-tailed: ***p< 0.01, **p< 0.05, *p< 0.1.
Time Parameters are suppressed.

Table 3.6: Naïve Model of Trade Network Formation (logistic regression)

	Exports		Imports	
Rule of Law A	0.205***	(0.047)	0.147***	(0.045)
Rule of Law B	0.147***	(0.016)	0.205***	(0.018)
Ongoing MID	−2.020***	(0.282)	−2.020***	(0.267)
Distance (logged)	−0.167***	(0.031)	−0.167***	(0.029)
GDP A (logged)	0.851***	(0.075)	0.710***	(0.068)
GDP B (logged)	0.710***	(0.029)	0.851***	(0.024)
Population A (logged)	−0.236***	(0.072)	−0.265***	(0.065)
Population B (logged)	−0.265***	(0.025)	−0.236***	(0.021)
PTA	1.328***	(0.107)	1.328***	(0.088)
Alliance Portfolio Similarity	0.940***	(0.120)	0.940***	(0.131)
Peace Years AB	0.005***	(0.002)	0.005**	(0.002)
Constant	−22.004***	(0.891)	−22.004***	(0.814)
N	193526		193526	
Log Likelihood	-78961.152		-78961.152	

Note: Two-tailed: ***p< 0.01, **p< 0.05, *p< 0.1. Standard errors are clustered by country.

Table 3.7: Naïve Model of Rule of Law (OLS)

	Exports		Imports	
Direct Degree	−0.001	(0.005)	0.001	(0.004)
Indirect Degree	−0.022***	(0.007)	−0.017***	(0.005)
Partners' RL	0.863***	(0.140)	0.890***	(0.130)
Area	−0.058	(0.054)	−0.032	(0.050)
GDP/cap.	0.589***	(0.123)	0.709***	(0.121)
Polity	−0.002	(0.013)	0.008	(0.014)
British Colony	0.200	(0.176)	0.111	(0.177)
Constant	−2.903**	(1.388)	−4.707***	(1.338)
N	1404		1405	
R^2	0.56		0.55	

Note: Two-tailed: ***p< 0.01, **p< 0.05, *p< 0.1. Standard errors are clustered by country.

Table 3.8: Robustness Check 1: Trade and Domestic Rule of Law (MC ERGM, trade link coded as exports per GDP greater than 1%

Equation 1: Trade Network Formation (Dyadic Level)		
	Exports	
Rule of Law A	0.105^{***}	(0.007)
Rule of Law B	0.058^{***}	(0.006)
Ongoing MID	-0.949^{***}	(0.129)
Distance	-0.058^{***}	(0.005)
GDP A	0.330^{***}	(0.010)
GDP B	0.280^{***}	(0.009)
Population A	-0.037^{***}	(0.011)
Population B	-0.107^{***}	(0.009)
PTA	0.498^{***}	(0.025)
Alliance Similarity	0.354^{***}	(0.035)
Peace Years AB	0.002^{***}	(0.001)
Degree Density	0.825^{***}	(0.009)
Equation 2: Rule of Law (Monadic Level)		
Direct Degree	0.001	(0.013)
Indirect Degree	−0.007	(0.009)
Partners' Rule of Law	0.319^{*}	(0.1867)
Area	24.247	(17.729)
GDP/cap	0.399^{***}	(0.099)
Polity	0.011	(0.011)
British Colony	0.176	(0.159)
Linear Shape	0.296	(1.102)
Quadratic Shape	−0.213	(0.046)
N(t)	131 countries (15 years)	

Note: Two-tailed: ***p< 0.01, **p< 0.05, *p< 0.1. Time Parameters are suppressed.

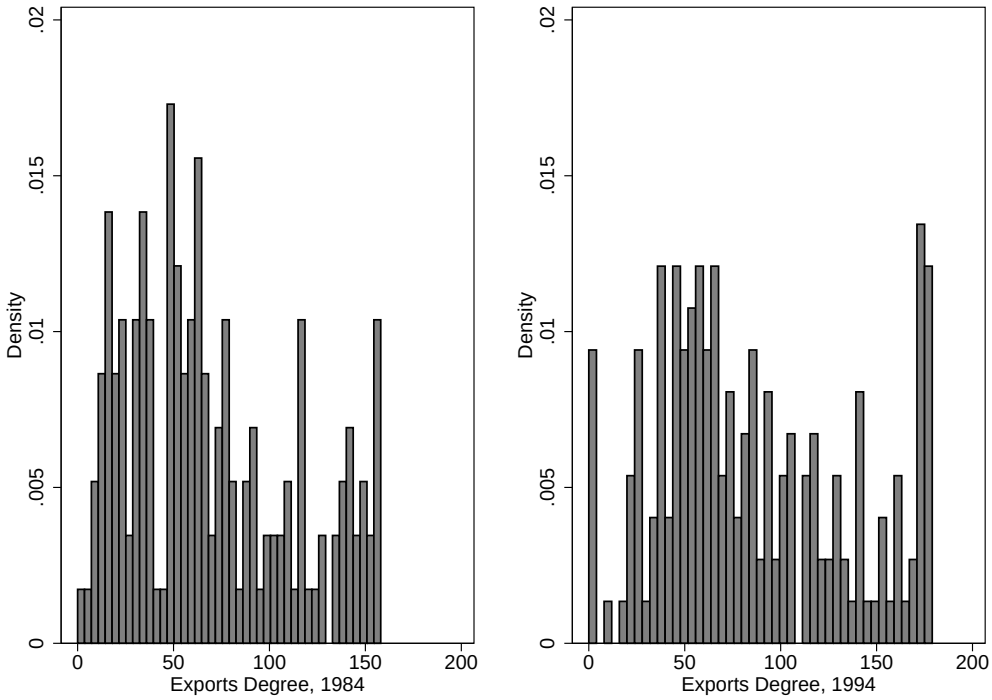
Table 3.9: Robustness Check 2: Trade and Domestic Rule of Law (MC ERGM, trade link coded as exports per GDP greater than 5%

Equation 1: Trade Network Formation (Dyadic Level)		
	Exports	
Rule of Law A	0.098^{***}	(0.007)
Rule of Law B	0.046^{***}	(0.007)
Ongoing MID	-0.960^{***}	(0.138)
Distance	-0.060^{***}	(0.005)
GDP A	0.307^{***}	(0.010)
GDP B	0.280^{***}	(0.009)
Population A	0.360^{***}	(0.011)
Population B	-0.114^{***}	(0.010)
PTA	0.513^{***}	(0.025)
Alliance Similarity	0.333^{***}	(0.032)
Peace Years AB	0.002^{***}	(0.001)
Degree Density	0.746^{***}	(0.009)
Equation 2: Rule of Law (Monadic Level)		
Direct Degree	0.003	(0.012)
Indirect Degree	−0.007	(0.009)
Partners' Rule of Law	0.275	(0.193)
Area	24.748	(17.408)
GDP/cap	0.404^{***}	(0.097)
Polity	0.012	(0.011)
British Colony	0.176	(0.155)
Linear Shape	0.157	(0.913)
Quadratic Shape	-0.207^{***}	(0.042)
N(t)	131 countries (15 years)	

Note: Two-tailed: ***p< 0.01, **p< 0.05, *p< 0.1. Time Parameters are suppressed.

Figure 3.1: Trade Network Degree Distribution

Figure 3.2: Trade Network Degree Distribution Over Time



CHAPTER 4
TRADE NETWORK AND DOMESTIC REPRESSION

4.1 Introduction

In Chapter 3, I conducted empirical tests of the networks theory by applying it to explaining the relationship between international trade and domestic rule of law. The implications of the networks theory, however, extend beyond that this particular application. The central theoretical concept explored in this dissertation—*Operations Costs*, or the costs of conducting business in a given country—is much broader than just rule of law. Instead, the concept of *Operations Costs* can be applied to a large number of international relations research questions. One can identify a large number of domestic practices and behaviors that impose *Operations Costs* on international business, such as capital tax laws, the level of fiscal capacity, the level of respect for domestic human rights, democracy, and internal conflict. The networks theory helps shed light on each of the behaviors listed above. The goal of this chapter is to explore the application of the networks theory to one of these areas—the study of human rights.

As I explain in more detail in the following section, the network theory developed in this dissertation allows for approaching the study of human rights from a new theoretical angle. The use of SNA approaches is relatively new to the human rights literature (e.g., Murdie, 2012), with only a few studies explicitly exploring the link between the formation of international networks and the effect of the resulting networks on domestic human rights (Hafner-Burton, 2005, 2009). I build on this

emerging research by focusing on the economic costs of repression, such as higher risks, negative publicity, and decreased quality of human capital. These costs are suffered by both the domestic economic elites and their international business partners. These business elites can alleviate their losses resulting from such costs using one of two strategies: pressuring the government to improve their human rights practices or setting up channels for indirect economic transactions through states with more favorable political environments.

A state's choice of strategy, in turn, dictates the type and number of international business partners it can attract. States with better human rights practices attract both a larger number of international business partners and more international business from less repressive states. In contract, repressive states attract less international business in general, and less business from states with strong human rights laws, in particular. Finally, the types and number of international business partners a state is able to attract determines its own current and future incentives for respecting human rights. States that are forced to rely on indirect channels for their international transactions have a lower long-term incentive to improve their existing human rights practices than states with a large number of international business partners.

The rest of this chapter proceeds in the following way. I start by providing a brief overview of the literature on domestic respect for human rights and situating the current project within this literature. Next, I show how the theoretical model developed in Chapter 2 can be easily recast to explain the relationship between states' formation of international trade relationships and the effect of the resulting trade ties

on their domestic level of respect for human rights. The section that follows uses the theoretical propositions developed in Chapter 2 to state a number of testable hypotheses regarding this relationship. In the Research Design section, I describe the empirical model and the way the variables are measured. Next, I test the hypotheses, describe the results, and conduct a series of robustness checks, after which I conclude.

4.2 T

he research on international law has recently undergone several major paradigmatic changes. The realist view of international law as a powerless and idealistic institution (Austin and Austin, 1861; Goldsmith and Posner, 2005; Mearsheimer, 1994/1995), was replaced by the managerial school's of thought argument that "almost all nations observe almost all principles of international law and almost all of their obligations almost all of the time" (Henkin, 1979, 47). Breaches of international law, in the meantime, are attributed to factors beyond states' control, such as error, imprecise information, or lack of administrative resources (Chayes and Chayes, 1993). This optimistic view, however, does not bode well with the strong empirical evidence of pervasive noncompliance, especially in the area of human rights law. Amnesty International, for example, reports human rights violations in 101 out of 155 countries surveyed in 2011 (Amnesty International, 2012). As a result, scholars of human rights have searched for additional, more nuanced and issue-specific explanations.

One of the central ideas of the present day human rights research is that, while the causes of human rights abuses tend to be located within the state (e.g., lack of protections, unchecked executives), the influence for changing repressive prac-

tices might have to come from the outside of the state. Hence, current human rights research is primarily focused on exploring the two principle mechanisms for the international influence on individual states' human rights practices: coercion and persuasion (Hafner-Burton, 2005). Persuasion is defined as altering states' identities to embrace the norms associated with respecting human rights. Drawing on social constructivism, normative scholars argue that persuasion succeeds when the norm becomes fully internalized, i.e. abiding by the norm is viewed as fully compatible with actors' self-interest (Finnemore, 1993; Wendt, 1999). The scholars of the persuasion mechanism have focused on identifying particular features that make some states more amenable to persuasion than others, such as democratic governments or strong judiciaries (Conrad and Ritter, 2013; Powell and Staton, 2009).

The coercion mechanism may be exercised using either military or economic tools. Military coercion, or the use or threats of a physical intervention, to force a state to change its human rights practices is relatively rare (Pape, 2012). Economic coercion is "the threat or act by a sender government or governments to disrupt economic exchange with the target state, unless the target acquiesces to an articulated demand" (Drezner, 2003, 643). The coercive mechanism usually entails altering the offending state's incentive structure by either providing additional incentives for complying with the demand (aid, membership in international organizations, additional concessions in international negotiations, or other economic benefits) or increasing the costs of non-compliance (economic sanctions, exclusion from international organizations or economic treaties). Kelley (2004), for example, demonstrates the EU's strategic use of the membership incentive to encourage minority rights' protections in Slovakia and

Latvia. Hafner-Burton (2005) finds evidence of improved human rights practices as a result of inclusion of human rights clauses in preferential trade agreements.

Neither persuasion nor coercion, however, prove to be very effective mechanisms by themselves. The persuasion mechanism requires changing actors' preferences regarding the behavior, which is usually a long and gradual process with uncertain systematic empirical record of success. Since repression constitutes a tool for extracting economic and political benefits, actors that rely on repression are unlikely to be persuaded to give it up in the absence of an alternative way to access these benefits. Creating such alternatives, however, typically entail a lengthy and risky endeavor of building legitimate political institutions (Hafner-Burton, 2005, 600). Coercive mechanisms, such as economic sanctions or suspension of institutional memberships have also been shown to have mixed or no success (Galtung, 1967; Haass, 1997; Pape, 1997). Peksen (2009) demonstrates that economic sanctions aimed at alleviating domestic repression tend to worsen, rather than improve the pre-sanctions situation. According to this study, sanctions lead to substantial decreases in such human rights indicators as government respect for physical integrity rights, including freedom from disappearances, extra-judicial killings, torture, and political imprisonment. Peksen and Drury (2010) find analogous results regarding the detrimental effects of economic sanctions on the democratic practices of the targeted government.

Convinced that either persuasion or coercion constitute very successful mechanisms to explain the worldwide changes in human rights practices, the research has shifted towards theoretical frameworks that emphasize an interaction between international pressure and domestic factors. Pioneered by Moravcsik (2000), these

theories emphasize that a change in domestic practices (e.g., an establishment of a human rights regime) is most successful when it results from a cooperation between domestic and international entrepreneurs. Domestic groups that are most likely to support such regimes, in turn, are the groups who need these regimes for protection of their rights and well-being. Human rights regimes, therefore, are going to be most supported by the domestic elites in newly democratized states—the elites who fear an authoritarian reversal and need such regimes to cement the fledgling democracy.

My network theory builds on the domestic—international framework, yet approaches it from a different angle. Rather than focusing on the political benefits of human rights regimes, it emphasizes their economic advantages. It is the argument of this chapter that domestic repression imposes an economic operations cost on both domestic economic elites involved in international business and their international business partners. These business elites can alleviate their losses resulting from such costs using one of two strategies: either by pressuring their government to improve domestic human rights practices or by setting up channels for indirect economic transactions through states with more favorable political environments. Depending on the strategy it chooses, a state attracts a certain type and number of international business partners. States in which the economic elites are able to successfully lobby their government to improve human rights practices will attract both a larger number of international business partners and more international business from other states that respect human rights. In contrast, states whose elites are unable or unwilling to pressure the government to alleviate repressive practices will attract less international business in general, and less business from states with strong human rights laws, in

particular.

The types and number of international business partners a state is able to attract, in turn, determines its own future incentives for improving domestic human rights practices. States with few international business partners who are forced to rely on indirect channels for their international transactions will have a lower long-term incentive to improve their existing human rights practices than states with a large number of international business partners. The logic of the network theory as it applies to explaining the level of domestic respect for human rights is elaborated in further detail in the next section.

4.3 International Trade and Domestic Repression

4.3.1 Who Benefits from International Trade

Just like in the previous chapters, let us start with the premise that, within each state, there exists a set of firms for whom engaging in international trade is associated with positive benefits. Like in the previous chapters, we can formally think of these benefits as a positive parameter δ, $0 < \delta < 1$.

4.3.2 The Economic Costs of Repression

The central premise of this chapter is that domestic violations of human rights or repression on the part of government against its citizens imposes a number of economic costs on domestic economic elites conducting international business, as well as their international business partners. Especially in more recent years, human rights research has detected a shift away from the traditionalist view on the relationship

between international commerce and respect for human rights. Rooted in Marxism and dependency theory's view of firms as pure profit-maximizers, this traditionalist approach maintained that the interests of international firms are in natural alignment with those of the repressive regimes: both can disproportionately benefit from using repression to keep down the costs of labor and production. While this view has found some support during earlier time periods (Cardoso and Faletto, 1979; Maxfield, 1998), more recent empirical research suggests that such relationship may no longer hold (Blanton and Blanton, 2007; Hafner-Burton, 2009; Richards, Gelleny and Sacko, 2001; Spar, 1998).

As noted by these recent studies, the issue of human rights comes up with increased frequency during economic negotiations, especially those involving the US or Western European states (Hafner-Burton, 2005, 2009). The 2004 US-Singapore free trade agreement, for example, stipulates that both parties "strive to ensure" a number of collective bargaining, labor, and minimum wage rights, and establishes a number of joint committees and procedures to oversee compliance with these terms Hafner-Burton (2009, 7). Similar clauses are found in large number of agreements involving the US or European states. Increased attention to human rights practices has been drawn by the so-called "spotlight effect," associated with the human rights advocates' use of media to shame multi-national corporations (MNCs) into improving human rights conditions in their international locations (Spar, 1998). Such shaming has been rather effective, forcing a number of MNCs, most notably Nike, Reebok, Starbucks Coffee, and The Gap to make substantial revisions to their over-seas practices or even pull out their businesses altogether. Macy's, Levi Strauss, Liz Claiborne, and

Eddie Bauer, for example, had to terminate their business in Burma in response to rising levels of repression by the ruling junta (Spar, 1998, 10). In other words, whether dictated by the fair wage concerns of the domestic labor unions or normative considerations, these human rights clauses impose considerable costs on the economic elites in countries with poor human rights records, effectively limiting or altogether precluding them from participating in lucrative international trade deals (Blanton and Blanton, 2007).

Poor human rights practices impose costs on domestic and international economic elites more broadly. Repression and internal violence may increase the risk of operating in a country by directly disrupting the flows of capital, goods, and information, or even threatening the physical safety of international businesspersons. All these factors increase the costs and decrease the efficiency of business operations, making repressive regimes less attractive venues for international firms.

Finally, a shift of international business interests from natural resource procurement to consumer products, manufacturing, information, and service sectors (Blanton and Blanton, 2007; Kozlow, Rutter and Walker, 1978) triggered a corresponding change from the demands for cheap labor to the focus on skilled and qualified workforce (Mody, Dasgupta and Sinha, 1999; Moran, 2002). Therefore, repression may also decrease the potential economic benefits of operating in a country by inadvertently damaging its human capital. While respect for human rights is not a necessary condition for achieving high skills and productivity, talent and creativity are more likely to thrive in favorable human rights conditions (Blanton and Blanton, 2007, 146). Repressive government practices may also turn the populous away from

pursuing certain professions or acquiring particular skills.

To recast this in the formal language of chapter 2, poor human rights practices can be thought of as imposing additional costs of operations. States with poor human rights practices can be thought of as playing *Low Type*, which is associated with incurring a discounting parameter $0 < \alpha < 1$ both on their own trade benefits and on the trade benefits of their trade partners. States exhibiting respect for human rights, on the other hand, can be though of playing *High Type*. Remember, that the trade benefits of *High Types* or their trade partners' are not discounted ($\alpha_H = 1$).

4.4 Two Strategies of Deflecting the Economic Costs of Repression

Aware of the economic costs of political repression, the affected economic elites have two strategies for deflecting these costs: they can either lobby the repressing government to improve their practices or conduct their international economic transactions through indirect channels. In the formal language of Chapter 2, the first strategy involves the repressive state paying a fixed cost σ to become a *High Type* and avoid the discounting parameter on its trade benefits.

The lobbying strategy, however, is not always available (as the cost σ may be too high). The literature identifies repression as one of the tools to extract particular political and economic benefits (e.g., security in office, rents), the other two tools being distribution of rents and policy concessions (Acemoglu and Robinson, 2000, 2006, 2012). The use of repression, moreover, is neither costless nor most preferred, as it destroys the loyalty of the population. Population's loyalty, in the meantime is necessary for the successful use of the other two tools (Gandhi, 2008; Wintrobe, 1998).

Governments, therefore, are most likely to rely on repression when the distribution of benefits or policy concessions do not constitute viable alternatives, i.e., in countries that lack both rich resources necessary to distribute rents and political institutions that would allow for making credible policy concessions (Gandhi, 2008; Wintrobe, 1998).

Since a repressive government is unlikely to give up repression lest it can shift to another tool of maintaining its hold on power, improving domestic human rights usually hinges on the possibility of building viable political institutions and re-building the lost trust of the population.[1] Institution-building, and even more importantly, the re-rebuilding of trust, are lengthy and gradual processes.

When domestic economic groups are unable to convince their government to improve human rights practices, they have to rely on the second strategy of avoiding the economic costs of domestic repression—set up their international economic transactions through indirect channels. Reliance on intermediaries allows *Low Type* states to benefit from economic deals with *High Type* states, who would be unable or reluctant to deal with them directly. Unable to do direct business with the Coca-Cola company, for example, North Korea is known to import Coke from intermediary countries like Taiwan or Singapore (New Zealand Herald, 2012; Williams, 2013).

4.5 Trade and Repression:

[1]The third tool—distribution of rents—is dependent on the availability of rich natural resources, which are usually assumed to be exogenous.

Empirical Predictions

In this section, I rely on the Propositions 4-6, derived in Chapter 2, to develop testable hypotheses regarding the relationship between a state's number of direct and indirect trade partners and its incentives to repress or respect human rights of its citizens. According to the logic of Proposition 4, states with strong respect for human rights form a larger number of direct trade relationships. Such states have many potential trade partners to choose from, as they provide favorable business environments for international firms, who need not fear the negative publicity or investment risks associated with operating within repressive states. States that abuse human rights, on the other hand, struggle to attract international firms and, as a result, have fewer international business partners to choose from. This leads to Hypothesis 4.1:

Hypothesis 4.1. *There is a positive relationship between the strength of respect for human rights and the number of direct trade partners.*

The level of domestic repression, however, is endogenous to the formation of the trade relationships. Therefore, Proposition 4 suggests that one may also observe the reverse relationship: states with a large number of direct trade partners will have a greater incentive for respecting their citizen's human rights than states with few direct trade partners. The logic is that direct trade relationships are valuable to important domestic groups. Pursuing additional economic gains, these groups will pressure their government to maintain the status quo or improve domestic business conditions even more. In other words, these domestic groups are further empowered by each

additional trade relationship, which triggers additional pressure on the government. Hence, Hypothesis 4.2 posits a direct relationship between the number of direct trade partners and a state's incentive to respect human rights.

Hypothesis 4.2. *States with more direct trade partners will have a greater incentive to respect human rights than states with fewer direct trade partners.*

Next, Proposition 5 predicts an inverse relationship between the number of indirect trade partners and a state's incentive to respect human rights. This prediction is somewhat counter-intuitive, as one expects that any additional trade relations, direct or indirect, will provide benefits for domestic economic elites, enhancing their power to pressure their government to provide a more sound business environment. Upon closer examination, however, the inverse relationship is clear. The idea is that states with few established trade relationships are likely finding themselves in a such marginalized trade network position for a reason: they either lack powerful domestic economic groups to pressure the government on human rights or the cost of improving human rights practices is currently too prohibitive. Unable to pressure their government on human rights reform, the existing economic elites within such states are forced to resort to relying on indirect trade relationships, using intermediaries to re-sell their goods on the world market or import desired goods from over-seas. In other words, because the trade network is very densely connected otherwise, each indirect link is a manifestation of the absence of a (more profitable) direct link, rather than an additional trade channel. States resort to indirect links out of necessity rather than economic preference, in situations where they fail to attract direct trade, due

to poor domestic conditions. Therefore, Hypothesis 4.3 posits a negative relationship between the number of indirect trade partners and domestic respect for human rights.

Hypothesis 4.3. *The number of indirect trade partners is inversely related to a state's incentive to respect human rights.*

Finally, Proposition 6 posited a positive relationship between the number of state's *High Type* trade partners and its respect for human rights. The argument is that although trade with both *High* and *Low Type* yields positive economic benefits, each additional *High Type* trade partner provides higher net benefits, as such benefits are not discounted by the costs of operating in a high-risk environment. Hence, all else equal, the economic elites within the states with more *High Type* trade partners have greater economic resources to pressure their government for further improvement of domestic business climate. This is stated below in Hypothesis 4.4.

Hypothesis 4.4. *States have a greater incentive to respect human rights as more of their direct and indirect trade partners respect human rights.*

4.6 Research Design

The primary empirical tests are conducted using a Continuous MC ERGM estimator Ripley, Snijders and Preciado (2012), described in Chapter 3. As described in detail in section 3.4, the Continuous MC ERGM constitutes is the best available estimator both in terms of allowing for a simultaneous estimation of network formation and effect, as well as due to its close fit with the theoretical model (see Section 4.7.3 for additional robustness checks).

4.6.1 Dependent Variables

Just like in Chapter 3, the empirical model consists of two simultaneously estimated equations, and as a result, has two dependent variables. The dependent variable in the first equation is a the trade network, measured at at the system-level. The dependent variable in the second equation is the monadic (or state-level) respect for human rights.

4.6.1.1 Network Formation: Trade Links

The Network Formation equation allow for testing Hypothesis 4.1, as well as to model the simultaneity of network formation and effect, posited by the theoretical model. Just like in Chapter 3, the trade network is measured as a directed nxn matrix $\mathbf{g}$. Similar to Chapter 3, I use two alternative measures of a trade connection. In the first model I estimate, the ij^{th} cell of the trade matrix is coded as 1 if state i exported any goods to j in time period t ($\text{export}_{ij} > 0$), else the cell entry is coded as 0. For the second model, I construct the analogous measure based on the amount of imports between i and j.[2]

4.6.1.2 Network Effect: Domestic Repression

Consistent in the recent human rights literature, I measure a state's level of respect for human rights using the *Physical Integrity* variable from the CIRI Human Rights Data Project (Cingranelli and Richards, 2010). The *Physical Integrity* variable is an index that consists of additive five additive component variables (Torture, Ex-

[2]The results are robust to using different thresholds, such as $\text{export}_{ij} > 1\%$ or 5% of i's total trade (see section 4.7.3).

trajudicial Killing, Political, Imprisonment, and Disappearance), each ranging from 0 (the worst outcome) to 2 (the best outcome) (Cingranelli and Richards, 2010). As a result, my *Human Rights* variable is measured on a 9-point ordinal scale ranging from 0 (no respect for human rights) to 8 (full respect for human rights). Although the CIRI dataset includes information about 195 countries between 1981-2009, my estimation sample is limited to 130 countries between 1985-2000, due to the data availability on other variables, primarily the *Rule of Law* measure and *Trade*.

4.6.2 Independent Variables

4.6.2.1 Network Formation: Trade Links

In accordance with Hypothesis 4.1, which predicts a positive relationship between a state's respect for human rights and its number of direct trade partners, the dependent variable from the *Human Rights* equation—*Human Rights*—is also the two primary independent variable (*Human Rights A* and *Human Rights B*) in the *Trade Network Formation* equation.

The rest of the trade equation model is specified the same way as in Chapter 3. In accordance with Hypothesis 3.1, I include a control variable for domestic rule of law (*Rule of Law A* and *Rule of Law B*). As previously, I expect rule of law to have a positive effect on the number of trade partners. Like in Chapter 3, the *Trade Network Formation* equation includes a set of common control variables identified by the literature, such as *Ongoing Military Dispute*, *Peace Years*, *GDP per capita*, *Population*, *Distance*, *PTAs*, and *Alliance Portfolio Similarity* (Hegre, Oneal and Russett, 2010; Oneal and Russett, 2005). These variables are measured in the same

way as in Chapter 3, and I have the same expectations regarding their effects.

Finally, just like in Chapter 3, the *Trade Network Formation* model contains a network-specific endogenous variable: *Degree Density*, which is estimated as the average number of outgoing ties across all actors which captures actors' baseline probability to form ties. The coefficient on this variable is analogous to the intercept parameter in OLS model.

4.6.2.2 Network Effect: Domestic Repression

The *Domestic Repression* equation includes three primary independent variables: *Direct Trade Degree* necessary for testing Hypothesis 4.2, *Indirect Trade Degree* allowing for a test of Hypothesis 4.3, and *Average Partner's Human Rights Level*, needed for testing Hypotehsis 4.4. *Direct Trade Degree* is measured as the total number of state's direct trade partners, *Indirect Degree* is calculated as the total number of unique second degree trade partners (partners that can be indirectly reached through one internmediary).[3] Finally, *Average Partner's Human Rights Level* is the arithmetic mean of the *Human Rights* scores of State i's direct trade partners.

In selecting the appropriate control variables, I rely on the previous human rights research, specifically on Hafner-Burton (2005). The first set of control variables—*Polity* and *Durability*—captures the elements of domestic political context and are obtained from the Polity dataset (Marshall and Jaggers, 2008). *Polity* is measured on a 21-point ordinal scale, ranging from -10 to 10, with higher val-

[3]This measure exclude i's indirect links to states with whom it already has a direct trade link.

ues associated with more democratic regimes. *Durability* intends to capture political stability and is measured as the number of year since the most recent change in the Polity score. Consistent with previous research, I expect that more democratic states have greater respect for human rights (Henderson, 1991; Poe, Tate and Keith, 1999). I expect *Durability* to have a positive effect on human rights, as repression and human rights abuses are likely to spike during the periods of regime transitions (Hafner-Burton, 2005).

Scholars have also put forth a number of theoretical arguments relating human rights abuses to competition for resources. I account for such explanations by controlling for *GDP/capita*, *Area*, *Ethnic Fractionalization*, and *Religious Fractionalization*. *GDP/capita* captures the idea that resource competition may be less adverse in more affluent societies (Pritchard, 1989; Fearon and Laitin, 2003). States with larger *Area* have lower population density, which decreases interaction and population pressures (Henderson, 1991; Poe, Tate and Keith, 1999). Ethnic and religious diversity may further exacerbate competition for resources, by dividing population into several conflicting groups (Cunningham and Weidmann, 2010). Data on *GDP/capita* are obtained from Gleditsch (2002), while the data on *Area*, *Ethnic*, and *Religious Fractionalization* are obtained from Fearon and Laitin (2003)

As mentioned above, governments of resource rich states may be less likely to opt for repression, as they can maintain their power through resource redistribution (Gandhi, 2008). I capture this effect by controlling for *Oil*, measured as a state's total production of fuel rents per capita (logged) in a given year and obtained from Ross (2001).

To control for the effect of international human rights treaties, I include a dichotomous control variable *CAT*, which captures a state's ratification of the Convention against Torture (CAT). Signing the CAT indicates a state's intent to improve its human rights practices. The literature shows, however, that signing the CAT is not necessarily associated with improvement in human rights practices, as states sign human rights treaties for various other reasons (Hathaway, 2002). The data on the CAT accessions are obtained from Conrad and Ritter (2013). The model also accounts for possible path-dependency in human rights practices, produced as a result of colonial legacies, by including control variables of *British Colony* and *French Colony* (Mitchell and McCormick, 1988; Mitchell, Ring and Spellman, 2013).

Finally, the model accounts for temporal dependence by including a linear and a quadratic shape effects, which capture the basic drive towards higher values on the dependent variable over time.

4.7 Empirical Results

The results of the empirical analysis are presented in Table 4.2. Model 1 presents the results of the analysis in which trade links are operationalized using positive exports from country A to country B in a given year, while Model 2 presents the analogous results for measuring trade links using imports.

4.7.1 Trade Network Formation

In the *Trade Network* equation, the primary parameters of interest are *Human Rights A* and *Human Rights B*. Consistent with Hypothesis 4.1, both of these variables are positive and statistically significant in each model. This indicates that states with

greater respect for domestic human rights are both more likely to engage in trade themselves, as well as are more attractive trade partners to other states. This result is very important, as it yields credence to the model's central assumption which posits that repression creates unfavorable business environment.

All of the control variables act as expected, providing additional credence to the model specifications. Further supporting Hypothesis 3.1 posited in Chapter 3, *Rule of Law A* and *Rule of Law B* are positive and statistically significant, suggesting that states with strong rule of law constitute more desirable trade partners. Conflict, operationalized as *Ongoing MID*, has a negative effect on the probability of trade link formation (Keshk, Pollins and Reuveny, 2004). *Alliance Portfolio Similarity* is positive and statistically significant, indicating that states with similar preferences are also more likely to engage in trade. Elapsed time since the last militarized dispute, operationalized as *Peace Years* also has a positive effect on trade.

Consistent with the gravity model, trade decreases with distance and increases with *GDP/cap*. Once we control for GDP/capita and other variables, we find that states with larger populations are less likely to engage in trade—the coefficients on *Population A* and *Population B* are negative and statistically significant. Members of a preferential trade agreement are more likely to trade—the coefficient on *PTA* is positive and statistically significant (Goldstein, Rivers and Tomz, 2007; Hegre, Oneal and Russett, 2010). Finally, *Degree Density* is positive and statistically significant, which indicates that observed trade network densities are high.

4.7.2 Network Effect: Human Rights

States' domestic human rights practices are explored in the second equation of Table 4.2. The central variables of interest here are *Direct Degree* (states' number of direct trade partners), *Indirect Degree* (states' number or indirect trade partners removed by 1 link), and *Partners' Human Rights*, measured as the average human rights score of a state's direct trade partners. Just like before, in the first model, I operationalize the trade network using the data on exports, while the second model shows the analogous results of using the imports data.

Just like the coefficient on *Direct Degree* is insignificant in both models, which mirrors the results of Chapter 3 concerning the effect of trade network on rule of law. The lack of significance on this effect suggests that, while a state's level of human rights' respect matters for the trade network formation, the number of direct trade partners has no effect on domestic respect for human rights, in contrast to Hypothesis 4.2.

Next, *Indirect Degree* is negative and statistically significant in both models. This provides support for Hypothesis 4.3, indicating that states with more indirect trade partners tend to have lower respect for domestic human rights. Note that this result is also consistent with the results of the empirical analysis conducted in Chapter 3, in which I find an analogous negative relationship between indirect trade and domestic rule of law. Returning to the Coke example at the beginning of this chapter, this result suggests that North Korea's poor human rights practices create a "vicious cycle," by forcing North Korea to rely on indirect trade, which in turn,

lowers its future incentives to improving domestic human rights practices.

Table 4.2 provide no support for Hypothesis 4.4, which posits a positive relationship between state i's respect for human rights and that of its trade partners. *Partners' Human Rights* is insignificant in the first model, and actually negative rather than positive in the second model. This result suggests that the ability to establish economic relationships with states with high respect for human rights may actually decrease a repressive state's incentive to improve its human rights practices. In other words, when it comes to respect for domestic human rights, states may be playing a game of strategic substitutes rather than a game with strategic complements that is modeled in this dissertation. I leave exploring this relationship to future research.

Next, let us examine the control variables. Consistent with previous literature, I find no relationship between a state's ratification of CAT and its human rights practices (Hathaway, 2002), as the coefficient on *CAT* is statistically insignificant in both models. *Ethnic Fractionalization* is negative and statistically significant in both models, suggesting that repression is more likely in ethnically diverse states (Cunningham and Weidmann, 2010). *Religious Fractionalization* and *Area*, on the other hand, are insignificant in both models, providing no additional support for the group competition explanations.

Somewhat surprisingly, the coefficient on *GDP/capita* is negative and statistically significant, suggesting that states with greater GDP per capita are less likely to respect domestic human rights. Since the model controls for *Polity* and *Durability*—both positive and statistically significant, this results may be driven by nondemocratic

states with large income disparities, which are known to engage in domestic repression (Henderson, 1991).

Colonial heritage and oil dependency, in the meantime, seem to have no effect on governments' repressive tendencies, as *British*, *French Colony*, and *Oil* do not reach statistical significance. Finally, the level of human rights seems to first improve and then drop off over time, as suggested by the negative coefficient on *Quadratic Shape*.

4.7.3 Robustness Checks

Tables 4.3-4.7 provide a series of robustness checks on the main empirical results. Table 4.3 presents a model, in which a trade network link is operationalized as the presence of exports or imports between i and j in a given year (a trade link between i and j is coded as 1 if $\text{exports}_{ij}+\text{imports}_{ij} > 0$). The empirical model is robust to this specification change: all coefficients remain the same in terms of direction and statistical significance is each of the equations. As discussed in more detail in Section 3.8, one should not be too quick to interpret this robustness as evidence that total trade is an adequate measure of the theoretical concept of trade links developed in this paper. Although there is a significant over-lap between exports and imports flows, the two are obviously not theoretically identical. The same pair of states may have significant differences between import and export regulations, taxes, quotas, and laws. For example, states tend to tax imports more than exports (Barbieri, Keshk and Pollins, 2009; Clist and Morrissey, 2011).

To check the robustness of the empirical estimator, Tables 4.4 and 4.5 present

the results of estimating two separate naïve models: a naïve model of trade network formation (Table 4.4) and a naïve model of human rights (Table 4.5). These tables show that the main empirical results are robust to the choice of the estimator, although the two sets of results are not (and cannot be) identical, as the MC ERGM estimator conducts a simultaneous estimation of the two outcomes, as well as allows for including of a set of network-level endogenous covariates, such as *Degree*, *Average Partner's Rule of Law*, *Linear Shape*, and *Quadratic Shape*.

The only difference between the *Trade Formation* equation in the main model presented in Table 4.2 and the naïve model (Table 4.4) is in the coefficient on *Ongoing MID*, which changes from insignificant in the former to negative and statistically significant in the latter.

The *Human Rights* equation exhibits more differences. While the results concerning the main covariates of interest are identical in the *Exports* model, neither *Indirect Degree* nor *Partners' Repression* are statistically significant in the *Imports* model. There are also several changes in direction and significance among the control variables. *GDP/capita* changes from negative and statistically significant in Table 4.2 to positive and statistically significant in Table 4.5. Most likely due to the lack of simultaneous estimation by the naïve model, this change indicates that once we account for the theoretically important simultaneity between network formation and network effect, *GDP/cap.* actually has a negative effect on *Human Rights*. Similarly, the coefficient on *Area* is negative and statistically significant in the naïve model, while insignificant when the two equations are simultaneously estimated. The opposite change happens to *Durability*: positive and statistically significant in the models

that account for simultaneous outcomes, this variable shows no effect in the naïve models. Finally, *French Colony* and *Religious Fractionalization* switch from insignificant in the main models to positive and statistically significant in the naïve models.

Finally, Tables 4.6 and 4.7 check the results for robustness to the choice of 0 as the conceptual threshold for dichotomizing trade links into 1s (presence of a link) and 0s (absence of a link). Like in Section 3.8, I use the thresholds of 1 and 5% of exports per state i's total GDP. The results of these robustness checks are presented in Tables 4.6 and 4.7, accordingly. We can see that the results are robust to these specifications as well. All coefficients in both equations remain the same in direction and significance, with the exception of *Average Partner's Human Rights*, which becomes negative and statistically significant from being insignificant in the *Exports* model of Table 4.2.

4.8 Conclusion

In this chapter, I conducted a series of alternative empirical tests of the networks theory developed in this dissertation, by applying the theory to explain the relationship between the formation of the international trade network and the effect of this network on domestic human rights practices of its member-states. After using the existing literature to establish that human rights abuses impose a number of important economic costs of the repressive states, I argue that the economic groups within such states have two strategies for avoiding such costs. The first strategy lies in the lobbying or otherwise pressuring their government to improve its human rights practices. When the first strategy is unavailable or too costly, the domestic groups can

instead rely of conducting their economic transactions through international intermediary states—states that are willing to trade with repressive states, yet have high enough respect for human rights, so that they can also maintain trade relationships with states that avoid direct trade with human rights abusers.

I use the theory to derive a set of hypotheses. First, I predict an endogenous relationship between the level of domestic respect for human rights and the number of direct trade partners. Namely, I posit that the relationship will work both ways: states with strong respect for human rights will attract more direct trade partners, and states with a larger number of direct trade partners will have higher respect for human rights. Second, I expect that states with poor respect for human right will have to primarily rely on indirect trade relationship, and, as a result, we should observe an inverse relationship between a state's number of indirect trade partners and its respect for human rights. Finally, since trade with less repressive states is more beneficial, states with a larger number of less repressive trade partners should be also more likely to improve their domestic human rights practices themselves.

I test these predictions using the CIRI data on human rights practices for the time period between 1987-2000. The results provide some support for my predictions. Specifically, I find evidence a positive relationship between respect for human rights and the probability of forming direct trade relationships, as well as evidence for a negative relationship between the number of indirect trade partners and respect for human rights. The results are robust to a large number of alternative model specifications.

Table 4.1: Trade and Human Rights: Descriptive Statistics

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
Equation 1: Trade Network Formation (Dyadic Level)					
Export Links	0.820	0.384	0	1	97905
Imports Links	0.796	0.403	0	1	97905
Human Rights A	4.649	2.493	0	8	97905
Human Rights B	4.749	2.401	0	8	97905
Rule of Law A	3.944	1.577	0.917	6	97905
Rule of Law B	3.743	1.534	0	6	97905
Ongoing MID	0.003	0.051	0	1	97905
Distance (logged)	7.909	2.2	-4.605	9.420	97905
GDP A (logged)	1.504	15.263	22.895	97905	
GDP B (logged)	17.854	1.767	13.117	22.895	97905
Population A (logged)	10.023	1.357	6.770	14.039	97905
Population B (logged)	9.378	1.518	5.505	14.039	97905
PTA	0.195	0.396	0	1	97905
Alliance Portfolio Similarity	0.052	0.284	-0.252	1	97905
Peace Years AB	42.557	28.345	0	183	97905
Equation 2: Human Rights (Monadic Level)					
Direct Degree (exports)	123.693	39.353	27	183	97905
Indirect Degree (exports)	36.429	26.912	0	121	97905
Direct Degree (imports)	115.38	37.26	25	180	97905
Indirect Degree (imports)	44.097	25.446	0	114	97905
Area (logged)	12.96	1.555	9.916	16.655	97905
GDP/cap. (logged)	8.734	0.954	6.167	10.377	97905
Polity	3.685	6.952	-9	10	97905
Durability	31.033	36.882	0	190	97905
British Colony	0.269	0.443	0	1	97905
French Colony	0.127	0.333	0	1	97905
Ethnic Fractionalization	0.43	0.261	0.004	0.933	97905
Religious Fractionalization	0.338	0.22	0.02	0.778	97905
Oil/cap (logged)	-2.043	2.553	-8.047	3.613	97905
CAT	0.597	0.491	0	1	97905

Table 4.2: Trade Network Formation and Domestic Human Rights
(A Continuous Markov Chain ERGM Estimation)

Equation 1: Trade Network Formation (Dyadic Level)				
	Exports		Imports	
Human Rights A	0.108***	(0.006)	0.119***	(0.006)
Human Rights B	0.108***	(0.005)	0.099***	(0.005)
Rule of Law A	0.119***	(0.007)	0.027***	(0.009)
Rule of Law B	0.063***	(0.009)	0.064***	(0.008)
Ongoing MID	0.380	(0.260)	0.362	(0.270)
Distance	−0.084***	(0.006)	−0.084***	(0.006)
GDP A	0.441***	(0.012)	0.356***	(0.013)
GDP B	0.339***	(0.011)	0.411***	(0.010)
Population A	−0.043***	(0.013)	−0.040***	(0.014)
Population B	−0.042***	(0.012)	−0.024***	(0.011)
PTA	0.634***	(0.028)	0.617***	(0.028)
Alliance Similarity	0.514***	(0.035)	0.520***	(0.036)
Peace Years AB	0.002***	(0.001)	0.003***	(0.001)
Degree Density	0.982***	(0.010)	0.991***	(0.011)
Equation 2: Human Rights (Monadic Level)				
Direct Degree	0.001	(0.003)	0.001	(0.003)
Indirect Degree	−0.005***	(0.002)	−0.005***	(0.002)
Partners' Human Rights	−0.232	(0.153)	−0.250*	(0.141)
CAT ratification	0.032	(0.049)	0.033	(0.046)
Ethnic Fract.	−0.372***	(0.112)	−0.371***	(0.108)
Religious Fract.	0.157	(0.122)	0.161	(0.119)
Area	−0.011	(0.021)	−0.011	(0.021)
GDP/cap	−0.111***	(0.025)	−0.110***	(0.027)
Polity	0.016***	(0.004)	0.016***	(0.003)
Durability	0.004***	(0.001)	0.004***	(0.001)
British Colony	−0.074	(0.058)	−0.075	(0.057)
French Colony	−0.085	(0.064)	−0.087	(0.069)
Oil	0.008	(0.012)	0.008	(0.012)
Linear Shape	0.105	(0.273)	0.136	(0.253)
Quadratic Shape	−0.033***	(0.007)	−0.032***	(0.007)
N(t)	126 countries (13 years)		126 countries (13 years)	

Note: Two-tailed: ***p< 0.01, **p< 0.05, *p< 0.1. Time Parameters are suppressed. Naïve models produce similar results, without allowing to account for network-specific measures and dynamics.

Table 4.3: Trade and Domestic Human Rights
(MC ERGM, trade link coded as exports+imports> 0)

Equation 1: Trade Network Formation (Dyadic Level)		
	Exports+Imports	
Human Rights A	0.123***	(0.007)
Human Rights B	0.106***	(0.006)
Rule of Law A	0.045***	(0.010)
Rule of Law B	0.031***	(0.009)
Ongoing MID	0.266	(0.287)
Distance	−0.046***	(0.006)
GDP A	0.435***	(0.013)
GDP B	0.402***	(0.012)
Population A	−0.042***	(0.015)
Population B	−0.028***	(0.014)
PTA	0.699***	(0.033)
Alliance Similarity	0.667***	(0.045)
Peace Years AB	0.005***	(0.001)
Degree Density	1.338***	(0.013)
Equation 2: Human Rights (Monadic Level)		
Direct Degree	−0.003	(0.004)
Indirect Degree	−0.006***	(0.0020)
Partners' Human Rights	−0.031	(0.123)
CAT	0.029	(0.050)
Area	−0.014	(0.021)
GDP/cap	−0.125***	(0.028)
Polity	0.015***	(0.003)
Durability	0.004***	(0.001)
Ethnic Fractualization	−0.310***	(0.110)
Religious Fractualization	0.108	(0.123)
Oil	0.010	(0.012)
British Colony	−0.070	(0.056)
Linear Shape	0.307	(0.329)
Quadratic Shape	−0.030***	(0.007)
N(t)	126 countries (13 years)	

Note: Two-tailed: ***p< 0.01. Time Parameters are suppressed.

Table 4.4: Naïve Model of Trade Network Formation (logistic regression)

Equation 1: Trade Network Formation (Dyadic Level)				
	Exports		Imports	
Human Rights A	0.142***	(0.030)	0.138***	(0.027)
Human Rights B	0.138***	(0.007)	0.142***	(0.009)
Rule of Law A	0.140***	(0.044)	0.079*	(0.043)
Ongoing MID	−2.018***	(0.273)	−2.018***	(0.266)
Distance	−0.195***	(0.036)	−0.195***	(0.035)
GDP A	0.840***	(0.076)	0.701***	(0.067)
GDP B	0.701***	(0.030)	0.840***	(0.025)
Population A	−0.125	(0.082)	−0.171***	(0.065)
Population B	−0.171***	(0.027)	−0.125***	(0.023)
PTA	1.329***	(0.111)	1.329***	(0.086)
Alliance Portfolio Similarity	0.997***	(0.120)	0.997***	(0.131)
Peace Yrs AB	0.005***	(0.002)	0.005**	(0.002)
Constant	−24.078***	(0.855)	−24.078***	(0.845)
Log Likelihood	-68617.834		-68617.834	
N(t)	176968		176968	

Note: Two-tailed: ***p< 0.01, **p< 0.05, *p< 0.1.

Table 4.5: Naïve Model of Human Rights (OLS)

	Exports		Imports	
Direct Degree	−0.010	(0.008)	−0.002	(0.008)
Indirect Degree	−0.023**	(0.011)	−0.015	(0.010)
Partners' Repression	−0.389	(0.431)	−0.042	(0.471)
Area	−0.269***	(0.095)	−0.262***	(0.096)
GDP/cap.	1.063***	(0.356)	1.049***	(0.349)
Polity	0.071**	(0.032)	0.074**	(0.031)
Durability	−0.002	(0.005)	−0.001	(0.005)
British Colony	0.334	(0.516)	0.155	(0.512)
French Colony	1.635***	(0.483)	1.452***	(0.477)
Religious Fract.	2.343***	(0.771)	2.343***	(0.785)
Ethnic Fract.	−1.427**	(0.679)	−1.407*	(0.713)
Oil/cap.	−0.029	(0.069)	−0.033	(0.068)
CAT	−0.296	(0.231)	−0.361	(0.239)
Constant	2.343	(4.177)	−0.398	(4.080)
N	1196		1196	
R^2	0.49		0.48	

Note: Two-tailed: ***p< 0.01, **p< 0.05, *p< 0.1.
Standard errors are clustered by country.

Table 4.6: Robustness Check 1: Trade and Domestic Human Rights (MC ERGM, trade link coded as exports per GDP greater than 1%)

Equation 1: Trade Network Formation (Dyadic Level)		
	Exports	
Human Rights A	0.098***	(0.006)
Human Rights B	0.095***	(0.005)
Rule of Law A	0.052***	(0.008)
Rule of Law B	0.010	(0.008)
Ongoing MID	−0.919***	(0.154)
Distance	−0.076***	(0.006)
GDP A	0.321***	(0.011)
GDP B	0.271***	(0.010)
Population A	0.048***	(0.012)
Population B	−0.029**	(0.0113)
PTA	0.524***	(0.028)
Alliance Similarity	0.404***	(0.037)
Peace Years AB	0.002***	(0.001)
Degree Density	0.945***	(0.010)
Equation 2: Human Rights (Monadic Level)		
Direct Degree	−0.002	(0.004)
Indirect Degree	−0.007**	(0.002)
Partners' Rule of Law	−0.234*	(0.132)
CAT	0.063	(0.049)
Area	−0.006	(0.020)
GDP/cap	−0.131***	(0.032)
Polity	0.014***	(0.003)
Durability	0.004***	(0.001)
British Colony	0.044	(0.055)
French Colony	−0.014	(0.062)
Ethnic Fractionalization	−0.374***	(0.105)
Religious Fractionalization	0.052	(0.111)
Oil	0.016	(0.012)
Linear Shape	0.307	(0.361)
Quadratic Shape	−0.030***	(0.007)
N(t)	131 countries (15 years)	

Note: Two-tailed: ***p< 0.01, **p< 0.05, *p< 0.1. Time Parameters are suppressed.

Table 4.7: Robustness Check 1: Trade and Domestic Human Rights (MC ERGM, trade link coded as exports per GDP greater than 5%)

Equation 1: Trade Network Formation (Dyadic Level)		
	Exports	
Human Rights A	0.095***	(0.006)
Human Rights B	0.087***	(0.005)
Rule of Law A	0.046***	(0.009)
Rule of Law B	0.001	(0.008)
Ongoing MID	−0.943***	(0.142)
Distance	−0.078***	(0.006)
GDP A	0.297***	(0.011)
GDP B	0.291***	(0.010)
Population A	0.117***	(0.012)
Population B	−0.043***	(0.012)
PTA	0.541***	(0.029)
Alliance Similarity	0.371***	(0.036)
Peace Years AB	0.002***	(0.001)
Degree Density	0.857***	(0.010)
Equation 2: Human Rights (Monadic Level)		
Direct Degree	−0.001	(0.004)
Indirect Degree	−0.005**	(0.002)
Partners' Rule of Law	−0.263**	(0.133)
CAT	0.064	(0.048)
Area	−0.016	(0.020)
GDP/cap	−0.125***	(0.029)
Polity	0.015***	(0.004)
Durability	0.0042***	(0.001)
British Colony	0.036	(0.056)
French Colony	−0.025	(0.065)
Ethnic Fractionalization	−0.389	(0.105)
Religious Fractionalization	0.060	(0.114)
Oil	0.016	(0.012)
Linear Shape	0.140	(0.315)
Quadratic Shape	−0.028***	(0.007)
N(t)	131 countries (15 years)	

Note: Two-tailed: ***p< 0.01, **p< 0.05, *p< 0.1. Time Parameters are suppressed.

CHAPTER 5
CONCLUSION

Social actors, whether individuals, firms, international athletic clubs, or international states, are inseparable from the social networks in which they exist. These networks, of course, are carefully and strategically chosen. Individuals vie for memberships in prestigious professional networks. Legislators seek to form formal or informal coalitions to trade votes or co-sponsor bills. Firms carefully vet their networks of suppliers, compete for buyers, and negotiate with traders. International football clubs contend for memberships in local, national, and international leagues. State leaders carefully negotiate the international treaties that they enter.

The property of the resulting networks is that they are highly endogenous, which means that they are both defined by their members and define their members. The goal of this dissertation is to disentangle these two effects: the effect of a network on its agents and the reverse effect of agents on the network they form. Building on the recent advances in SNA, I model the endogenous relationships between actors' decisions to enter a network and the effects of this network on the characteristics of its members. To capture the strategic interdependence associated with the player–network interaction, I develop an n-player formal game. I argue that the two outcomes—agents' choice of network ties and their individual characteristics—are endogenous and mutually dependent. In my theoretical approach, I use agent-specific characteristics to separate agents into *High* and *Low Types*, so that *High Types* constitute more attractive network partners.

A firm's type, for example, is determined by its level of commitment to R&D: *High Type* firms dedicate substantial amounts of their budgets to come up with innovative products, while *Low Type* firms take advantage of these innovations by becoming partners, suppliers or distributors of *High Type* firms. *High Type* firms, of course, also benefit from working with other *High Types*, which allows them to take advantage of each other's innovations. Google, for example, often engages in mutually-beneficial collaborations with other technology giants, such as Intel and Samsung (Clark, 2013). Within congressional co-sponsorship networks, one can think of a legislator's type as the amount of effort put into crafting a bill: *High Type* legislators draft their own bills or collaborate with other *High Types* to take advanatge of one another's expertise, while *Low Type* legislators prefer to save the time and effort by becoming co-sponsors on the bills written by *High Types*. Likewise, international states that make up an export network vary based on a large number of domestic characteristics that enhance or decrease their attractiveness as business partners, such as the level of rule of law, human rights protections, tax incentives for international business, capital tax rates, and fiscal capacity.

Given this type heterogeneity, the actors maximize their payoffs by simultaneously choosing their own type and a set of direct network links to other players. The value of each direct link depends on the player's own type, as well as the type of the network partner. In addition, by forming direct links, players are sometimes able to also acquire indirect trade links to additional players. The trade-off is that, although an indirect link yields a lower benefit than a direct link, indirect links are costless, while direct links are associated with a fixed cost. Actors' utilities in the

game, therefore, do not just depend on their own actions, but also on those of the other players in the network.

The resulting empirical implications highlight the complexity and conditional nature of network-level processes. First, the model predictions are conditional on network density, i.e., the strength and direction of the effects vary depending on whether we are exploring a relatively dense network, like the trade network or a more sparse network, such as that of international conflict. Next, I find that, for relatively dense networks, or star-shaped networks, *High Types* attract a greater number of direct network relationships, and vice versa: states with more direct network links will have a greater incentive to play *High Type*. *Low Type* players, on the other hand, are less successful at attracting direct network ties, and as a result, tend to get stuck in a vicious cycle of relying on indirect ties, which, in turn, provides a negative incentive for playing *High Type*. In addition, a state's type action is positively affected by the average types of its direct network partners: as a greater number of one's direct partners choose *High Type*, one has a greater incentive to also play *High Type*.

These theoretical findings challenge the assumption of complementarity between direct and indirect network ties, common to network studies relying on additive measures like centrality (e.g., Ward, 2006).[1] I demonstrate that, while complementarity is certainly possible in some equilibria (e.g, sparse networks), direct and indirect links may also serve as substitutes for one another and even induce opposite effects—

[1]Centrality measures the *total* connectedness of an actor in a network, typically by adding up the total number of its direct and indirect links, sometimes weighting direct links more heavily.

which calls for a modeling the effect of direct and indirect links separately or using network measures that capture this dynamic.

In addition, this dissertation's theoretical approach challenges the common conceptualization of indirect links as any paths that lead from A to C through B, highlighting that, in cases such as trade, such paths are only theoretically important in the absence of a shorter or direct link. A firm, for example, will only resort to shipping its goods through an intermediary when a direct route is too costly or unavailable. Future research related to the effects of indirect links must pay greater attention to this conceptual issue.

I test the empirical predictions of the model by applying it to two distinct research areas within the study of IR. In Chapter 3, I recast the model to study the endogenous relationship between international trade and domestic rule of law. In Chapter 4, I conduct a set of separate empirical tests of the theoretical model, by exploring its applicability to explaining the relationship between international trade and domestic respect for human rights. In both cases, I argue that a state's type or attractiveness as a trade partner depends on its ability to provide a favorable business environment for internationally trading firms. Both rule of law and respect for domestic human rights are important factors for ensuring such a favorable environment. Rule of law decreases economic risks by ensuring property protections and contract enforcement, while respect for human rights enhances the quality of domestic human capital as well as allows for meeting the labor rights standards required by many *High Type* states.

Both sets of empirical tests provide some support for the theoretical model.

First, consistent with the first empirical prediction of the model, stated in Proposition 3, actors' individual characteristics or type have an important effect on network formation. Whether I measure type in terms of their respect for the rule of law or domestic human rights, I find that *High Types* are more likely to form direct network links than *Low Types*.

In contrast, the second prediction of the model, stated in Proposition 4, does not find empirical support in either set of tests. The number of direct links seems to have no effect on an actor's probability to play *High Type*. The empirical tests revealed that the number of direct trade relationships does not seem to affect either the level of rule of law or the respect for human rights. This lack of empirical support for the prediction highlights that network formation is largely driven by the selection effect (see Proposition 3): it is possible that, at least when it comes to the international trade network, states account for the potential pressures for domestic improvement when choosing their direct trade relationships. And as a result, states that are unwilling or unable to undergo domestic improvement choose to also forgo particular trade relationships that would require such improvement. The number of direct trade relationships, on its own, however, does not seem to have a "value-added" effect on domestic type.

Third, the empirical tests provide support for the prediction regarding the negative relationship between the number of indirect network ties and the incentive to play *High Type*, posited in Proposition 5. Namely, states with larger numbers of indirect trade relationships are both less likely to enforce domestic rule of law and respect for human rights. This result provides further evidence of a possible

selection effect, posited in the previous paragraph, as indirect trade relationships may offer the optimal solution for states that are unwilling or unable to improve their domestic type. By choosing to conduct their business transactions through the select few less politically demanding channels, such states effectively trade in the "benefit" of continuing with repressive and corrupt domestic policies in exchange for two types of cost. First, they pay the cost associated with the inefficiencies of moving goods through an intermediary vs. a direct channel. Second, by adopting a less attractive domestic type, *Low Type* states forgo the benefit of gaining direct trade relationships with "more politically demanding" or *High Type* trade partners by being unable to meet the necessary political or economic standards. More broadly, this finding also calls scholarly attention to the virtually unexplored effect of indirect network relationships. Future research, for example, could find a way to separate the correlational and causal effects of indirect relationships, determining whether the indirect links' produce a "value-added" effect or whether the effect found here are simply due to selection. Finally, the empirical tests provide some support for the prediction regarding the positive relationship between an actor's type choice and the average type choice of its direct network partners, stated in Proposition 6. This prediction, however, is only supported by the empirical tests related to to explaining domestic rule of law, which show that a state's rule of law is positively affected by the average rule of law of its direct trade partners. In concert with recent appeals by the proponents of SNA, this result highlights that importance of studying the effects of various types of network configurations.

More broadly, this dissertation makes a theoretical and methodological con-

tribution by emphasizing that particular network features cannot always be isolated from the rest of the network and the network itself should be modeled. Trade, alliance formation, IO memberships, and other behaviors by international actors are relational in nature: that is, rather than involving a single actor, they consist of simultaneous and strategic interactions among two or more actors. A cooperative or conflictual relationship between A and B does not affect just these two states; it also has an indirect effect on all other states with which either A or B have any kind of a relationship. For example, a dispute between Japan and China does not just decrease trade between these two countries. It also creates a potential for an increase in trade between Japan and other states, such as Germany, whose entrepreneurs take advantage of the resulting market opening (Li, Vashchilko and Vashchilko, 2012). Similarly, US-Iran tension goes beyond just the US and Iran, affecting both US and Iranian allies and foes, such as Great Britain or Russia. Yet most of the current scholarship models such strategic interactions as reduced form dyadic relationships, largely ignoring third parties and macro-processes (Oatley, 2011; Poast, 2010). The theoretical and empirical modeling approaches employed in this dissertation allows for accounting for this kind of strategic inter-dependence among multiple actors.

Relatedly, this dissertation emphasizes the non-random processes behind network formation, or the endogeneity between network formation and effect. Whether it is a network of professional associates, legislative co-sponsorships, campaign contributions, or international conflict, membership is associated with a particular selection and/or self-selection processes. This means that the task of evaluating the effects of such networks—e.g., their centrality, polarity, or shortest path measures—is in-

separable from modeling their formation—a step rarely undertaken by existing SNA research. In contrast, treating such network measures as exogenous imposes a rather strict and often unrealistic assumption, which may bias the resulting inferences.

This dissertation also brings together a number of existing disparate empirical findings—such as the positive effect of rule of law on trade, the relationship between trade network degree and domestic outcomes, and the spatial clustering of strong rule of law states—under the umbrella of a single unified theoretical model. It advances the literature on the relationship between international interactions and domestic-level behaviors by positing an original and yet unexplored causal mechanism—the effects of the direct and indirect links. Unlike the majority of the previous literature that either provides a functionalist account of network formation or simply takes the existing international organization as given, the theory developed here provides a strategic account of network formation being endogenous to network effect.

5.1 Future Research

This dissertation also outlines several directions for future research. First, states' network memberships extend beyond just the trade network. Future research should also go beyond modeling one network at a time to explore the effects of overlapping network memberships, as well as the possible interactions among these network effects. In addition, future research might model and explore network effects using other types of multi-player games. Not all networks, for example, function according to the rules of the public goods game with strategic complements. Finally, it is worth exploring network effects beyond those on monadic behavior (e.g., on dyadic

decisions, such as a dispute). Methodologically, the current statistical estimators are limited to modeling only binary network ties as the outcome variable, despite the non-binary nature of many political networks, including the trade network modeled here. Future work should focus on incorporating this feature of political networks. Finally, this dissertation highlights several future directions for data collection. International research would certainly benefit from data on indirect trade as well as other types of indirect transactions (e.g., capital flows).

Another direction for future research is a closer exploration of the relationship between a state's position within a network and its domestic outcomes. This dissertation's simplifying assumptions have significantly limited the variation in network positions whose effects can be explored (a center of a star vs. a spoke). Relaxing this simplifying assumption would allow for a more complex set of equilibria network configurations. Such an extended theoretical framework could, in turn, help explain such phenomena as the occurrence of similar domestic outcomes within geographically distant states. Network position, for example, could help explain why Russia and Brazil, and not their geographical neighbors, turned out to be the biggest victims of the 2008 US financial crisis.

5.1.1 The Future of Ukraine's Rule of Law

We can now use this dissertation's theoretical framework to draw implications for the opening example of Ukraine and its prospects for rule of law enforcement. The hope of liberal democracy brought by the 2004 Orange Revolution that brought has all but waned shortly in its aftermath. As a result of political prosecutions of

opposition leaders, lack of property rights protections, today's Ukraine finds itself on the threshold of joining a Customs Union with Russia, Belarus, and Kazakhstan rather than a lucrative free trade agreement with the European Union. The current prospects for rule of law enforcement in Ukraine, therefore, do not look very bright.

Pointing out a missing ingredient in the current standard economic development approaches to domestic change (Boix and Stokes, 2003; Burkhart and Lewis-Beck, 1994; Epstein et al., 2006), this dissertation highlights the importance of international incentives. The brief successes of the Orange Revolution quickly disintegrated as Ukraine failed to embed within a high rule of law international network, such as the EU. The EU's hesitation and prolonged negotiation, coupled with the strong objection on the part of Russia, precluded the necessary economic incentives to offset the costs of legal and institutional improvements, pushing Ukraine back towards its pre-2004 equilibrium (Kubicek, 2009).

Ukraine of today continues to horrify the domestic public, international observers, and international firms. The most prominent indicators of deteriorating rule of law are the political arrests of the main opposition leaders, Yulia Tymoshenko and Yuriy Lutsenko, following the 2010 presidential election. Both of these arrests have been condemned as illegal by the European Court of Human Rights (BBC, 2012, 2013*a*). The 2013 US Trade Representative's ranked Ukraine as a "Priority Foreign Country—the [...] rarely used, bottom-tier judgment" of the country in terms of the strength of its property rights protections. Highlighting the exacerbating role of "'rogue' groups with links to the Ukrainian government," the report notes that foreign firms have no legal recourse and calls for economic sanctions, directly or through

the World Trade Organization (BBC, 2013*b*).

Just as expected by the formal game, the adverse rule of law situation, in turn, further undermines Ukraine's prospects of EU membership. Despite the recent EU overtures, Ukraine is unable and unwilling to meet the EU's rule of law requirements, and hence denied the economic benefits associated with such a membership. Instead, Ukraine is forced to seek other economic options, such as the recently negotiated observer status with the "Eurasia Union," where it can join membership with other weak rule of law post-Soviet states of Russia, Belarus, and Kazakhstan.

So how can a country like Ukraine break out of the "vicious cycle" of poor rule of law? The theoretical framework adopted in this dissertation explains the failure of a number of solutions attempted by the international community, such as economic sanctions or humanitarian military intervention. Both of these options impose or demand a type change, without providing any compensation for the cost of such a change σ or even creating additional costs by destroying the infrastructure, and destabilizing the economy. Bilateral sanctions merely force the target to re-direct its trade flows through indirect trade links, hurting only the sender (Lektzian and Biglaiser, 2012; Tomz and Wright, 2010).

Multi-lateral sanctions also fail to induce a shift to *High Type* action, as in the game, states play *High Type* when the potential trade benefit from the network outweigh the cost σ. States choose to play *Low Type*, in other words, when the cost of playing *High Type* is greater than the potential greater benefits from becoming an more efficient and attractive network partner. By isolating a *Low Type* state from the rest of the network, multilateral economic sanctions decrease rather than enhance

its incentive to choose *High Type*. If the benefits of the pre-sanctions network were insufficient to outweigh the cost of domestic improvements, then even lower benefits from a sparser post-sanctions network will not do so either. A state with no direct links, in other words, will never play *High Type*, as it has no positive benefits from the network to outweigh the cost of doing so. A state with an infinite number of direct links, on the other hand, will have the greatest incentive to play *High Type*, but whether this incentive is sufficient is ultimately determined by the level of σ.

Similarly, humanitarian intervention fails to deal with the underlying reasons for *Low Type* action. Simply removing the regime does not change the existing equilibrium, as the new regime will face the exact same incentives and costs as the previous one. A forced regime change by itself neither creates additional network benefits (e.g., additional direct links) to outweigh the cost a domestic *High Type* action, nor decreases the cost of playing *High Type*. The model implies, however, that the success of a humanitarian intervention may be enhanced (but not guaranteed) when it is accompanied by administrative and reconstruction aid, as such aid may sufficiently decrease the cost of playing *High Type*.

Instead, the game provides two solutions. First, the equilibria are, in part, determined by the cost of trade relationships c, conceptualized as the costs of transportation, as well as the costs of negotiating tax treaties and acquiring the legal expertise necessitated with operating within a different state. As these costs decrease and all else holds constant, the network slowly moves towards a complete network equilibrium, in which each state has a direct connection to each other state, providing additional incentives for improving domestic type. Such improvement, however, im-

plies a long-term process, associated with over-time improvements in transportation, information technology, legal training and treaty negotiation.

Second, equilibria are separated based on the cost of choosing *High Type*, σ, which is conceptualized as the cost of building the administrative capacity to enforce domestic law, as well as the opportunity cost of foregoing corruption as a form of political side-payments to one's supporters. Lowering this cost may be made possible through a more active involvement of the international community, such as negotiating the "golden parachutes" with the current political elites (Mansfield and Snyder, 2007).

Finally, a third way to change the equilibrium involves changing the game or playing out-of-equilibrium strategy to induce out-of-equilibrium response. If there emerged a player, such as a state, an IO, or an NGO, whose payoff would incorporate changing the behavior of *Low Types* by providing them with side-payments that would either lower their transportation costs c or the cost of playing *High Type* σ. If the European Union, for example, was interested in causing change in Ukraine's rule of law, it could choose to pay the cost of admitting Ukraine into the Union without requiring domestic change, for the sake of providing Ukraine with additional economic incentives to improve its domestic practices.[2]

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[2]For similar solutions to collective action problems, see Conybeare (1980) and Hardin (1982).

APPENDIX A
STABLE NETWORKS AND THEIR SHAPES

A.1 Equilibria Concepts

In the game defined in this paper, the actors have to make two choices: the first choice concerns the links that they would like to make, and the second choice relates to actor's type (high or low) $D = \{0, 1\}$. Thus this game's equilibria consist of two parts, both of which have to be satisfied. In this section, I define the two parts that make up the equilibria and then combine them into a single equilibrium concept that will be used to solve the game in the rest of the paper.

A.1.1 Pairwise Nash Stability

Since the consent of both players is necessary to form a link, we are forced to move beyond Nash equilibrium and its standard refinements to consider coordinated actions on the part of coalitions (at least pairs) of players (Jackson and Wolinsky, 1996; Jackson, 2008). Jackson and Wolinsky (1996) address this by proposing the concept of *pairwise Nash stability*. Pairwise stability involves two rules about a network: (1) no agent can raise her payoff by deleting a link that she is directly involved in and (2) no two agents can both benefit (at least one strictly) by adding a link between themselves. More formally, the graph g is pairwise stable if:

1. $\forall ij \in g, u_i(g) \geq u_i(g - ij)$ and $u_j(g) \geq u_j(g - ij)$

   and

2. $\forall ij \notin g$, if $u_i(g) < u_i(g + ij)$ then $u_j(g) > u_j(g + ij)$.

We say that g is *defeated* by g' if $g' = g - ij$ and (1) is violated for ij, or if $g' = g + ij$ and (2) is violated for ij. Condition (2) embodies the assumption that, if i strictly prefers to form the link ij and j is just indifferent, then the link ij will be formed. A network is *pairwise Nash stable* if it is both Nash stable and pairwise stable.

A.1.2 Type Stability

The second part of the equilibria for this game concerns actors' binary choice of type $D = \{0, 1\}$. Here, I use the standard Nash equilibrium concept: an action profile $d_i^* \in D$ is a Nash equilibrium if no unilateral deviation in strategy by any single player is profitable for that player, that is:

$$d_i \in D_i, d_i \neq d_i^* : u_i\left(d_i^*, d_{-i}^*\right) \geq u_i\left(d_i, d_{-i}^*\right). \tag{A.1}$$

A.1.3 Strong Stability

In order to solve the game, I combined the equilibria concepts described above into a new equilibrium concept—*strong Nash stability.* A network is defined to be strongly Nash stable if it is both pairwise Nash stable and type stable.

A.2 Pairwise Stable Network Shapes

The shape of the equilibrium networks will depend on the relationship between link cost c, trade benefits δ, and trade partner attractiveness (operations' costs) α. In terms of domestic operations' costs, there will be three types of equilibria, separated by two threshold cost σ_1^* and σ_2^*, so that all states choose the low costs type ($d = 1$) when $\sigma < \sigma_1^*$, some states choose the low cost ($d = 1$), while others choose the high cost ($d = 0$) when $\sigma_1^* < \sigma < \sigma_2^*$, and all states play the high cost type ($d = 0$) when

$\sigma > \sigma_2^*$.

The model has a large number of equilibria. I begin with three types of *symmetrical* equilibria, and then extend the discussion to the relevant features of *asymmetrical* equilibria. The model is solved in two stages: first, I identify the most common *symmetrical* shapes that trade networks take on at different cost ranges, then I identify the Nash stable type choices for each possible network position. The first stage of the analysis reveals three common *symmetrical* shapes that trade networks can take on depending on the cost of links: *complete* networks or *cliques*, *stars*, and *circles* or *rings* (see Figure 2.3)[1].

A *complete* network or a *clique* is a network in which each player has a link to each other player: $g \in g^N$ is a complete network if $\forall i \in g, j \in g : ij = 1$. An empirical example of a complete trade network is a trade union, such as the European Union (EU) or the North Atlantic Free Trade Agreement (NAFTA).

A *star-shaped* or a *hub–and–spokes* network is a network in which all players are linked to one central player—*the hub*—and there are no other links: $g \in g^N$ is a star if $g \neq \emptyset$ and there exists $i \in N$ such that if $jk \in g$, then either $j = i$ or $k = i$. Individual i is the center of the star. Empirical examples of star-shaped networks include colonial trade networks with the colonizer as the center of the star and the colonies as the *vertices* or *spokes*(the British or French Empires and their colonies, etc.). The existing ballistic missile and nuclear proliferation networks provide another example of star-shaped networks, with North Korea and Pakistan as the hubs or the

[1]Of course, the existing trade networks rarely fall neatly into these three shape categories. Therefore, the three shapes identified here are best thought of as the ideal types.

central nodes (Montgomery, 2005, 171). Montgomery (2005, 171) finds no confirmation of any transactions between Iran, Libya, and North Korea—the spokes of the nuclear proliferation network—as of mid-2005.

Finally, a *circle* or a *ring* is a network in which each player has direct links with exactly two other players. Again, the most prominent example comes from nuclear proliferation literature, which commonly refers to the "rings" of non-nuclear developing countries with varying technical capabilities trade knowledge in attempts to each other's nuclear potential (Braun and Chyba, 2004).

Since making/maintaining direct links is costly, as the cost c increases, states form networks with fewer direct links. When the cost of forming/maintaining links is low, states form complete networks, as the cost increases, states forgo direct links for the indirect ones—as the indirect links allow for deriving the network benefits without paying the costs. Finally, when the cost of links is high, states choose to form networks with the minimal number of direct links, maximizing their reliance on the indirect links. This relationship between the cost of links and network shapes is formally stated in Proposition 1 (for proof, see p.141).

Proposition 1 (stated on p. 30, an extension of Jackson and Wolinsky (1996)). In the symmetric connections model:

i For $c+\sigma < \alpha_i\alpha_j\left(\delta - \alpha_{ijl}\delta^2\right)$, the unique pairwise stable network is the complete graph, g^N.

ii. For $\alpha_i\alpha_j\left(\delta - \alpha_{ijl}\delta^2\right) < c+\sigma < \alpha_i\alpha_j\delta$, a star encompassing all players is pairwise stable, but not necessarily the unique pairwise stable graph.

iii. For $\alpha_i\alpha_j\delta < c+\sigma$, any pairwise stable network which is non-empty is such that each player has at least two links.

Proof of Proposition 1. i. In this cost range, any players who are not directly connected will benefit from forming a link. Equation (3) can be rearranged in the following way, so that the costs of forming a link are on the left side and the benefits are on the right ride of the equation:

$$\alpha_i \sum_{j=1}^{n} \prod_{l\in P} \alpha_l\delta - \sigma - k_i c_{ij} = 0 \tag{A.2}$$

$$\sigma + k_i c_{ij} = \alpha_i \sum_{j=1}^{n} \prod_{l\in P} \alpha_l\delta \tag{A.3}$$

The sufficient condition for the actors to always prefer a direct link over an indirect one is that the difference between the benefit from a direct link and the benefit from an indirect link is at least as high as the cost of a direct link. Based on equation (4), this difference can be expressed as:

$$\alpha_i\alpha_j\delta - \alpha_i\alpha_j\alpha_{ijl}\delta^2, \tag{A.4}$$

where α_{ijl} represents the domestic type (high or low cost) of the intermediate link between i and j. Equation (5) simplifies in the following way:

$$\alpha_i\alpha_j\delta - \alpha_i\alpha_j\alpha_{ijl}\delta^2 = \alpha_i\alpha_j\delta\left(1-\alpha_{ijl}\delta\right). \tag{A.5}$$

ii. In this cost range, the benefit of turning indirect links into direct ones do not justify the costs. Each connected player will have at least one direct link and derive additional benefit from indirect links without paying the costs of turning them into direct ones.

iii. In this range, pairwise stability precludes "loose ends", so every connected player will have at least two links.

□

A.2.1 The Center of Star-Shaped Networks

We can obtain an interesting extension of Proposition 1.iii by examining the conditions under which the star network's center takes the costly action $d = 1$ to improve its type. It can be shown algebraically that states will form a star network with a low cost state at the center when $c < \alpha_i \alpha_j (\delta - \delta^2)$, while the necessary condition for a network with a high cost state at the center is $c < \alpha_i \alpha_j \alpha_l (\delta - \delta^2)$ or simply $c < \alpha_i \alpha_j \alpha (\delta - \delta^2)$, since $\alpha_l = \alpha$ for this case. Since $\alpha < 1$, it follows that $\alpha_i \alpha_j (\delta - \delta^2) > \alpha_i \alpha_j \alpha (\delta - \delta^2)$. This means that when $\alpha_i \alpha_j \alpha (\delta - \delta^2) < c < \alpha_i \alpha_j (\delta - \delta^2)$, we will observe star networks with low cost centers, but not star networks with high cost centers. This can be restated as Lemma A.1.

Lemma

Lemma A.1. *When $\alpha_i \alpha_j \alpha (\delta - \delta^2) < c < \alpha_i \alpha_j (\delta - \delta^2)$, we will observe star networks with low cost centers, but not star networks with high cost centers.*

A.2.2 Complete Networks

Lemma A.2. *i. A necessary condition for an equilibrium consisting of a complete network of low cost states is $\sigma < (n-1)(1-\alpha)\delta$.*

ii. A necessary condition for a complete network of high cost states equilibrium is $\sigma > (n-1)(1-\alpha)\delta$.

iii. When

$$(n-1)(1-\alpha)\delta < \sigma < \delta\left(n-k-1-\alpha^2(k-1)\right) < (n-1)(1-\alpha)\delta,$$

there may exist a complete network equilibrium consisting of k high cost states and $n-k$ low cost states.

Proof of Lemma A.2.

i. In a complete networks of low cost types, no state can benefit by unilaterally playing $d=0$ when:

$$U_i(1) - U_i(0) > 0; \tag{A.6}$$

$$U_i(1) = (n-1)\delta - (n-1)c - \sigma; \tag{A.7}$$

$$U_i(0) = (n-1)\alpha\delta - (n-1)c. \tag{A.8}$$

Substituting (A.7) and (A.8) into the left-hand side of (A.6), we obtain:

$$U_i(1) - U_i(0) = (n-1)(1-\alpha)\delta - \sigma.$$

Equation (A.6) holds when:

$$(n-1)(1-\alpha)\delta - \sigma > 0$$

or

$$\sigma < (n-1)(1-\alpha)\delta.$$

ii. In a complete network of high cost states, no state can improve its utility by unilaterally deviating to playing $d=1$ when

$$U_i(d=1) - U_i(d=0) < 0; \tag{A.9}$$

$$U_i\left(d=1\right)=\left(n-1\right)\alpha\delta-\left(n-1\right)c-\sigma; \tag{A.10}$$

$$U_i\left(d=0\right)=\left(n-1\right)\alpha^{\delta}-\left(n-1\right)c. \tag{A.11}$$

Substituting (A.10) and (A.11) into the left-hand side of (A.10), we obtain:

$$U_i\left(d=1\right)-U_i\left(d=0\right)=\left(n-1\right)\left(1-\alpha\right)\alpha\delta-\sigma.$$

Equation (A.9) holds when:

$$\left(n-1\right)\left(1-\alpha\right)\alpha\delta-\sigma<0$$

or

$$\sigma>\left(n-1\right)\left(1-\alpha\right)\alpha\delta.$$

iii. The threshold value of σ in i. is always strictly greater than that in ii., which means that there may be a third equilibrium in which k states play $d=0$ and $n-k$ states play $d=1$. Such an equilibrium is possible when:

$$\left(n-1\right)\left(1-\alpha\right)\alpha\delta<\sigma<\left(n-1\right)\left(1-\alpha\right)\delta. \tag{A.12}$$

We can also show that in such an equilibrium, k states will play $d=0$ and $n-k$ will play $d=1$, as long as for $n-k$ players:

$$U\left(d=1\right)-U\left(d=0\right)>0; \tag{A.13}$$

$$U\left(d=1\right)=\left(n-1\right)\left(n-k-1\right)\delta+k\alpha\delta-\left(n-1\right)c-\sigma; \tag{A.14}$$

$$U\left(d=0\right)=\left(n-1\right)\left(n-k\right)\alpha\delta+\left(k-1\right)\alpha^2\delta-\left(n-1\right)c. \tag{A.15}$$

Substituting (A.14) and (A.15) into the lefthand side of (A.13), we obtain:

$$\left(n-1\right)\left(n-k-1\right)\delta+k\alpha\delta-\left(n-1\right)\left(n-k\right)\alpha\delta-\left(k-1\right)\alpha^2\delta-\sigma>0, \tag{A.16}$$

which simplifies to:

$$\sigma < \delta \left(n - k - 1 - \alpha^2 \left(k - 1 \right) \right). \tag{A.17}$$

□

A.2.3 Star Networks

Lemma A.3 (Center of a Star)**.** *The center of a star-shaped network i_c plays $d = 1$, when $\sigma < (1 - \alpha)(n - 1)\alpha\delta$, and $d = 0$ otherwise.*

Proof of Lemma A.3. The center of a star-shaped network i_c plays $d = 1$ when:

$$U_{i_c}(1) - U_{i_c}(0) > 0. \tag{A.18}$$

$$U_{i_c}(1) = k_d\delta + k_a\delta - (n - 1)c - \sigma; \tag{A.19}$$

$$U_{i_c}(0) = k_d\alpha\delta + k_a\alpha^2\delta - (n - 1)c. \tag{A.20}$$

Substituting (A.19) and (A.20) into the left-hand side of (A.18), we obtain:

$$\begin{aligned} U_{i_c}(1) - U_{i_c}(0) &= k_d\delta + k_a\delta - (n - 1)c - \sigma - k_d\alpha\delta \\ &\quad - k_a\alpha^2\delta + (n - 1)c = (1 - \alpha)(k_d\delta + k_a\alpha\delta) - \sigma. \end{aligned}$$

Equation (A.18) holds when:

$$(1 - \alpha)(k_d\delta + k_a\alpha\delta) - \sigma > 0$$

or

$$\sigma < (1 - \alpha)(k_d\delta + k_a\alpha\delta).$$

□

Lemma A.4 (Spokes of a Star)**.** *When the link formation cost c allows for star-shaped equilibria:*

i. If the center of a star plays $d = 1$, the spokes play $d = 1$ when $\sigma < (1-\alpha)\left(\delta + \delta^2 (n-2)\right)$, and $d = 0$ otherwise.

ii. Stars with High Type spokes will never have a Low Type center.

Proof of Lemma A.4.

i. If the center of a star playes $d = 1$, the spokes of a star play $d = 1$ when:

$$U_{i_v}(1) - U_{i_v}(0) > 0. \tag{A.21}$$

$$U_{i_v}(1) = \delta + (n-2)\delta^2 - c - \sigma. \tag{A.22}$$

$$U_{i_v}(0) = \alpha\delta + (n-2)\alpha\delta^2 - c. \tag{A.23}$$

Substituting (A.22) and (A.23) into the left-hand side of (A.21), we obtain:

$$U_{i_v}(1) - U_{i_v}(0) = \delta + (n-2)\delta^2 - c - \sigma - \alpha\delta$$
$$- (n-2)\alpha\delta^2 + c = (1-\alpha)\left(\delta + \delta^2 (n-2)\right) - \sigma.$$

Equation (A.21) holds when:

$$(1-\alpha)\left(\delta + \delta^2 (n-2)\right) - \sigma > 0$$

or

$$\sigma < (1-\alpha)\left(\delta + \delta^2 (n-2)\right).$$

ii. If the center of a star plays $d = 0$, "vertices" of a star play $d = 1$ when:

$$U_{i_v}(1) - U_{i_v}(0) > 0. \tag{A.24}$$

$$U_{i_v}(1) = \alpha\delta + (n-2)\,\alpha\delta^2 - c - \sigma; \tag{A.25}$$

$$U_{i_v}(0) = \alpha^2\delta + (n-2)\,\alpha^2\delta^2 - c. \tag{A.26}$$

Substituting (A.25) and (A.26) into the left-hand side of (A.24), we obtain:

$$U_{i_v}(1) - U_{i_v}(0) = (1-\alpha)\left(\alpha\delta + \alpha\delta^2(n-2)\right) - \sigma.$$

Equation (A.24) then holds when:

$$(1-\alpha)\left(\alpha\delta + \alpha\delta^2(n-2)\right) - \sigma > 0$$

or

$$\sigma < (1-\alpha)\left(\alpha\delta + \alpha\delta^2(n-2)\right).$$

Then, by lemma A.3, we should observe a star with an high costs center and low costs spokes when:

$$(1-\alpha)(n-1)\,\alpha\delta < \sigma < (1-\alpha)\left(\alpha\delta + \alpha\delta^2(n-2)\right). \tag{A.27}$$

Inequality (A.27), however, can only hold iff:

$$(1-\alpha)(n-1)\,\alpha\delta < (1-\alpha)\left(\alpha\delta + \alpha\delta^2(n-2)\right). \tag{A.28}$$

Suppose (A.28) is true, then

$$(1-\alpha)(n-1)\,\alpha\delta - (1-\alpha)\left(\alpha\delta + \alpha\delta^2(n-2)\right) < 0.$$

By simplifying, we obtain:

$$\alpha\left(1-\alpha\right)\left(\delta-\delta^{2}\right)\left(n-2\right)<0 \tag{A.29}$$

This is a contradiction, because $\alpha > 0$, $(1-\alpha) > 0$, $(\delta-\delta^2) > 0$, and $(n-2) > 0$ by definition, which means that (A.29) must be positive.

□

Lemma A.5 (Homogeneous Star Networks)**.**

i. Star networks consisting of low type states only are possible when:

$$\sigma < \left(1-\alpha\right)\left(\delta+\alpha\delta^{2}\left(n-2\right)\right).$$

ii. Star networks consisting of high costs states are possible when $\sigma > \left(1-\alpha\right)\left(n-1\right)\alpha\delta$.

Proof of Lemma A.5.

i. As shown in Lemma A.3, the center of a star will play $d = 1$ when

$$\sigma_c < \left(1-\alpha\right)\left(n-1\right)\delta, \tag{A.30}$$

and the spokes of a star will play $d = 1$, when

$$\sigma_v < \left(1-\alpha\right)\left(\delta+\alpha\delta^{2}\left(n-2\right)\right). \tag{A.31}$$

One can see, however, that for all possible parameter values, $\sigma_c > \sigma_v$, which means that (A.30) is always satisfied when (A.31) is.

We can check this by subtracting (A.31) from (A.30).

$$\sigma_c - \sigma_v = \left(1-\alpha\right)\left(n-1\right)\delta - \left(1-\alpha\right)\left(\delta+\alpha\delta^{2}\left(n-2\right)\right)$$

By simplifying, we obtain:

$$\sigma_c - \sigma_v = \delta\,(1-\alpha)\,(n-2)\,(1-\alpha\delta)\,.$$

Note that all of the terms in the above equation are positive: $\delta > 0$, $(1-\alpha) > 0$, $(n-2) > 0$, and $(1-\alpha\delta) > 0$.

This shows that (A.31) is the necessary condition for formation of stars consisting of low cost states.

ii. Analogously, a star consisting of high cost states is possible when neither its center no its spokes can gain by playing $d = 1$ or when

$$\sigma_c > (1-\alpha)\,(n-1)\,\alpha\delta \tag{A.32}$$

and

$$\sigma_v > (1-\alpha)\left(\alpha\delta + \alpha\delta^2\,(n-2)\right). \tag{A.33}$$

We can show that $\sigma_c > \sigma_v$, which means that (A.33) is always satisfied when (A.32) is:

$$\sigma_c - \sigma_v = (1-\alpha)\,(n-1)\,\alpha\delta - (1-\alpha)\left(\alpha\delta + \alpha\delta^2\,(n-2)\right)$$

By simplifying, we obtain:

$$\sigma_c - \sigma_v = \alpha\,(1-\alpha)\left(\delta - \delta^2\right)(n-2)\,. \tag{A.34}$$

Since by definition $\alpha > 0$, $(1-\alpha) > 0$, $(\delta - \delta^2) > 0$, and $(n-2) > 0$, $\sigma_c - \sigma_v > 0$.

□

A.2.4 Circles

Lemma A.6 (Circle Networks.)**.**

i. When n is odd, all states in a circle network will play $d = 1$ when

$$\sigma < 2(1-\alpha)\left(\frac{\delta - \delta^{\frac{n-1}{2}}}{1-\delta}\right), \tag{A.35}$$

and $d = 0$ otherwise.

ii. When n is even, state i that is a part if a circle network plays $d = 1$ when $\sigma < 2(1-\alpha)\left(\frac{\delta - \delta^{\frac{n-2}{2}}}{1-\delta} + \frac{1}{2}\delta^{\frac{n}{2}}\right)$, and $d = 0$ otherwise.

Proof of Lemma A.6.

i. When n is odd, state i that is a part of a circle network plays $d = 1$ when:

$$U_i(d=1) - U_i(d=0) > 0. \tag{A.36}$$

Let us first derive state i's utility from playing $d = 1$ in circle networks, assuming that all other states play $d = 1$. Note that this utility is slightly different for circles made up of odd and even numbers of states n. For an odd number of states, the utility of playing $d = 1$ in a circle network is:

$$U_i(d=1) = 2\delta + 2\delta^2 + ... + 2\delta^{\frac{n-1}{2}} - 2c - \sigma = \sum_{k=1}^{\frac{n-1}{2}} \delta^k - 2c - \sigma.$$

This function can be transformed in the following way using the *geometric series* formula:[b]

$$U_i(d=1) = 2\left(\frac{1}{1-\delta} - \frac{\delta^{\frac{n-1}{2}}}{1-\delta} - 1\right) - 2c - \sigma.$$

[b] According to the geometric series formula, $\sum_{n=0}^{\infty} x^n = \frac{1}{1-x}$, for $|x| < 1$.

This simplifies to

$$U_i\left(d=1\right)=2\left(\frac{\delta-\delta^{\frac{n-1}{2}}}{1-\delta}\right)-2c-\sigma. \tag{A.37}$$

Analogously, we can show that the utility of playing $d=0$ (assuming all other players play $d=1$) is defined as:

$$U_i\left(d=0\right)=2\alpha\left(\frac{1}{1-\delta}-\frac{\delta^{\frac{n-1}{2}}}{1-\delta}-1\right)-2c. \tag{A.38}$$

Substituting (A.37) and (A.38) into the left-hand side of (A.36), we obtain:

$$U_i\left(d=1\right)-U_i\left(d=0\right)=2\left(\frac{1}{1-\delta}-\frac{\delta^{\frac{n-1}{2}}}{1-\delta}-1\right)-2c-2\alpha\left(\frac{1}{1-\delta}-\frac{\delta^{\frac{n-1}{2}}}{1-\delta}-1\right)+2c-$$

This simplifies to

$$U_i\left(d=1\right)-U_i\left(d=0\right)=2\left(1-\alpha\right)\left(\frac{1}{1-\delta}-\frac{\delta^{\frac{n-1}{2}}}{1-\delta}-1\right)-\sigma. \tag{A.39}$$

Equation (A.36) then holds when:

$$2\left(1-\alpha\right)\left(\frac{1}{1-\delta}-\frac{\delta^{\frac{n-1}{2}}}{1-\delta}-1\right)\sigma>0$$

or

$$\sigma<2\left(1-\alpha\right)\left(\frac{1}{1-\delta}-\frac{\delta^{\frac{n-1}{2}}}{1-\delta}-1\right).$$

ii. When n is even, if all other states play $d=1$, state i plays $d=1$ in a circle network when:

$$U_i\left(d=1\right)-U_i\left(d=0\right)>0. \tag{A.40}$$

$$U_i\left(d=1\right)=2\left(\frac{\delta-\delta^{\frac{n-2}{2}}}{1-\delta}+\frac{1}{2}\delta^{\frac{n}{2}}\right)-2c-\sigma; \tag{A.41}$$

$$U_i\left(d=0\right)=2\alpha\left(\frac{\delta-\delta^{\frac{n-2}{2}}}{1-\delta}+\frac{1}{2}\delta^{\frac{n}{2}}\right)-2c. \tag{A.42}$$

Substituting (A.41) and (A.42) into the left-hand side of (A.40), we obtain:

$$U_i\left(d=1\right)-U_i\left(d=0\right)=2\left(\frac{\delta-\delta^{\frac{n-2}{2}}}{1-\delta}+\frac{1}{2}\delta^{\frac{n}{2}}\right)-2\alpha\left(\frac{\delta-\delta^{\frac{n-2}{2}}}{1-\delta}+\frac{1}{2}\delta^{\frac{n}{2}}\right)-\sigma.$$

Equation (A.40) then holds when:

$$2\left(\frac{\delta-\delta^{\frac{n-2}{2}}}{1-\delta}+\frac{1}{2}\delta^{\frac{n}{2}}\right)-2\alpha\left(\frac{\delta-\delta^{\frac{n-2}{2}}}{1-\delta}+\frac{1}{2}\delta^{\frac{n}{2}}\right)-\sigma>0$$

or

$$\sigma<2\left(1-\alpha\right)\left(\frac{\delta-\delta^{\frac{n-2}{2}}}{1-\delta}+\frac{1}{2}\delta^{\frac{n}{2}}\right).$$

□

Table A.1: Symmetrical Strong Nash Stability Equilibria at Varying Costs.

Link Cost c	Switching to Low Costs Type Price σ	Network Description
	Complete Networks	
$c < \alpha^2\delta - \alpha^3\delta^2$	$\sigma > (1-\alpha)(n-1)\alpha\delta$ (Lemma A.2.ii)	Complete network of high cost states.
$c < \alpha^2\delta - \alpha^3\delta^2 < \delta - \delta^2$ or $c < \delta - \delta^2 < \alpha^2\delta - \alpha^3\delta^2$	$(1-\alpha)(n-1)\alpha\delta < \sigma < \delta\left(n-k-1-\alpha^2(k-1)\right) < (n-1)(1-\alpha)\delta$ (Lemma A.2.iii)	Complete network of k high cost states and $n-k$ low cost states.
$c < \delta - \delta^2$	$\sigma < (1-\alpha)(n-1)\delta$ (Lemma A.2.i)	Complete network of low cost states.
	Star-Shaped Networks	
$\alpha^2\delta - \alpha^3\delta^2 < c < \alpha^2\delta$	$\sigma > (1-\alpha)(n-1)\alpha\delta$ (Lemmas A.3–A.4, A.5.ii)	A star consisting of high cost states.
$\alpha^2\delta - \alpha^2\delta^2 < c < \alpha\delta$	$(1-\alpha)\left(\delta + \alpha\delta^2(n-2)\right) < \sigma < (1-\alpha)(n-1)\alpha\delta$ (Lemmas A.3–A.4)	A star with a low cost state at the center and high cost spokes.
$\delta - \delta^2 < c < \delta$	$\sigma < (1-\alpha)\left(\delta + \delta^2(n-2)\right)$ (Lemma A.5.i)	A star consisting of low cost states.
	Circle Networks	
For odd n, $n > 4$: $\alpha^2\delta - \alpha^3\delta^2 < c < \frac{\alpha\left(\alpha\delta - (\alpha\delta)^{\frac{n-1}{2}}\right)}{1-\alpha\delta}$. For even n, $n > 4$: $\alpha^2\delta - \alpha^3\delta^2 < c < \frac{\alpha\left(\alpha\delta - (\alpha\delta)^{\frac{n-2}{2}}\right)}{1-\alpha\delta} + \frac{1}{2}\alpha^{\frac{n}{2}+2}\delta^{\frac{n}{2}}$ for even n.	For odd n and $n > 4$: $\sigma > 2(1-\alpha)\left(\frac{\delta - \delta^{\frac{n-1}{2}}}{1-\delta}\right)$; for even n and $n > 3$: $\sigma > 2(1-\alpha)\left(\frac{\delta - \delta^{\frac{n-2}{2}}}{1-\delta} + \frac{1}{2}\delta^{\frac{n}{2}}\right)$. (Lemma A.6)	Circle network of high cost states.
$\delta - \delta^2 < c < \left(\frac{\delta - \delta^{\frac{n-1}{2}}}{1-\delta}\right)$ for odd n, or $\delta - \delta^2 < c < \left(\frac{\delta - \delta^{\frac{n-2}{2}}}{1-\delta}\right) + \frac{1}{2}\delta^{\frac{n}{2}}$ for even n.	When n is odd and $n > 4$: $\sigma < 2(1-\alpha)\left(\frac{\delta - \delta^{\frac{n-1}{2}}}{1-\delta}\right)$; when n is even and $n > 3$: $\sigma < 2(1-\alpha)\left(\frac{\delta - \delta^{\frac{n-2}{2}}}{1-\delta} + \frac{1}{2}\delta^{\frac{n}{2}}\right)$. (Lemma A.6)	Circle network of low cost states.

APPENDIX B
PROOFS OF ADDITIONAL PROPOSITIONS

Proposition 3 (stated on p. 33). *Within the range of link formation cost* $c_a^* < c < c_b^*$*, High Type states have weakly higher direct degree.*

Proof of Proposition 3. Proposition 3 can be proven using a proof by contradiction. Suppose there is a pairwise stable network that consists of a *High Type* state H and a *Low Type* state L, so that L has a higher direct degree than H. States H and L will then either be unconnected (Figure B.1) or connected (Figure B.2).

Scenario 1. H and L are not connected (Figure B.1):

For L to have a greater direct degree means that L has at least one direct link. This implies that the cost of link formation c must be at least less than $\alpha\delta$ (if L's direct link is a state of *High Type*). If $c < \alpha\delta$, however, then H and L can both increase their utilities by forming a link between themselves, hence this network is not pairwise stable—a contradiction.

Scenario 2. H and L are connected (Figure B.2):

Let us check the type stability part of the equilibrium. State L will not deviate from its type choice $d = 0$ as long as its utility from $d = 0$ is greater than its utility from $d = 1$ or

$$\sigma > \delta (1 - \alpha) (n - 1) . \tag{B.1}$$

Analogously, H will not deviate from its regime decision $d = 1$ as long as:

$$\sigma < (1 - \alpha) \left(\alpha\delta + \alpha\delta^2 (n - 2) \right) . \tag{B.2}$$

Hence, this network is regime stable as long as there exists a range of σ, such that:

$$\delta(1-\alpha)(n-1) < \sigma < (1-\alpha)\left(\alpha\delta + \alpha\delta^2(n-2)\right). \tag{B.3}$$

Such a range exists if:

$$\delta(1-\alpha)(n-1) < (1-\alpha)\left(\alpha\delta + \alpha\delta^2(n-2)\right). \tag{B.4}$$

Dividing through by $\delta(1-\alpha)$, we obtain:

$$n-1 < \alpha + \alpha\delta(n-2), \tag{B.5}$$

or

$$\alpha > \frac{(n-2)+1}{\delta(n-2)+1}. \tag{B.6}$$

Since by assumption $0 < \delta < 1$, and $n > 2$ (since the network in Scenario 2 must have at least 3 actors), the numerator of the left-hand side of Inequality (B.6) is always greater than the denominator, which leads their ratio to be greater than 1. However, $\alpha < 1$, by assumption, which means that Inequality (B.6) will never hold. Hence, there is a contradiction. □

Proposition 4 (stated on p. 34). *Within the range of link formation cost $c_a^* < c < c_b^*$, states with greater direct degree have a weakly greater incentive to become High Type than states with lower direct degree.*

Proof of Proposition 4. I prove Proposition 4 using a proof by contradiction. Suppose that there is an equilibrium in which a state with more direct links plays a lower type action than a state with a lower direct degree. In such an equilibrium, the two states

of interest would either be unconnected to each other (Scenario 1), or connected, directly or indirectly (Scenario 2).

Scenario 1: If the two states are not directly connected, then the resulting network would look like the one presented in Figure B.1. Since L has indirect links, the cost range c must satisfy $c < \alpha\delta$ if L's direct links are to *High Types* or $c < \alpha^2\delta$ if L's direct links are to *Low Types*. Within either of these cost ranges, however, H and L would always improve their utility by forming a link. Such a network, therefore, cannot be an equilibrium.

In order for such a network to be an equilibrium, the following two conditions have to hold: (1) the link cost c has to satisfy at least $\delta - \alpha\delta^2 < c < \alpha\delta$ (assuming the other states play $d = 1$), (2) the cost of playing $d = 1$, σ, must satisfy $\sigma > (1-\alpha)(n-1)\alpha\delta$ to keep L from deviating to H, and (3) the cost of playing $d = 1$, σ, must satisfy $\sigma < \alpha(1-\alpha)(\delta + \delta^2(n-2))$ to keep H from deviating to L. Combining (2) and (3), we obtain:

$$(1-\alpha)(n-1)\alpha\delta < \sigma < \alpha(1-\alpha)\left(\delta + \delta^2(n-2)\right). \tag{B.7}$$

Let us divide Equation B.7 through by $\alpha(1-\alpha)$ to obtain:

$$(n-1)\delta < \frac{\sigma}{\alpha(1-\alpha)} < \delta + \delta^2(n-2), \text{or} \tag{B.8}$$

$$\frac{\sigma}{\alpha(1-\alpha)} \in \left((n-1)\delta; \delta + \delta^2(n-2)\right). \tag{B.9}$$

For this range to exist, however, the following must hold:

$$(n-1)\,\delta < \delta + \delta^2\,(n-2)\,. \tag{B.10}$$

Inequality B.10 can be re-written as:

$$(2-n)\left(\delta - \delta^2\right) > 0. \tag{B.11}$$

We know, however, that $\delta - \delta^2 > 0$ by definition ($0 < \delta < 1$), and $2 - n < 0$ by assumption that L has a higher direct degree than H, which implies the existence of other actors $n > 2$. Hence, there is a contradiction.

One may use an analogous proof for the case where the rest of the actors play $d = 0$ or where H and L are connected indirectly.

□

Proposition 5 (stated on p. 35). Within the range of link formation cost $c_a^* < c < c_b^*$ and $c < \alpha\delta - \alpha\delta^3$ (star-shaped networks with the maximum shortest path of two), states with greater indirect degree have a weakly lower incentive to become High Type than states with lower indirect degree.[a]

Proof of Proposition 5. Proposition 5 can be proven by contradiction. Suppose there exists an equilibrium star-shaped network with the maximum shortest path of two in which a state with more indirect links H has a greater incentive to play *High*

[a]Note that the relationship between the number of indirect links and the incentives to choose *High Type* in reversed under other link cost c conditions. Other link cost C conditions, however, are beyond the substantive interest of this paper and are not explored here.

Type than a state with fewer indirect links L. Such an network is depicted in Figure B.3, and cannot be an equilibrium network, as shown by Lemma A.4. This is a contradiction.

□

Proposition 6 (stated on p. 38). Actors' incentives to choose *High Type* weakly increase with the number of their direct trade partners that choose *High Type*.

Proof of Proposition 6. Proposition 6 can be proven using a direct proof. A direct link to a *High Type* state has a utility of $U_h\alpha_i\delta - c$, while a direct link to a *Low Type* state is $U_l = \alpha_i\alpha_l\delta - c$, where α_i is the discounting factor associated with state i's own type, whereas α_l represents the discounting factor associated with links to *Low Type* states (remember that links to *High Type* states are not discounted or $\alpha_h = 1$). Since $\alpha_l < 1$, $U_h > U_l$, which means that a link to *High Types* make a larger contribution to state i's incentive to choose *High Type*. □

Figure B.1: Scenario 1. The Two Nodes are Not Connected

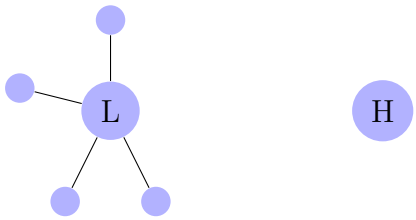


Figure B.2: Scenario 2. The Two Nodes are Connected

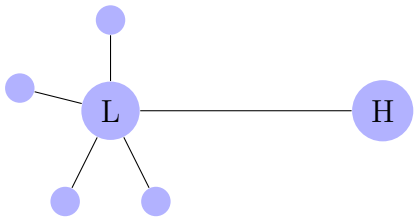
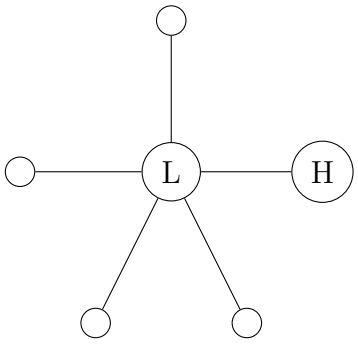


Figure B.3: A Star Network



REFERENCES

Acemoglu, Daron and James A. Robinson. 2000. "Democratization or repression?" *European Economic Review* 44:683–693.

Acemoglu, Daron and James A. Robinson. 2006. *Economic Origins of Dictatorship and Democracy*. New York: Cambridge University Press.

Acemoglu, Daron, Simon Johnson and James A. Robinson. 2001. "Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review* 91(5):1369–1401.

Acemoglu, Robinson and James A. Robinson. 2012. *Why Nations Fail: The Origins of Power, Profit, and Poverty*. New York: Crown Business.

Ahlquist, John S. 2006. "Economic Policy, Institutions, and Capital Flows: Portfolio and Direct Investment Flows in Developing Countries." *International Studies Quarterly* 50(3):681–704.

Aizenman, Joshua and Ilan Noy. 2006. "FDI and trade—Two-way linkages?" *The Quarterly Review of Economics and Finance* 46(3):317–337.

Albuquerque, Rui. 2003. "The Composition of International Capital Flows: Risk Sharing through Foreign Direct Investment." *Journal of International Economics* 61(2):353–383.

Amnesty International. 2012. "Amnesty International Report: The State of the World's Human Rights.".

Antràs, P. and A. Costinot. 2011. "Intermediated Trade." *The Quarterly Journal of Economics* 126(3):1319–1374.

Archer, Margaret Scotford. 1988. *Culture and Agency: The Place of Culture in Social Theory*. Cambridge University Press.

Austin, John and Sarah Austin. 1861. *The Province of Jurisprudence Determined*. Vol. 2 J. Murray.

Axelrod, Robert. 1984. *The Evolution of Cooperation*. New York: Basic Books.

Barbieri, Katherine, Omar Keshk and Brian Pollins. 2008. *Correlates of War Project Trade Data Set Codebook, Version 2.0*. Online: http://correlatesofwar.org.

Barbieri, Katherine, Omar M.G. Keshk and Brian M. Pollins. 2009. "Trading Data: Evaluating our Assumptions and Coding Rules." *Conflict Management and Peace Science* 26(5):471–491.

Bayer, Resat and Matthew C. Rupert. 2004. "Effects of Civil Wars on International Trade, 1950-92." *Journal of Peace Research* 41(6):699–713.

BBC. 2012. "Ukraine Lutsenko Arrest 'Violated Rights', Says Court.". July 3.

BBC. 2013*a*. "Ukraine Violated Tymoshenko's Rights—European Court.". April 30.

BBC. 2013*b*. "Ukraine 'Worst Abuser of Intellectual Property Rights'.". May 1.

Beck, Nathaniel, Kristian Skrede Gleditsch and Kyle Beardsley. 2006. "Space Is More than Geography: Using Spatial Econometrics in the Study of Political Economy." *International Studies Quarterly* 50(1):27–44.

Bennett, D. Scott and Allan Stam. 2000. "Research Design and Estimator Choices in the Analysis of Interstate Dyads: When Decisions Matter." *Journal of Conflict Resolution* 44(5):653–685.

Bernard, Andrew B. and J Bradford Jensen. 1999. "Exceptional Exporter Performance: Cause, Effect, or Both?" *Journal of International Economics* 47(1):1–25.

Bernard, Andrew B., J. Bradford Jensen, Stephen J. Redding and Peter K. Schott. 2007. Firms in International Trade. Working Paper 13054 National Bureau of Economic Research.

Bhattacharya1, K., G. Mukherjee1, J. Saramki, K. Kaski and S. S. Manna1. 2008. "The International Trade Network: Weighted Network Analysis and Modeling." *Journal of Statistical Mechanics: Theory and Experiment* pp. 1–10.

Blanton, Shannon Lindsey and Robert G Blanton. 2007. "What Attracts Foreign Investors? An Examination of Human Rights and Foreign Direct Investment." *Journal of Politics* 69(1):143–155.

Bliss, Harry and Bruce Russett. 1998. "Democratic Trading Partners: the Liberal Connection, 1962–1989." *Journal of Politics* 60(4):1126–1147.

Boix, Carles and Susan C. Stokes. 2003. "Endogenous Democratization." *World Politics* 55:517–549.

Borensztein, E., J. De Gregorio and J-W. Lee. 1998. "How Does Foreign Direct Investment Affect Economic Growth?" *Journal of International Economics* 45(1):115 – 135.

Borga, Maria and William J. Zeile. 2004. "International Fragmentation of Production and Intrafirm Trade of U.S. Multinational Companies." *Bureau of Economic Analysis Working vPaper WP2004-02* .

Braun, Chaim and Christopher F. Chyba. 2004. "Proliferation Rings: New Challenges to the Nuclear Nonproliferation Regime." *International Security* 29(2):5–49.

Burkhart, Ross E. and Michael S. Lewis-Beck. 1994. "Comparative Democracy: the Economic Development Thesis." *American Political Science Review* 88(4):903–910.

Büthe, Tim and Helen V Milner. 2008. "The Politics of Foreign Direct Investment into Developing Countries: Increasing FDI through International Trade Agreements?" *American Journal of Political Science* 52(4):741–762.

Cardoso, Fernando H. and Enzo Faletto. 1979. *Dependency and Development in Latin America (Dependencia Y Desarrollo en América Latina, Engl.)*. University of California Press.

Carlsnaes, Walter. 1992. "The Agency-Structure Problem in Foreign Policy Analysis." *International Studies Quarterly* 36(3):245–270.

Chayes, Abram and Antonia Handler Chayes. 1993. "On Compliance." *International Organization* 47(02):175–205.

Chyzh, Olga. 2011. "When It Pays to Be Nice: What International Organizations Promote Democratization." *Presented at the 2011 Society for Political Methodology Summer Meeting* .

Cingranelli, David L. and David L. Richards. 2010. "The Cingranelli-Richards (CIRI) Human Rights Dataset.". 11.12.09.
URL: *http://www.humanrightsdata.org*

Clark, Don. 2013. "Samsungs Technology Choices Good for Intel, AMD." *Wall Street Journal* . June, 21.

Clist, Paul and Oliver Morrissey. 2011. "Aid and Tax Revenue: Signs of a Positive Effect since the 1980s." *Journal of International Development* 23(2):165–180.

Collier, Paul. 2000. Doing Well out of War: An Economic Perspective. In *Greed and Grievance: Economic Agendas in Civil Wars*, ed. Mats Berdal and David M. Malone. Boulder, CO: Lynne Rienner pp. 91–111.

Conlon, Graham. 2012. "Ukraine: Opportunities Are Here." *Panorama* 6:29.

Conrad, Courtenay R. and Emily H. Ritter. 2013. "Tenure, Treaties, and Torture: The Conflicting Domestic Effects of International Law." *Journal of Politics* . forthcoming.

Conybeare, John AC. 1980. "International Organization and the Theory of Property Rights." *International Organization* 34(3):307–334.

Cranmer, Skyler J., Bruce A. Desmarais and Elizabeth J. Menninga. 2012. "Complex Dependencies in the Alliance Network." *Conflict Management and Peace Science* forthcoming.

Cranmer, Skyler J, Tobias Heinrich and Bruce A Desmarais. 2013. "Reciprocity and the Structural Determinants of the International Sanctions Network." *Social Networks* . Forthcoming.

Cunningham, Kathleen Gallagher and Nils B. Weidmann. 2010. "Shared Space: Ethnic Groups, State Accommodation, and Localized Conflict1." *International Studies Quarterly* 54(4):1035–1054.

Curwen, Philip A. 2007. *The Social Networks of Small Arms Proliferation: Mapping an Aviation Enabled Supply Chain*. Naval Postgraduate School, Monterey, CA: MA Thesis.

Dessler, David. 1989. "What's at Stake in the Agent-Structure Debate?" *International Organization* 43(3):441–473.

Dollar, David. 1992. "Outward-oriented Developing Economies Really do Grow More Rapidly: Evidence from 95 LDCs, 1976-85." *Economic Development and Cultural Change* 40(3):523–544.

Dollar, David and Aart Kraay. 2002. "Spreading the Wealth." *Foreign Affairs* 81(1):120–133.

Dorussen, Han and Hugh Ward. 2008. "Intergovernmental Organizations and the Kantian Peace." *Journal of Conflict Resolution* 52(2):189–212.

Dorussen, Han and Hugh Ward. 2010. "Trade Networks and the Kantian Peace." *Journal of Peace Research* 47(1):29–42.

Dowrick, Steve and Jane Golley. 2004. "Trade Openness and Growth: Who Benefits?" *Oxford Review of Economic Policy* 20(1):38–56.

Dreher, Axel. 2006. "Does Globalization Affect Growth? Evidence from a New Index of Globalization." *Applied Economics* 38(10):10911110.

Drezner, Daniel. 2003. "The Hidden Hand of Economic Coercion." *International Organization* 57(3):643–659.

Eaton, Jonathan and Mark Gersovitz. 1981. "Debt with Potential Repudiation: Theoretical and Empirical Analysis." *Review of Economic Studies* 48(2):289–309.

Epstein, David L., Robert Bates, Jack Goldstone, Ida Kristensen and Sharyn O'Halloran. 2006. "Democratic Transitions." *American Journal of Political Science* 50(3):551–569.

Evans, Peter B, Harold Karan Jacobson and Robert D Putnam, eds. 1993. *Double-edged Diplomacy: International Bargaining and Domestic Politics*. Vol. 25 University of California Press.

Fars News Agency. 2013. "Iran, Bangladesh Keen to Expand Trade Cooperation.". May 21.

Fearon, James D. and David D. Laitin. 2003. "Ethnicity, Insurgency, and Civil War." *American Political Science Review* 97(01):75–90.

Feenstra, R.C. and G.H. Hanson. 2004. "Intermediaries in Entrepot Trade: Hong Kong Re-Exports of Chinese Goods." *Journal of Economics & Management Strategy* 13(1):3–35.

Ferguson, Niall. 2002. *Empire: The Rise and Demise of the British World Order and the Lessons for Global Power*. London: Allen Lane.

Finnemore, Martha. 1993. "International Organizations as Teachers of Norms: The United Nations Educational, Scientific, and Cultural Organization and Science Policy." *International Organization* 47(4):565–597.

Fisman, R., P. Moustakerski and S.J. Wei. 2008. "Outsourcing Tariff Evasion: A New Explanation for Entrepôt Trade." *The Review of Economics and Statistics* 90(3):587–592.

Fogel, Kathy, Randall Morck and Bernard Yeung. 2008. "Big Business Stability and Economic Growth: Is What's Good for General Motors Good for America?" *Journal of Financial Economics* 89(1):83–108.

Franzese, Robert J. and Jude C. Hays. 2008. "Interdependence in Comparative Politics." *Comparative Political Studies* 41(4-5):742–780.

Franzese, Robert J., Jude C. Hays and Aya Kachi. 2012. "Modeling History Dependence in Network-Behavior Coevolution." *Political Analysis* 20(2):175–190.

Galeotti, Andrea, Sanjeev Goyal and Jurjen Kamphorst. 2006. "Network Formation with Heterogeneous Players." *Games and Economic Behavior* 54(2):353–372.

Galtung, Johan. 1967. "On the Effects of International Economic Sanctions, with Examples from the Case of Rhodesia." *World Politics* 19(03):378–416.

Gandhi, Jennifer. 2008. *Political Institutions Under Dictatorship*. Cambridge University Press.

Gawande, Kishore and Hui Li. 2009. "Dealing with Weak Instruments: An Application to the Protection for Sale Model." *Political Analysis* 17(3):236–260.

Ghosn, Faten and Scott Bennett. 2003. "Codebook for the Dyadic Militarized Interstate Incident Data, Version 3.10.". URL: http://correlatesofwar.org.

Gill, Jeff. 2006. *Essential Mathematics for Political and Social Research*. Cambridge: Cambridge University Press.

Gleditsch, Kristian Skrede. 2002. "Expanded Trade and GDP Data." *Journal of Conflict Resolution* 46(5):712–724.

Gleditsch, Kristian Skrede and Michael D. Ward. 2006. "Diffusion and the International Context of Democratization." *International Organization* 60(4):911–933.

Goldsmith, Jack L. and Eric A. Posner. 2005. *The Limits of International Law*. Oxford: Oxford University Press.

Goldstein, Judith L., Douglas Rivers and Michael Tomz. 2007. "Institutions in International Relations: Understanding the Effects of the GATT and the WTO on World Trade." *International Organization* 61(01):37–67.

Gourevitch, Peter. 1978. "The Second Image Reversed: the International Sources of Domestic Politics." *International Organization* 32(4):881–912.

Green, Donald P., Soo Yeon Kim and David H. Yoon. 2001. "Dirty Pool." *International Organization* 55(2):441–468.

Greene, William H. 2000. *Econometric Analysis*. Upper Saddle River, NJ: Prentice Hall.

Greif, Avner. 1993. "Contract Enforceability and Economic Institutions in Early Trade: The Maghribi Traders' Coalition." *American Economic Review* pp. 525–548.

Greif, Avner, Paul Milgrom and Barry R Weingast. 1994. "Coordination, Commitment, and Enforcement: The Case of the Merchant Guild." *Journal of Political Economy* pp. 745–776.

Haass, Richard N. 1997. "Sanctioning Madness." *Foreign Affairs* pp. 74–85.

Hafner-Burton, Emilie. 2005. "Trading Human Rights: How Preferential Trade Agreements Influence Government Repression." *International Organization* 59(3):593–629.

Hafner-Burton, Emilie. 2009. *Forced to Be Good: Why Trade Agreements Boost Human Rights*. Ithaca, NY: Cornell University Press.

Hafner-Burton, Emilie M. and Alexander H. Montgomery. 2006. "Power Positions: International Organizations, Social Networks, and Conflict." *Journal of Conflict Resolution* 50(1):3–27.

Hage, Frank M. 2011. "Choice or Circumstance? Adjusting Measures of Foreign Policy Similarity for Chance Agreement." *Political Analysis* 19:287–305.

Hardin, Russell. 1982. *Collective Action*. Baltimore: Johns Hopkins University Press.

Hathaway, Oona A. 2002. "Do Human Rights Treaties Make a Difference?" *The Yale Law Journal* 111(8):1935–2042.

Hays, Jude C., Aya Kachi and Robert J. Franzese, Jr. 2010. "A Spatial Model Incorporating Dynamic, Endogenous Network Interdependence: A Political Science Application." *Statistical Methodology* 7(3):406–428.

Hegre, Havard, John R. Oneal and Bruce Russett. 2010. "Trade does promote peace: New simultaneous estimates of the reciprocal effects of trade and conflict." *Journal of Peace Research* 47(6):763–774.

Henderson, Conway W. 1991. "Conditions Affecting the Use of Political Repression." *Journal of Conflict Resolution* 35(1):120–142.

Henkin, Louis. 1979. *How Nations Behave: Law and Foreign Policy.* Columbia University Press.

Hirschman, Albert. 1970. *Exit, Voice, and Loyalty.* Harvard University Press.

Hiscox, Michael. 2002. "Commerce, Coalitions, and Factor Mobility: Evidence from Congressional Votes on Trade Legislation." *American Political Science Review* 96(03):593–608.

Hoff, Peter D. and Michael Ward. 2004. "Modeling Dependencies in International Relations Networks." *Political Analysis* 12(2):160–75.

Holland, Paul W. and Samuel Leinhardt. 1977. "A Dynamic Model for Social Networks." *Journal of Mathematical Sociology* 5:5–20.

Jackson, Matthew O. 2008. *Social and Economic Networks.* Princeton University Press.

Jackson, Matthew O. and Asher Wolinsky. 1996. "A Strategic Model of Social and Economic Networks." *Journal of Economic Theory* 71(1):44–74.

Jacobson, H. K, W. M Reisinger and T. Mathers. 1986. "National Entanglements in International Governmental Organizations." *The American Political Science Review* 80(1):141–159.

Jensen, Nathan. 2008. "Political Risk, Democratic Institutions, and Foreign Direct Investment." *Journal of Politics* 70(4):1040–1052.

Kant, Immanuel. 1795. *Perpetual Peace.* Gutenberg Project.

Karlin, S. and H. M. Taylor. 1975. *A First Course in Stochastic Processes.* New York: Academic Press.

Katzenstein, Peter J., Robert O. Keohane and Stephen D. Krasner. 1998. "International Organization and the Study of World Politics." *International Organization* 52(4):645–685.

Kelley, Judith O. 2004. *Ethnic Politics in Europe: The Power of Norms and Incentives.* Princeton: Princeton University Press.

Keohane, Robert O. and Joseph S. Nye, Jr. 1977. *Power and Interdependence.* Boston: Little, Brown.

Keshk, Omar M. G., Brian M. Pollins and Rafael Reuveny. 2004. "Trade Still Follows the Flag: The Primacy of Politics in a Simultaneous Model of Interdependence and Armed Conflict." *Journal of Politics* 66(4):1155–1179.

Kozlow, Ralph, John Rutter and Patricia Walker. 1978. "US Direct Investment Abroad in 1977." *Survey of Current Business* 58(8).

Krueger, Anne O. 1998. "Why Trade Liberalisation is Good for Growth." *The Economic Journal* 108(450):1513–1522.

Kubicek, Paul. 2009. "Problems of Post-post-communism: Ukraine after the Orange Revolution." *Democratization* 16(2):323–343.

Lange, Matthew, James Mahoney and Matthias Vom Hau. 2006. "Colonialism and Development: A Comparative Analysis of Spanish and British Colonies1." *American Journal of Sociology* 111(5):1412–1462.

Lange, Matthew K. 2004. "British Colonial Legacies and Political Development." *World Development* 32(6):905–922.

Lebow, Richard Ned. 1994. "The Long Peace, the End of the Cold War, and the Failure of Realism." *International Organization* 48(2):249–277.

Lektzian, David and Glen Biglaiser. 2012. "Investment, Opportunity, and Risk: Do US Sanctions Deter or Encourage Global Investment?" *International Studies Quarterly* 57(1):65–78.

Lektzian, David and Mark Souva. 2001. "Institutions and International Cooperation An Event History Analysis of the Effects of Economic Sanctions." *Journal of Conflict Resolution* 45(1):61–79.

Li, Quan. 2006. "Democracy, Autocracy, and Tax Incentives to Foreign Direct Investors: A Cross-National Analysis." *Journal of Politics* 68(1):62–74.

Li, Quan. 2009. "Democracy, Autocracy, and Expropriation of Foreign Direct Investment." *Comparative Political Studies* 42(8):1098–1127.

Li, Quan and Adam Resnick. 2003. "Democratic Institutions and Foreign Direct Investment Inflows to Developing Countries." *International Organization* 57(1):175–211.

Li, Quan, Aleksandr Vashchilko and Tatiana Vashchilko. 2012. "Interstate Political Relations and Bilateral FDI Flows." *working paper* .

Lumenga-Neso, O., M. Olarreaga and M. Schiff. 2005. "On "Indirect" Trade-Related R&D Spillovers." *European Economic Review* 49(7):1785–1798.

Mahutga, Matthew C. 2006. "The Persistence of Structural Inequality? A Network Analysis of International Trade, 19652000." *Social Forces* 84(4):1863–1889.

Mansfield, Edward D., Helen V. Milner and B. Peter Rosendorff. 2000. "Free to Trade: Democracies, Autocracies, and International Trade." *The American Political Science Review* 94(2):pp. 305–321.

Mansfield, Edward D and Jack L Snyder. 2007. "The Sequencing "Fallacy"." *Journal of Democracy* 18(3):5–10.

Manski, Charles F. 1993. "Identification of Endogenous Social Effects: The Reflection Problem." *The Review of Economic Studies* 60(3):531–542.

Maoz, Zeev. 2001. Democratic Networks: Connecting National, Dyadic, and Systemic Levels of Analysis in the Study of Democracy and War. In *War in a Changing World*, ed. Zeev Maoz and Azar Gat. University of Michigan Press.

Maoz, Zeev. 2006. "Network Polarization, Network Interdependence, and International Conflict, 18162002." *Journal of Peace Research* 43(4):391–411.

Maoz, Zeev. 2009. "The Effects of Strategic and Economic Interdependence on International Conflict across Levels of Analysis." *American Journal of Political Science* 53(1):223–240.

Maoz, Zeev. 2010. *Networks of Nations: The Evolution, Structure, and Impact of International Networks, 1816-2001*. Cambridge University Press.

Maoz, Zeev, Ranan D. Kuperman, Lesley Terris and Ilan Talmud. 2006. "Structural Equivalence and International Conflict." *Journal of Conflict Resolution* 50(5):664–689.

Marshall, Monty G. and Keith Jaggers. 2008. "Polity IV Project: Political Regime Characteristics and Transitions, 1800-2007. Version p4v2008e [Computer File].". College Park, MD: Center for International Development and Conflict Management, University of Maryland. URL: http://www.cidcm.umd.edu/inscr/polity/index.htm.

Martin, Philippe, Thierry Mayer and Mathias Thoenig. 2008. "Make Trade Not War?" *The Review of Economic Studies* 75(3):865–900.

Maxfield, Sylvia. 1998. "Understanding the Political Implications of Financial Internationalization in Emerging Market Countries." *World Development* 26(7):1201–1219.

Mearsheimer, John J. 1994/1995. "The False Promise of International Institutions." *International Security* 19(3):5–49.

Meschi, Elena and Marco Vivarelli. 2009. "Trade and Income Inequality in Developing Countries." *World Development* 37(2):287–302.

Metternich, Nils W. 2011. "Anti-Government Networks in Civil Conflicts. How Network Structures Affect Anti-Government Behavior." *paper presented at the Annual Meeting of the Peace Science Society* .

Migdal, JoelS. 1988. *Strong Societies and Weak States: State-society Relations and State Capabilities in the Third World*. Princeton University Press.

Milgrom, Paul R and Douglass C North. 1990. "The Role of Institutions in the Revival of Trade: The Law Merchant, Private Judges, and the Champagne Fairs." *Economics and Politics* 2(1):1–23.

Milner, Helen V. 1997. *Interests, Institutions, and Information: Domestic Politics and International Relations*. Princeton University Press.

Mitchell, Neil J. and James M. McCormick. 1988. "Economic and Political Explanations of Human Rights Violations." *World Politics* 40(04):476–498.

Mitchell, Sara McLaughlin, Jon Ring and Mary K. Spellman. 2013. "What Did They Leave Behind? Legal Systems, Colonial Legacies, and Human Rights Practices." *Journal of Peace Research* p. forthcoming.

Mody, Ashoka, Susmita Dasgupta and Sarbajit Sinha. 1999. "Japanese Multinationals in Asia: Drivers and Attractors." *Oxford Development Studies* 27(2):149–164.

Montgomery, Alexander H. 2005. "Ringing in Proliferation: How to Dismantle an Atomic Bomb Network." *International Security* 30(2):pp. 153–187.

Moran, Theodore H. 2002. *Beyond Sweatshops: Foreign Direct Investment and Globalization in Developing Nations*. Brookings Institution Press.

Moravcsik, Andrew. 2000. "The Origins of Human Rights Regimes: Democratic Delegation in Postwar Europe." *International Organization* 54(2):217–252.

Morrow, James D., Randolph M. Siverson and Tressa E. Tabares. 1998. "The Political Determinants of International Trade: The Major Powers, 1907-90." *The American Political Science Review* 92(3):649–661.

Mukherjee, Bumba, Dale L. Smith and Quan Li. 2009. "Labor (Im)mobility and the Politics of Trade Protection in Majoritarian Democracies." *The Journal of Politics* 71(01):291–308.

Murdie, Amanda. 2012. "The Ties that Bind: A Network Analysis of Human Rights INGOs." *unpublished manuscript* .

New Zealand Herald. 2012. "After 60 years, Coke is back in Myanmar.". June 15.

Norris, J. R. 1997. *Markov Chains*. Cambridge, England: Cambridge University Press.

Oatley, Thomas. 2011. "The Reductionist Gamble: Open Economy Politics in the Global Economy." *International Organization* 65(02):311–341.

Olson, Mancur. 1993. "Dictatorship, Democracy, and Development." *The American Political Science Review* 87(3):567–576.

Oneal, John R. and Bruce Russett. 2005. "Rule of Three, Let It Be? When More Really Is Better." *Conflict Management and Peace Science* 22(4):293–310.

Pape, Robert A. 1997. "Why Economic Sanctions Do Not Work." *International Security* 22(2):90–136.

Pape, Robert A. 2012. "When Duty Calls: A Pragmatic Standard of Humanitarian Intervention." *International Security* 37(1):41–80.

Peksen, Dursun. 2009. "Better or Worse? The Effect of Economic Sanctions on Human Rights." *Journal of Peace Research* 46(1):59–77.

Peksen, Dursun and A Cooper Drury. 2010. "Coercive or Corrosive: The Negative Impact of Economic Sanctions on Democracy." *International Interactions* 36(3):240–264.

Peterson, Timothy M. 2011. "Third-party Trade, Political Similarity, and Dyadic Conflict." *Journal of Peace Research* 48(2):185200.

Pevehouse, Jon C. 2005. *Democracy from Above: Regional Organizations and Democratization*. Cambridge University Press.

Pindyck, Robert S and Andres Solimano. 1993. "Economic instability and aggregate investment." *NBER Macroeconomics Annual* 8:259–318.

Poast, Paul. 2010. "(Mis)Using Dyadic Data to Analyze Multilateral Events." *Political Analysis* 18(4):403–425.

Poe, Steven C, C Neal Tate and Linda Camp Keith. 1999. "Repression of the Human Right to Personal Integrity Revisited: A Global Cross-National Study Covering the Years 1976-1993." *International Studies Quarterly* 43(2):291–313.

Porta, Rafael La, Florencio Lopez-De-Silanes, Andrei Shleifer and Robert W. Vishny. 1997. "Legal Determinants of External Finance." *The Journal of Finance* 52(3):pp. 1131–1150.

Powell, Emilia Justyna and Jeffrey K. Staton. 2009. "Domestic Judicial Institutions and Human Rights Treaty Violation." *International Studies Quarterly* 53(1):149–174.

Powell, Robert. 2006. "War as a Commitment Problem." *International Organization* 60(01):169–203.

Pritchard, Kathleen. 1989. Human Rights and Development: Theory and Data. In *In Human Rights and Development: International Views*, ed. David P. Forsythe. London: Macmillan pp. 329–347.

Putnam, Robert D. 1988. "Diplomacy and Domestic Politics: the Logic of Two-Level Games." *International organization* 42(3):427–460.

Quinn, Dennis. 2000. "Democracy and International Financial Liberalization." *unpublished manuscript* .

Ray, James Lee. 2001. "Integrating Levels of Analysis in World Politics." *Journal of Theoretical Politics* 13(4):355–388.

Reiter, Dan and Allan C Stam. 2003. "Identifying the Culprit: Democracy, Dictatorship, and Dispute Initiation." *American Political Science Review* 97(2):333–337.

Ricardo, David. [1817] 2004. *The Principles of Political Economy and Taxation*. Mineola, New York: Dover Publications, Inc.

Richards, David L., Ronald D. Gelleny and David H. Sacko. 2001. "Money with a Mean Streak? Foreign Economic Penetration and Government Respect for Human Rights in Developing Countries." *International Studies Quarterly* 45(2):219–239.

Rigobon, Roberto and Dani Rodrik. 2005. "Rule of law, democracy, openness, and income." *Economics of Transition* 13(3):533–564.

Ripley, Ruth M., Tom A.B. Snijders and Paulina Preciado. 2012. "Manual for RSiena.".
URL: *http://www.stats.ox.ac.uk/ snijders/siena/RSiena$_M$anual.pdf*

Rodríguez, Francisco and Dani Rodrik. 2001. "Trade Policy and Economic Growth: A Skeptics Guide to the Cross-National Evidence." *NBER Macroeconomics Annual 2000* 15(2000):261325.

Rodrik, Dani, Arvind Subramanian and Francesco Trebbi. 2002. Institutions Rule: The Primacy of Institutions over Geography and Integration in Economic Development. Working Paper 9305 National Bureau of Economic Research.

Rogowski, Ronald. 1989. *Commerce and Coalitions: How Trade Affects Domestic Political Alignments*. Princeton, NJ: Princeton University Press.

Rosecrance, Richard N and Arthur A Stein. 1993. *The Domestic Bases of Grand Strategy*. Cornell University Press.

Ross, Michael L. 2001. "Does Oil Hinder Democracy?" *World Politics* 53(3):325–361.

Russett, Bruce and John Oneal. 2001. *Triangulating Peace: Democracy, Interdependence, and International Organization*. New York: W.W. Norton.

Russett, Bruce M. 1993. *Grasping the Democratic Peace: Principles for a Post-Cold War World*. Princeton University Press.

Schultz, Kenneth A and Barry R Weingast. 2003. "The Democratic Advantage: Institutional Foundations of Financial Power in International Competition." *International Organization* pp. 3–42.

Schumpeter, Joseph A. 1942. *Capitalism, Socialism and Democracy.* London: Rutledge.

Signorino, Curtis S. and Jeffrey M. Ritter. 1999. "Tau-b or Not Tau-b: Measuring the Similarity of Foreign Policy Positions." *International Studies Quarterly* 43(1):115–144.

Simmons, Beth A. 2000. "International Law and State Behavior: Commitment and Compliance in International Monetary Affairs." *American Political Science Association* 94(4):819–835.

Simpser, Alberto and Daniela Donno. 2012. "Can International Election Monitoring Harm Governance?" *The Journal of Politics* 74(02):501–513.

Smith, Adam. [1776] 2003. *The Wealth of Nations.* New York: Bantam Classics.

Smith, David A. and Douglas R. White. 1992. "Structure and Dynamics of the Global Economy: Network Analysis of International Trade 19651980." *Social Forces* 70(4):857–893.

Smith, Ron and Bernard Udis. 2003. New Challenges to Arms Export Control: Whither Wassenaar? In *The Arms Trade, Security and Conflict*, ed. Paul Levine and Ron Smith. Routledge, 2003 pp. 94–110.

Snijders, T. A. B., C. Steglich and M. Schweinberger. 2007. Modeling the Co-evolution of Networks and Behavior. In *Longitudinal Models in the Behavioral and Related Sciences*, ed. K van Montfort, H Oud and A. Satorra. Berlin: Springer pp. 41–71.

Snyder, David and Edward L. Kick. 1979. "Structural Position in the World System and Economic Growth, 1955-1970: A Multiple-Network Analysis of Transnational Interactions." *American Journal of Sociology* 84(5):1096–1126.

Sobel, Andrew C. 2002. *State Institutions, Private Incentives, Global Capital.* University of Michigan Press.

Souva, Mark, Dale Smith and Shawn Rowan. 2008. "Promoting Trade: The Importance of Market Protecting Institutions." *Journal of Politics* 70(2):383–392.

Spar, Debora L. 1998. "The Spotlight and the Bottom Line: How Multinationals Export Human Rights." *Foreign Affairs* pp. 7–12.

Staats, Joseph L and Glen Biglaiser. 2012. "Foreign Direct Investment in Latin America: The Importance of Judicial Strength and Rule of Law." *International Studies Quarterly* 56(1):193–202.

Steglich, C., Tom A.B. Snijders and M. Pearson. 2010. "Dynamic Networks and Behavior: Separating Selection from Influence." *Sociological Methodology* 40:329–392.

Strazzari, Francesco and Simone Tholens. 2010. "Another Nakba: Weapons Availability and the Transformation of the Palestinian National Struggle, 1987-2007." *International Studies Perspectives* 11(2):112–130.

Tomz, Michael and Mark Wright. 2010. Sovereign Theft: Theory and Evidence about Sovereign Default and Expropriation. In *The Natural Resources Trap: Private Investment without Public Commitment*, ed. William Hogan and Federico Sturzenegger. Cambridge, MA: MIT Press.

von Stein, Jana. 2008. "The International Law and Politics of Climate Change." *Journal of Conflict Resolution* 52(2):243–268.

Wacziarg, Romain and Karen Horn Welch. 2008. "Trade Liberalization and Growth: New Evidence." *The World Bank Economic Review* 22(2):187–231.

Waltz, Kenneth N. 1979. *Theory of International Politics*. New York: McGraw-Hill.

Ward, Hugh. 2006. "International Linkages and Environmental Sustainability: The Effectiveness of the Regime Network." *Journal of Peace Research* 43(2):149–166.

Ward, Michael D., Randolph M. Siverson and Xun Cao. 2007. "Disputes, Democracies, and Dependencies: A Reexamination of the Kantian Peace." *American Journal of Political Science* 51(3):pp. 583–601.

Wendt, Alexander. 1987. "The Agent-Structure Problem in International Relations Theory." *International Organization* 41(3):335–370.

Wendt, Alexander. 1999. *Social Theory of International Politics*. Cambridge: Cambridge University Press.

Williams, Rob. 2013. "US basketball Star Dennis Rodman Tells North Korea Leader Kim Jong-Un He Has 'Friend for Life'." *The Independent* . March 1.

Wimmer, Andreas and Brian Min. 2006. "From Empire to Nation-State: Explaining Wars in the Modern World, 1816-2001." *American Sociological Review* 71(6):867–897.

Wintrobe, Ronald. 1998. *The Political Economy of Dictatorship*. Cambridge University Press.

Wolf, Martin. 2005. *Why Globalization Works*. New Haven: Yale Nota Bene.