INTERNATIONAL TRADE: COSTS, COERCION, AND CONFLICT

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by

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ABSTRACT

There is a large literature examining the relationship between trade and international politics. However, the majority of extant studies examine the extent of trade interaction, despite acknowledging the potential for states to rely on trade to differing degrees. In this dissertation, I devise measures of potential trade gains and potential trade losses, using these measures to address three important research questions in the study of international relations. First, I look at the relationship between exit costs and conflict, arguing that asymmetry in exit costs is associated with a higher likelihood of militarized conflict. Second, I examine the connection between exit costs and sanction threats, finding that vulnerable states are more likely to be targeted with sanction threats but are not likely to give in to these threats. Finally, I look at the connection between potential trade gains and protectionism, arguing that inelastic demand is associated with lower tariffs for democracies, but higher tariffs for autocracies. This study demonstrates that there is considerable room for further exploration into the connection between trade potential and international outcomes.

CHAPTER 1. INTRODUCTION

1.1. Background

Trade and international politics have been closely linked since the dawn of human civilization; and these these two forces in conjunction have shaped the modern world (e.g. Findlay and O'Rourke 2007). Thucydides (1970), considered one of the first political scientists, argues that the Peloponnesian War resulted largely from fear of the growing power of Athens, managed by its Navy's control of trade in the Aegean, which allowed it impose tariffs on the trade of other states. Later, the European rise to dominance on the world stage was due in large part to wealth generated by trade, which was, in turn, facilitated by politics. For example, Europe benefitted from increased trade along the routes through Central Asia (such as the Silk Road) as a consequence of the *Pax Mongolica*, an era of stability and safety resulting from Mongol control over the greater part of Eurasia. Similarly, the wealth of American colonies that flowed into Europe resulted from necessity, as the voyages of discovery were motivated by the peripheral position of Europe in the known world, cut off from the wealth of the East Indies by the Islamic states of the Middle East.[1]

Additionally, the potential wealth trade bears motivates states to use politics – and power – to shape trade relationships. For example, the great commercial empires – the Portuguese, Dutch, and British – captured strategic territory from Africa, the Middle East, and through the Indian Ocean and South Asia in order to control word trade in valuable commodities. These empires were maintained by force and fought over frequently by

1 In fact, much of the benefit that Europe experienced came at the expense of the Islamic states of the Middle East, which had previously enjoyed prosperity as the literal and figurative center of civilization.

would-be usurpers. Indeed, during the age of mercantilism, the pursuit of power and plenty were inseparable (*e.g.,* Viner 1948), as gains from trade served both to facilitate aggression by financing military campaigns (for example, the Spanish Armada against England), and to encourage preemption by sparking fear and distrust among economic competitors (such as the series of wars between commercial rivals, the English and Dutch).

However, beginning in the Enlightenment, before political science was a distinct discipline, scholars began discounting the tenants of mercantilism as logically flawed (Hume 1752; Smith 1776). Noting the potential for mutual gains to accrue to trade partners, economic philosophers began espousing the practice of free trade over protectionism.[2] Indeed, during this liberal era, scholars began arguing that trade binds the interests of states, increasing the chances of peace between trade partners (*e.g.,* Montesquieu 1748; Kant 1795), a position that continues to dominate the literature today (*e.g.,* Oneal and Russett 1997, 1999, 2000; Gartzke 2007).

Yet, in this dissertation, I argue that scholars' narrow conception of trade has limited empirical study of its effects. Rather than focusing solely on the extent of trade interaction, I conceptualize and operationalize trade in terms of the potential gains to accrue, or, conversely, the costs associated with cutting off established trade ties. Beginning with this conceptualization, I relate trade gains – and exit costs – to three important research areas in the study of international relations: 1) the impact of trade on international conflict, 2) the prevalence and outcome of sanctions threats, and 3)

2 Specifically, mercantilists argued that a favorable trade balance – and the resulting inflow of gold and silver – secured state power, whereas Hume and Smith pointed out that domestic prices would increase to cancel out this advantage.

protectionism within states, with regard to regime type. As a whole, this project assesses the extent to which the *potential* impact of (increased or decreased) trade, as opposed to realized trade flows, affects state behavior and international outcomes. In the following section, I introduce the research question in more detail, emphasizing the limitation imposed on extant research by the focus on the extent of trade interaction as a measure of the importance of trade to national economies.

1.2. The Research Question:

1.2.1. Trade Interaction vs. Trade Potential

The primary question I address in this work is "how do the nuances of trade – looking beyond the simple level of trade interaction to the gains from trade to the costs associated with cutting off trade – influence international politics?" My argument follows from Keohane and Nye's (1977) discussion of sensitivity and vulnerability dependence. Specifically, I view trade as a source of benefits and costs to trading partners. One state's trade gains are a benefit to be foregone if trade is cut off, yet this exit cost may be used as bargaining leverage by its trade partner, particularly when that partner's exit costs are lower. As such, I argue that trade gains, depending on their (a)symmetry within dyads, may increase the stability of peace or lead to coercion attempts and, ultimately, to conflict. Additionally, I examine the effect of trade on sanctions and protectionism as following from state responses to these costs and benefits inherent in trade. Sanctions are the most salient form of economic coercion – the attempt to use a trade partner's exit costs as leverage; conversely, protectionism may result from states' attempts to preclude

becoming vulnerable to this same coercion.[3] Although the connection between trade and military conflict is central to this project, a better understanding of the coercive aspect of trade gains – and states' attempts to mitigate these influences – furthers our understanding of the complex relationship between trade and conflict. I discuss the benefit associated with measuring trade potential below in a brief overview of the following chapters.

1.2.2. Conceptualizing Potential Gains and Losses due to Trade

In Chapter 2, I discuss the operationalization of price elasticities of demand and supply used to calculate exit costs. I begin with a discussion of how trade flows, trade shares, and trade in terms of national income, all of which are measures of *interaction* (*e.g.,* Crescenzi 2003, 2005), fall short of capturing the true costs and benefits of international exchange. Indeed, one can imagine numerous, cross-cutting influences that higher levels of trade interaction may have. Within a given dyad, growth in trade volume suggests higher gains for each dyad member. Yet, simultaneously, one or both states within the dyad may become reliant on their trade partner, standing to suffer economically or strategically if the trade relationship is terminated. Domestic producers within each country may fight to protect themselves from competing imports, even resorting to promoting international conflict to maintain their source of wealth (*e.g.,* McDonald 2004). Overall, measures of trade interaction convey little to no information regarding the extent to which each trade partner is truly reliant on trade, nor regarding the symmetry of dependence. At best, extant measures of trade interaction are proxies of these gains and potential costs.

3 Of course there are also purely domestic causes of protectionism, specifically, removing external threats to import-competing firms and industries. I address these domestic influences in addition to my own variables of interest.

As such, I look to the economics literature, calculating the shape of supply for exports and demand for imports in order to gauge the extent to which a trade relationship is valuable to each trade partner. By looking to the commodity level and aggregating up to the dyad level, I construct measures of the extent to which each dyad partner benefits from dyadic trade, as well as the disparity in this reliance, which may invoke attempts at coercion.

1.2.3. Trade and Conflict

In Chapter 3, I examine the effect of exit costs on dyadic conflict. As mentioned above, extant research generally views trade as a source of economic gain resulting from comparative advantage, specialization and exchange. The dominant position remains that "peace is the natural effect of trade. Two nations who traffic with each other become reciprocally dependent; for if one has an interest in buying, the other has an interest in selling" (Montesquieu 1748). This argument has been expanded into the peace through trade hypothesis, which posits that, because trade gains terminate with the onset of conflict, this cost of exit serves as an opportunity cost to violence (Polachek 1980; Oneal, Oneal, Maoz, and Russet 1996; Oneal and Russett 1997, 2001; Russett and Oneal 2001).

The peace through trade hypothesis has come to dominate the literature on trade and conflict. Yet, scholars are aware that international trade conveys both benefits and costs to trading states (*e.g.,* Hirschman 1948; Keohane and Nye 1977). Despite the fact that exit costs are intrinsic elements of theories linking trade to conflict, the vast majority of empirical studies testing this relationship measure trade in terms of *the extent of interaction* (trade flows, often weighted by GDP or total national trade).

The modeling decision predominant in extant research tends to follow from practical concerns, given that measures of trade interaction are easily available. I attempt to overcome this limitation utilizing the measures of exit costs developed in Chapter 2 to reassess the trade-conflict relationship. I examine the potential for conflict (both in terms of event counts and the initiation of militarized interstate disputes) following from the relative extent of exit costs. I present hypotheses that suggest that the asymmetry in these costs – cases in which one state stands to suffer from lost trade while its partner does not – is associated with increased likelihood of conflict. This aggravating influence follows because a disparity in exit costs translates to instability and, specifically, incentives to coerce. However, mutually high exit costs result in less conflict because, in these cases, Montesquieu's prediction is true: both states need each other and neither has unilateral incentive to coerce. I illustrate this relationship with the historical example of World War II, and present several statistical models that support this argument.

1.2.4. Trade Sanctions

In Chapter 4, I follow up on the argument made in Chapter 3 that exit costs affect incentives for coercion, assessing the impact of exit costs on the onset of sanction threats, as well as their outcome. Sanctions are typically deemed ineffective,[4] and yet they are commonly employed. At the time of this writing, the United States is threatening to impose increasingly harsh sanctions on Iran if the latter state does not halt research that is allegedly leading to the development of nuclear weapons.[5] Although the largest body of

4 See, for example, Galtung 1967; Hoffman 1967; Wallensteen 1968; Doxey 1972, 1980; Barber 1979; Daoudi and Dajani 1983; Drury 1998; Pape 1997, 1998; and Drezner 1999. However, this view is not undisputed. For example, see Hufbauer, Schott, Elliott, and Oegg 2007.
5 Specifically, the U.S. is attempting to convince third-parties to enact sanctions because the it has already cut off most direct trade with Iran.

literature examines outcomes alone (and effectiveness specifically), I look at how the potential costs associated with losing trade affect states' willingness to threaten sanctions, and the response of targeted states. As such, I address the large literature on effectiveness, as the cost of sanctions is an important theoretical determinant thereof, yet typically measured poorly, often in terms of lost trade volumes resulting from imposed sanctions.[6] By looking at each state's exit costs, however, I examine more closely the target's ability to adjust to the harm inflicted by the sender, as well as the extent to which the sender would be harming itself. Additionally, I address the punishment motivations for sanctions, perhaps an understudied component of effectiveness (*e.g.,* Nossal 1989).

1.2.5. Trade and Protectionism

In Chapter 5, I examine how regime type conditions the impact of demand elasticity on protectionism. This chapter addresses an under-studied aspect of protectionism: the degree to which the shape of import demand conditions tariff levels in states. Although the economics literature addresses this issue, the relationship between import demand and tariff rates is typically treated hastily, with expectations based on the assumption that states attempt to maximize revenue and minimize welfare losses (*e.g.,* Grossman and Helpman 1994). Instead, most research on protectionism is based on Olson's (1965) theory of the collective action dilemma, which political groups must overcome in order to organize effectively for political influence. Olson highlights the conditions under which protectionism is likely to occur; specifically, because some firms can free ride on the others' work, for protectionism to occur (or at least for groups to

6 Hufbauer, Schott, Elliott, and Oegg (2007) show that sanctions, on average, cost the target 3 percent of its GDP.

lobby for it) the selective benefits of organization must exceed the costs.

Conversely, in this chapter, I look at how the ability of states to adjust demand for specific commodities due to rising prices affects governments willingness to expose themselves to trade ties that might lead to coercion attempts. It is generally a foregone conclusion that for protectionism to result in a given industry it must be more costly for the state to produce a given good than to import it. However, few studies have attempted to quantify the ease with which the states can meet demand for a given commodity through domestic production. This omission leaves open the opportunity to assess the role of the state, specifically its desire to balance trade gains and vulnerability.

Furthermore, I look beyond the conception of the relationship between import demand and tariff levels in the economics literature, which ignores the impact of political institutions. Specifically, I examine how democracy within states conditions their response to inelastic demand. I contend that democracy, which is associated with lower revenue extraction by the state (somewhat counter to the Grossman and Helpman model) results in lower tariffs under the condition of inelastic demand. Conversely, autocracies, which are often "stationary bandits" (Olson 1993), focus on revenue extraction, imposing higher tariffs when demand is inelastic. There are crucial implications of this chapter for the understanding of the relationship between exit costs, coercion, and conflict, because regime type influences the action taken to embrace or resist high exit costs.

1.2.6. Reconceptualizing the Understanding of Trade

I conclude with a brief discussion of the common thread binding the three distinct areas of inquiry within this dissertation, arguing that my attention to the *potential* effects

of trade allows for a detailed reexamination of many research questions within the study of international relations. Given that trade is inexorably bound to the study of state interactions, power, and conflict, I contend that we stand to benefit from examining states' exposure to trade gains, comparing the relative extent to which trade partners need each other, and the extent to which trade policy reflects the gains and losses associated with active or potential trade relationships.

CHAPTER 2. THE CONCEPTUALIZATION AND OPERATIONALIZATION OF TRADE RELATIONSHIPS

2.1. Introduction

The purpose of this chapter is to describe the procedures I use to create data measuring the degree to which states may become (or have already become) dependent on trade relationships. Specifically, I seek to capture the ability of states to adjust to lost imports or lost markets for exports. To this end, I develop data on import and export elasticities for states, as well as measures of exit costs for dyad trade partners. I begin with a discussion of how scholars conceptualize trade, focusing on the differences between studies in economics and politics. Then, I discuss my measures of trade potential, arguing that economists' measures of the impact of trade – which are typically developed without regard to how trade influences power and international politics – are nonetheless useful for addressing the political implications of trade potential.

2.2. Conceptualizations of Trade

Economists typically view trade in terms of its welfare increasing impact, most famously illustrated by Ricardo's (1817) work on comparative advantage. Ricardo shows that states will always be better off by producing and exporting goods for which they have a comparative advantage, while importing other goods.[7] This theory is later expanded by Heckscher and Ohlin (1933), who explain what type of goods states are likely to import or export in terms of the distribution of the factors of production. More recently, Krugman (1977) reexamines some of the assumptions underlying classical trade

7 Although attributed to Ricardo, it is in fact Mill (1848) that clarified the distinction between comparative advantage and absolute advantage.

theory, showing that, by allowing for increasing returns to scale, states may trade the same or similar goods rather than goods reflecting abundant factors of production.

Although the potential for trade to render states vulnerable to trade partners dates all the way back to Adam Smith (1776), Baldwin (1980, 475-481) notes that economists typically do not focus on the consequences of trade for political influence and coercion. Conversely, political scientists link trade directly to political power, as demonstrated by the literature on interdependence (Baldwin 1980; Keohane and Nye 1977; Hirschman 1945; Crescenzi 2003, 2005). Hirschman sums up concisely the dual nature of trade gains:

> The influence which country A acquires in country B by foreign trade depends in the first place upon the total gain which B derives from that trade; the total gain from trade for any country is indeed nothing but another expression for the total impoverishment which would be inflicted upon it by a stoppage of trade. In this sense the classical concept, gain from trade, and the power concept, dependence on trade, now being studied are seen to be merely two aspects of the same phenomenon (Hirschman 1945, 73; quoted in Baldwin 1980, 478).

Political scientists have highlighted two distinct forms of trade dependence (*e.g.,* Keohane and Nye 1977). Sensitivity reflects the degree to which external economic shocks influence a domestic economy, while vulnerability reflects the costs associated with terminating trade ties. As Baldwin (1980, 492) quips, the difference between states who are sensitive to trade and those who are vulnerable mirrors that between drinkers and alcoholics. One is affected by rising prices or lack of supply, while the other is potentially devastated.

2.3. Extant Studies Utilizing Exit Costs

A few notable studies in political science have attempted to measure exit costs directly, typically utilizing trade elasticities – and, specifically, the price elasticity of demand for imports – to do so (Polachek and McDonald 1992; Polachek and Seiglie 2006; Crescenzi 2003, 2005; Maoz 2009). A state's price elasticity of demand for imports is the response in quantity demanded of a given commodity given a change in its price.[8] If, for example, a one-percent increase in the import price for a given commodity leads to a one percent decrease in imports, then the commodity is considered to have a unit-elastic demand. Given this change in price, a less than one percent decrease in imports suggests that demand is inelastic while a greater than one percent decrease in imports suggests that demand is elastic.[9] The more elastic the demand, the easier it is to redirect trade to alternate markets, produce the good domestically, or simply endure lower availability.[10] Importantly, a more inelastic demand is a double-edged sword, suggesting that a given trade tie is valuable, and yet also conveying that the exporter holds economic means of political coercion against the importer. Both the positive and negative aspects of inelastic demand increase as trade volume increases, hence the attribution of various terms of

8 Specifically, it is the percentage change in quantity of imports divided by the percentage change in import price

9 Theoretically, import elasticities vary from negative infinity (perfect elasticity – any increase in price means demand falls to 0) to 0 (perfect inelasticity – demand remains constant regardless of how much price increases), where -1 is unit elasticity. Positive elasticities are rare, existing for Veblen Goods – those goods for which demand rises with price, typically for purposes of conspicuous consumption.

10 The import elasticity of demand can be thought of as the rate at which exit costs accrue with each additional unit imported, and when multiplied by the volume of trade in a given commodity, produces a measure of the total exit costs within this commodity, for the importer. When demand is more inelastic, exit costs are higher at a given level of trade because, in the event that this trade is lost, the importer cannot easily adjust its demand downward due to rising price – and therefore will likely pay higher prices to redirect lost trade, either to alternate foreign markets or to domestic production. On the other hand, more elastic demand for imports suggests that the importer's exit costs are lower because, even if import flow is high, the importer can easily adjust down its demand for a given commodity when prices rise, or obtain the good elsewhere at equivalent prices.

positive or negative connotation (*e.g.*, trade gains or vulnerability) to this situation.

However, the price elasticity of import demand provides only half of the information necessary to determine exit costs for dyadic trade. I also utilize export supply elasticities, which capture the change in quantity supplied of a given commodity given a change in its price. Extant studies typically employ the unrealistic assumption that export supply elasticities are perfectly elastic, meaning that exporters can always redirect lost trade essentially with zero cost.[11] However, if export supply elasticities vary, then we are unable to understand exit costs looking at import elasticities alone.

This concept can be illustrated using Ricardo's (1817) famous example in which England exports cloth to Portugal and Portugal exports wine to England. If England's import demand for wine is more elastic than Portugal's import demand for cloth, extant models would suggest that, holding trade volumes for cloth and wine equal, England will have lower exit costs for dyadic trade. However, if Portugal's export supply for wine is elastic and England's export supply for cloth is inelastic, then total exit costs may in fact be equal, because England's ease of obtaining wine elsewhere is matched by Portugal's ease of finding alternate markets for its wine exports, while, simultaneously, both states face relatively more difficulty replacing their lost cloth trade.

2.3.1. Use of Elasticities in Economics

Ironically, the utility of elasticities for measuring power and influence are generally ignored by economists who develop these measures. Instead, economists

11 A very elastic export supply signifies that an exporter has relatively more monopoly power, and, as such, relies less on trade with any one given trade partner. Conversely, an inelastic export supply suggests, all else equal, that easily available alternate sources of a given commodity exist.

typically utilize elasticities for two purposes. First, price elasticities are used to test the Marshall-Lerner condition (*e.g.,* Houthakker and Magee 1969). Specifically, the Marshall-Lerner condition holds that if the sum of (absolute) import and export elasticities is greater than 1 (*i.e.,* if supply and demand are relatively elastic), then a devaluation of a country's currency will improve its trade balance (Goldstein and Kahn 1985). Research suggests that inelastic demand in the short run tends to result in a worsening trade balance immediately after devaluation. However, over time, demand becomes increasingly elastic, resulting in improving trade balance due to devaluation in the long run – an empirical regularity called the "J-curve effect" (*e.g.,* McPheters and Stronge 1979).

Second, economists have utilized trade elasticities more recently to measure welfare loss stemming from existing trade barriers. Trade-weighted tariffs, historically used for this purpose, can be problematic given that, as tariffs rise, imports will decline, ceteris paribus. As such, higher tariffs will be weighted less than low ones if they succeed in limiting imports more (Anderson and Neary 1994, 1996, 2005, 2007). As such, Anderson and Neary propose an alternative measurement of trade restrictiveness that captures the level of welfare that would result if existing trade barriers were eliminated. Other economists have proposed alternate conceptualizations of a "trade restrictiveness index" (TRI) (see, for example, Papageorgiou et al. 1991; Loveday 1931; Leamer 1974; Feenstra 1995; Kee, Nicita, and Olarreaga 2008; Irwin 2007).[12] Ultimately, a relatively

12 Papageorgiou et al. (1991) develop subjective trade restrictiveness measures, which "have the advantage of incorporating important local considerations but … are inherently difficult to compare across different countries or time periods." (Anderson and Neary 2005, 2). Loveday (1931) and Leamer (1974) suggest that an ideal measurement of trade restriction is the trade flows that would result if no barriers existed. Feenstra (1995), Kee, Nicita, and Olarreaga (2006), and Irwin (2007) simplify Anderson and Neary's (2005)

simple yet useful TRI incorporates trade barriers and the elasticity of import demand (Feenstra 1995; Kee, Nicita, and Olarreaga 2006, 2009). Irwin (2007, 7) demonstrates that, with inelastic demand for imports, welfare losses are small, as lower prices that would result from liberalization are unlikely to translate into higher volumes of imports. Conversely, when demand is elastic, higher tariff rates suggest considerably reduced import flows, and higher welfare losses as a result.

As mentioned above, notably absent in the economics literature are studies employing elasticities to examine the extent to which trade gains and, therefore, exit costs accrue among trade partners. With a few notable exceptions (*e.g.,* Crescenzi 2003, 2005; Maoz 2009), studies in political science similarly ignore these measures of trade potential. Furthermore, studies in political science that do employ elasticities with regard to coercion and conflict use only those for imports due to an unavailability of export supply elasticities, particularly at the county level. As such, I contend that the estimation of import and export elasticities would improve our ability to understand international outcomes resulting from trade relationships.

2.4. Estimation of Trade Elasticities

2.4.1. Background

Although theory associated with the estimation of trade elasticities dates back to Orcutt (1950) and Houthakker and Magee (1969), recent attempts at estimation associated have been made by Marquez (1990, 1994, 2002), and, Kee, Nicita, and Olareaga (2008). These recent studies within the economics literature estimate trade

estimation technique, such that the resulting TRI is a function of imports as a share of GDP, import elasticity of demand, and import tariffs.

elasticities using error correction models (due to concerns for non-stationary data). This approach to estimation of elasticities complements a theoretical expectation of differing short-run and long run elasticities and the consequences thereof for the Marshall-Lerner condition.

Furthermore, the degree of aggregation employed in elasticity estimation varies. Elasticities are most commonly estimated at the country-level (*e.g.,* Hooper, Johnson, and Marquez 1998; Bahami-Oskooee and Niroomand 1998; Bahami-Oskooee 1998; Marquez 2002; Kohli 1991). However, measures have also been created at the the industry level (Harrigan 1997), and the HS 6-digit commodity level (Kee, Nicita, and Olareaga 2008). Addtionally, Marquez (1990) has created bilateral import demand elasticities and then, using import flows by trade partner, created weighted average multilateral import elasticities.

To be useful in inquiries into the relationship between trade potential and international politics, elasticities must be available across a wide degree of countries and commodities. However, data limitations must be taken into consideration when examining trade at disaggregated levels. For example, industry-level data are limited even in developed countries, and often completely unavailable for countries outside the United States. In the next section, I outline the method by which I create elasticities for a large sample of countries and commodities.

2.4.2. Data and Method

Indeed, creating useful import and export elasticities by commodity is no easy task. Using bilateral trade data provided by Feenstra *et al.* (2005), disaggregated to the

commodity (specifically, the Standard International Trade Classification 4 digit [SITC4] code) level, and excluding missing values, I am left with over six million observations spanning the seventeen-year period from 1984 to 2000. Nonetheless, there are relatively few observations by dyad, year, and commodity, to estimate elasticities in a manner consistent with the typical methods of economists.[13] Furthermore, my theoretical model holds elasticities to vary by trading state and commodity, irrespective of the trade partner, such that I capture the effects of supply and demand for commodities rather than the confounding influence of dyadic political relationships. As such, I utilize fixed effects regressions for each state (both as importer and exporter), and for each commodity (at the SITC 2 level, such that I have multiple observations for each importer, exporter, and year because these observations are at the SITC4 level). I run a total of 19,459 regressions (10,146 for states as importers and 9,313 for states as exporters), representing 157 states and an average of 64 SITC 2 level commodities traded per state.[14] The specification of these models follows.

To calculate the price elasticities of supply and demand for a given state, and for a given commodity, I regress the (natural log of the) value of dyadic trade flow (imports or

13 Specifically, I do not employ error correction models, because doing so at the commodity level would require a massive number of human and computer hours. Each regression would require close attention to cointegrating vectors, precluding the possibility of automating the process. Furthermore, missing data precludes obtaining estimates for many states and commodities. Finally, unlike economists, I am not interested in the long run effects of changing prices for commodities (*e.g.,* Kee, Nicita, and Olarreaga 2008); whereas economists use the long run effects estimated by error correction models to test the Marshall Lerner condition, my theoretical perspective demands attention to immediate effects of changing prices. To test the usefulness of my estimates, I ran ten error correction models on random groups, with results quite similar to those I present in this paper, suggesting that my results do not suffer from the "spurious regression problem" (Granger and Newbold 1974), and that my simpler approach is nonetheless useful.

14 Too few observations (at the SITC4 commodity level) preclude the estimation of 2,067 export elasticity regression and 835 import elasticity regressions.

exports) on the (natural log of the) unit value[15] from the given trade partner and the (natural log of the) average unit value of the commodity from all other countries, as well as a year counter to account for trending.[16] The use of only two explanatory variables stems from the fact that, with fixed effects, I can include only variables that vary by commodity and trade partner. Although precluding the inclusion of important determinants of trade – such as dyadic distance, relative development, and regime types – the use of fixed effects accounts for the unit heterogeneity by trade partner, returning estimates for trade elasticities reflecting the behavior of the actual commodity for each trading state, rather than some confounding political variable.

Each trade partner is both an importer and an exporter, so both the import and export equations are run on all states. The fixed effects regression for import elasticities, run for each importer (state *i* within dyad *ij*), by commodity, is specified as:

$$\ln import\ value_j = \beta_0 + \beta_1 * \ln unit\ value_j + \beta_2 * \ln third\ party\ value_j + \beta_3 * year + a_j + u_j$$

Where *import value*$_j$, the dependent variable, is the value of imports from the exporter *j*. The primary independent variable is *unit value*$_j$, the unit value of the commodity from the exporter *j*; *third party value*$_j$ is the average unit value of the commodity from all exporters other than *j* – as such, I capture the response of quantity

15 Although elasticities represent the response of supply and demand to a change in price, it is not possible to obtain actual "price" by commodity, given that SITC4 level commodities are aggregated such that there are several relevant prices for any given commodity. Instead, consistent with economists' practices, I construct the unit value of imports and exports by commodity as the total value divided by quantity traded. Additionally, there are multiple entries for some commodities by dyad in a given year because this trade is measured using multiple units (for example, weight or number). In these cases I calculate unit value using the unit comprising the largest value of imports or exports, respectively. I then condense the multiple observations into one observation, with value equal to the total value of trade across all units in a given commodity.

16 Results are consistent in models using year dummy variables instead of a counter. I present results using the year counter because it produces fewer missing elasticities due to insufficient observations.

imported from a given country of origin due to price controlling for the price of alternatives; $year_t$ is a trend counter spanning from 1984 to 2000; a_j is the unit (exporter) specific error; and u_j is random error.

The regression for export elasticities, run for each exporter (again, state *i* within dyad *ij*, as each state is typically both an importer and exporter), by commodity, is specified as:

$$\ln export\ value_j = \beta_0 + \beta_1 * \ln unit\ value_j + \beta_2 * \ln third\ party\ value_j + \beta_3 * year + a_j + u_j$$

Where $export\ value_j$, the dependent variable, is the value of exports to the importer *j*. The primary independent variable is $unit\ value_j$, the unit value of the commodity to the importer *j*; $third\ party\ value_j$ is the average unit value of the commodity to all importers other than *j*; $year_t$ is a trend counter spanning from 1984 to 2000; a_j is the unit (importer) specific error; and u_j is random error.

The raw elasticity measures are simply β_1 from each regression. However, because these variables have large ranges, I standardize them from 0 to 1, with zero as the most elastic and 1 as the most inelastic. Furthermore, the largest and smallest elasticities represent severe outliers, so I set raw elasticities smaller than the 5th percentile to 0, and raw elasticities larger than the 95th percentile to 1, with raw elasticities between standardized appropriately. As such, my standardized measures avoid extreme skewness at both low and high extremes. Ultimately, my standardized elasticities serve as weights regarding exit costs; when supply or demand is elastic, trade is weighted down – potentially to zero (although this is rare), while, at the most inelastic supply and demand, trade retains its full value.

2.4.3. Estimation Results

Results of elasticity estimation are summarized in Table 2.1. Overall, the fit of elasticities seems good, with average Z scores of 2.59 for imports demand and 4.19 for export supply. At first glance, it appears problematic that approximately 40% of estimated elasticities are not significant at the 0.1 level. Specifically, this non-significance signals an absence of statistical evidence that demand or supply, respectively, is not completely inelastic. However, in nearly all these cases, estimates that are insignificant have the sign reverse of what I would expect (*i.e.* positive import demand elasticities and negative export supply elasticities). As such, the standardized elasticities tend to be coded as equal to 1 – that is, as estimation results suggest, they are coded as completely inelastic. Furthermore, in empirical tests using elasticities, results are unchanged when using either all estimated elasticities or a subsample of only significant elasticities.

Table 2.1. Significance for raw import demand and export supply elasticities

Import demand		Export supply	
Z score mean*	2.590914	Z score mean*	4.188798
Z score St. dev*	4.62309	Z score St. dev*	111.6159
% significant 0.05 level	51.2	% significant 0.05 level	50.2
% significant 0.1 level	60.6	% significant 0.1 level	58.4
* statistics calculated with absolute values of z scores			

2.4.3.1. The Shape of Supply and Demand

How do states react to changes in prices for their imports and exports? The following section details how elasticities vary by country and commodity (see the Appendix for detailed tables of import and export elasticities by SITC 2-digit commodity and by country). First, as expected, import demand has, on average, a negative sign, while export supply has a positive sign. As noted above, there are instances of positive import demand elasticities and negative export supply elasticities, yet in nearly all such

cases, these elasticities are not statistically significant from perfect inelasticity.

Table 2.2. Summary statistics for import demand and export supply elasticities, aggregate

Import demand				Export supply			
Raw		Standardized		Raw		Standardized	
Mean	-0.094653	Mean	0.5521871	Mean	0.8597293	Mean	0.5512125
Median	-0.007044	Median	0.5734234	Median	0.0445191	Median	0.561637
St. dev	26.43111	St. dev	0.2259369	St. dev	42.90884	St. dev	0.2121636
Min	-1984.368	Min	0	Min	-570.1207	Min	0
Max	1034.193	Max	1	Max	3364.251	Max	1
N	9311	N	9311	N	7246	N	7246

Note: for standardized elasticities, 0 refers to most elastic and 1 refers to most inelastic

Next, I present breakdowns of elasticities by democracy and power in order to determine if the shape of supply and demand tend to be influenced by either factor. Democracies tend to trade more (*e.g.,* Russett and Oneal 1999) while more powerful states tend to have larger economies (*e.g.,* Hirschman 1945), both of these phenomena suggesting potential for more elastic supply and demand. First, looking at democracies (defined as states with combined democracy-autocracy scores from the Polity IV project [Marshall and Jaggers 2009] greater than 5), Table 2.3 shows that mean elasticities do tend to be higher (*i.e.,* more elastic) than the aggregate case. Conversely, Table 2.4, looking at non-democracies, suggest the opposite case, more inelastic supply and demand.

[Table follows on next page]

Table 2.3. Summary statistics for import demand and export supply elasticities, democracies

Import demand				Export supply			
Raw		Standardized		Raw		Standardized	
Mean	-.1387039	Mean	.5542385	Mean	1.231343	Mean	.5598946
Median	-.0038091	Median	.5744569	Median	.0262779	Median	.5653619
St. dev	4.971369	St. dev	.2232921	St. dev	51.27929	St. dev	.1953986
Min	-188.3884	Min	0	Min	-207.1324	Min	0
Max	102.8472	Max	1	Max	3364.251	Max	1
N	5337	N	5337	N	4816	N	4816

Note: for standardized elasticities, 0 refers to most elastic and 1 refers to most inelastic
Democracy coded as polity2 score greater than 5

Table 2.4. Summary statistics for import demand and export supply elasticities, non-democracies

Import demand				Export supply			
Raw		Standardized		Raw		Standardized	
Mean	-.0354927	Mean	.549432	Mean	.1232316	Mean	.5340054
Median	-.0115871	Median	.5719715	Median	.0951628	Median	.5512953
St. dev	40.0481	St. dev	.2294402	St. dev	16.6815	St. dev	.2411033
Min	-1984.368	Min	0	Min	-570.1207	Min	0
Max	1034.193	Max	1	Max	311.5764	Max	1
N	3974	N	3974	N	2430	N	2430

Note: for standardized elasticities, 0 refers to most elastic and 1 refers to most inelastic
Non-democracy coded as polity2 score less than or equal to 5

Table 2.5, looking at relatively powerful states (defined as those with greater than average CINC scores) and Table 2.6, looking at less powerful states, show a similar, but weaker pattern. Specifically, powerful states tend to have more elastic supply and demand. For less powerful states, however, mean import demand is statistically indistinguishable from the baseline case (although statistically lower than that for powerful states).

Table 2.5. Summary statistics for import demand and export supply elasticities, more powerful states

Import demand				Export supply			
Raw		Standardized		Raw		Standardized	
Mean	-.0853349	Mean	.5452932	Mean	1.663488	Mean	.5727159
Median	-.0108172	Median	.5722175	Median	.0146621	Median	.5677339
St. dev	33.57693	St. dev	.2283697	St. dev	74.22069	St. dev	.1794958
Min	-87.77044	Min	0	Min	-50.20338	Min	0
Max	102.8472	Max	1	Max	3364.251	Max	1
N	2028	N	2028	N	2060	N	2060

Note: for standardized elasticities, 0 refers to most elastic and 1 refers to most inelastic
More powerful states coded as those with greater than mean CINC score

Table 2.6. Summary statistics for import demand and export supply elasticities, less powerful states

Import demand				Export supply			
Raw		Standardized		Raw		Standardized	
Mean	-.0972472	Mean	.5541067	Mean	.5404575	Mean	.5426708
Median	-.0061854	Median	.5736976	Median	.0564185	Median	.5592071
St. dev	29.72902	St. dev	.225233	St. dev	19.61526	St. dev	.2232627
Min	-1984.368	Min	0	Min	-570.1207	Min	0
Max	1034.193	Max	1	Max	834.4824	Max	1
N	7283	N	7283	N	5186	N	5186

Note: for standardized elasticities, 0 refers to most elastic and 1 refers to most inelastic
Less powerful states coded as those with less than or equal to mean CINC score

2.5. Operationalizing Exit costs

2.5.1. Creating the Commodity Level Exit Costs Measure

To ensure the robustness of my results, I utilize two operationalizations of exit costs. The first uses trade share as the measure of interaction, consistent with Crescenzi's operationalization. The second utilizes trade as a percentage of GDP (*aka* dependence), to provide additional confidence that resulting measures of exit costs are valid (see Gartzke and Li 2003; Barbieri and Peters 2003 for a useful exchange on measuring trade interaction).[17] By importer, exporter, commodity, and year, I multiply the elasticities

17 An important aspect of the Gartzke and Li/Barbieri and Peters debate is how to measure state

(which are constant over time and by importer/exporter) with the importer's (exporter's) trade interaction measure (share or dependence, respectively).[18] I then add each state's import and export exit costs together such that the final measure of commodity level exit costs is at the directed dyad level,[19] with two variables per directed dyad for each commodity: A's exit costs and B's exit costs. Specifically:

$$C_{ijct} = (e_{mic} * m_{ijct}) + (e_{xic} * x_{ijct})$$

Where C_{ijct} is the exit costs of state *i* on state *j*, for commodity *c*, and at time *t*; e_{mic} is the import price elasticity of demand of importer *i*, for commodity *c*; m_{ijct} is the the interaction measure (share or dependence) with regard to state *i*, from exporter *j*, for commodity *c*, and at time *t*; e_{xic} is the export elasticity of supply for exporter *i*, for commodity *c*; and x_{ijct} is the the interaction measure (share or dependence) with regard to state *i*, to importer *j*, for commodity *c*, and at time *t*.

2.5.2. Aggregate Exit Costs

To create yearly measures of exit costs for each state in a dyad, I sum all commodity-level exit costs measures within a directed dyad. The final measure takes into account the total gains that a state receives from trade from a particular dyadic partner in

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dependence on trade. However, I argue, in accordance with Crescenzi (2003, 2005), that both trade share *and* trade as a percentage of GDP are ultimately measures of interaction, capturing distinct aspects of interaction. Trade share captures the relative salience of dyadic trade with respect to all trade partners, while trade as a percentage of GDP captures the salience of dyadic trade with respect to each state's income. Yet neither trade share nor trade as a percentage of GDP alone provide any information regarding whether dyadic trade, if lost, could be easily replaced.

18 For each state, *trade share* is calculated as the value in U.S. dollars of the commodity traded, divided by the state's total trade of this commodity (both values are from Feenstra *et al.* 2005). Trade dependence is calculated as the value of the commodity traded (from Feenstra et al. 2005), divided by the state's GDP (from Gleditsch 2004).

19 In many cases, states do not import and export the same commodity. In these cases of *inter-industry* trade, the commodity-level exit cost is equal to the product of trade elasticity and interaction measure for the direction of trade in which the state engages.

a given year. Specifically:

$$E_{ijt} = \sum C_{ijct}$$

Where E_{ijt} is the final measure of exit costs at the directed dyad year level; and C_{ijct} is the commodity level exit cost measure calculated above. Share-based exit cost measures are highly skewed, so I take the natural log of these values. 2.7 provides a summary of my exit cost measures and a comparison to Crescenzi's (2003) measures. Additionally, in order not to waste important commodity-level variation, I also construct exit costs for *strategic* and *non-strategic* exit costs. I define strategic exit costs as fuels, iron and steel, industrial machinery, and arms. Specifically, strategic commodities encompass SITC 2 digit commodity codes 28, 32, 33, 34, 35, 67, 71, 72, 73, and 74; and SITC 4 digit commodity codes 8911, 8912, 8913 and 8919 (see the Appendix for a description of commodity codes).

Table 2.7. Comparison of exit costs measures

	Country-level	Directed dyad year-level	Final measure spacial and temporal domain
This study	import demand and export supply elasticities (by commodity; generated from fe models using Feenstra et al. 2005 data)	1: import share (by commodity, by year; calculated as imports to A from B, divided by A's total imports of this commodity; from Feenstra et al. 2005 2: import dependence (by commodity, by year; calculated as imports to A from B, divided by A's GDP; from Feenstra et al. 2005, Gleditsch 2004) 3: export share (by commodity, by year; calculated as exports from A to B, divided by A's total exports of this commodity; from Feenstra et al. 2005 4: export dependence (by commodity, by year; calculated as exports from A to B, divided by A's GDP; from Feenstra et al. 2005, Gleditsch 2004)	158 counties 13,238 directed dyads Yearly measures (1984-2000) 2 share-based measures per directed dyad year, per commodity 2 dependence-based measures per directed dyad year, per commodity Average of 64 commodities traded per state, 32 commodities per dyad.
Crescenzi 2003, 2005	N/A	1: import elasticity (aggregate; from Marquez 1990) 2: average import share (aggregate; calculated as imports to A from B, divided by A's total imports, averaged over 1966 to 1992; from Barbieri 1995	6 countries 40 directed dyads No temporal variation 2 measures per directed dyad No commodity variation

2.4.2.1. Summary Statistics for Exit Cost Measures

Table 2.8 presents summary statistics for aggregate exit costs measures for state A in a directed dyad (state B's summary statistics are identical). These statistics show predictably, that exit costs for strategic commodities are typically far lower than for non-strategic commodities. Furthermore, exit costs derived from trade as a percentage of GDP have wider variation than the share-based measures.

Table 2.8. Summary statistics for aggregate exit cost measures

	Mean	Median	St. dev	Min	Max	Obs.
Share-based						
Total	0.98	0.550	1.12	0	6.34	169,000
Strategic	0.38	0.042	0.65	0	4.59	169,000
Non-strategic	0.89	0.478	1.06	0	6.15	169,000
Dependence-based						
Total	0.23	0.013	1.61	0	100	169,000
Strategic	0.06	0.001	0.47	0	31.63	169,000
Non-strategic	0.17	0.010	1.46	0	100	169,000

Finally, Table 2.9 displays correlations both among different measures of exit costs and across dyad members. The correlation matrix shows that, for the share-based measures, total exit costs, strategic exit costs, and non-strategic costs are all very highly correlated (between 0.9 and 0.99) for a given dyad member, ruling out the possibility of using all three measures in the same statistical model. Correlations across dyad members is moderate for share-based measures, averaging 0.45. Trade dependence-based exit costs vary more widely, with much lower correlations between dyad members. For each state, strategic and non-strategic dependence-based exit costs correlate at 0.19, while the correlation between non-strategic and total dependence-based exit costs is very high, at 0.96. Importantly, dependence-based exit cost measures between dyad members have

very low correlations, averaging 0.02.

Table 2.9. Correlations between Dyadic exit cost measures

			State A						State B					
			Trade share			Trade dependence			Trade share			Trade dependence		
			Tot	Strat	Non strat	Tot	Strat	Non strat	Tot	Strat	Non strat	Tot	Strat	Nonstrat
State A	Trade share	Total	1											
		Strategic	0.91	1										
		Nonstrat	0.99	0.89	1									
	Trade dep.	Total	0.28	0.32	0.28	1								
		Strategic	0.26	0.32	0.26	0.46	1							
		Nonstrat	0.22	0.25	0.23	0.96	0.19	1						
State B	Trade share	Total	0.46	0.42	0.46	0.09	0.08	0.08	1					
		Strategic	0.42	0.41	0.41	0.09	0.09	0.07	0.91	1				
		Nonstrat	0.46	0.41	0.47	0.1	0.08	0.08	0.99	0.89	1			
	Trade dep.	Total	0.09	0.09	0.1	0.03	0.01	0.02	0.28	0.32	0.28	1		
		Strategic	0.08	0.09	0.08	0.01	0.01	0.01	0.26	0.32	0.26	0.46	1	
		Nonstrat	0.08	0.07	0.08	0.02	0.01	0.02	0.22	0.25	0.23	0.96	0.19	1

2.5. Summary

In this chapter, I estimate practical measures of the shape of supply and demand, using these elasticities to derive measures of the costs associated with cutting off trade for dyad members. My measures capture exit costs at the commodity level, as well as aggregated across dyad members for all commodities, strategic commodities, and non-strategic commodities. I contend that these measures contribute to the large literature examining the impact of trade on international politics – and, particularly, on international conflict – by capturing the degree and potential disparity of trade gains, which may be used as bargaining leverage by less vulnerable trade partners. These measures have other practical uses as well, as they may be used to address the opposite relationship – the impact of politics on the response in demand and supply given change

in prices and on the accumulation of exit costs. In the next chapters, I test the impact of exit costs on militarized conflict (Chapter 3) and sanction threats (Chapter 4), and then look at the conditioning impact of political institutions – specifically, democracy – on the relationship between demand inelasticity and protectionism (Chapter 5).

CHAPTER 3. PEACE IS THE NATURAL EFFECT OF SYMMETRY: DYADIC TRADE, EXIT COSTS, AND CONFLICT

3.1. Introduction

With record levels of trade flowing across state borders, scholars advocating the "peace through trade" hypothesis predict that militarized conflict should become increasingly rare. Yet history has shown that this relationship is not so simple. World War I occurred despite then unprecedented levels of trade, and amidst predictions that such costly conflicts would be unthinkable (Angell 1913).[20] Similarly, conflicts have raged in recent years despite high and growing levels of trade. Improving our understanding of when and how trade precludes or encourages conflict is crucial, particularly given the rise of China as a trading state and military power. Yet, despite significant advances in recent years, theoretical and empirical obstacles continue to preclude a clear understanding of the relationship between trade and conflict (Mansfield and Pollins 2001).

In this chapter, I highlight the importance of accounting for the potentially differential vulnerability inherent in trade (*e.g.,* Hirschman 1945; Keohane and Nye 1977; Wagner 1988). To operationalize vulnerability, I expand on Crescenzi's (2003, 2005) concept of *exit costs*, which explicitly capture the ability of states to adjust to the interruption of trade. I argue that asymmetric exit costs are connected both to higher incentives for coercion and higher gains from conquest. As such, an imbalance in exit costs suggests an elevated likelihood that conflict occurs. Conversely, mutually high exit costs encourage peace because they are associated with higher benefits from cooperation

20 Following World War I, Angell (1933) revised this stance, claiming that war is merely unprofitable, occurring when leaders fail to recognize this fact.

and higher costs for conflict. I illustrate this relationship using the case of Japan and the United States prior to World War II, demonstrating that the potential for states to recoup trade losses by force leads to conclusions differing from extant research in this area (*e.g.,* Crescenzi 2003, 2005).

This chapter fills an important gap in the literature on trade and conflict as I look beyond trade interaction – the blunt measure that is typically utilized in the empirical literature – to the costs for each trade partner associated with interrupting trade. Although recent research suggests that trade interaction is sufficient to reduce hostilities among trade partners, these studies ignore an important determinant of dyadic conflict: vulnerability resulting from the difficulty states face finding alternate markets or produce goods domestically, should a trade partner terminate dyadic trade. Although extant studies acknowledge this source of tension, the unavailability of data limits severely the extent to which exit costs may be included in examinations of dyadic conflict. To address this limitation, I introduce measures of exit costs at the directed dyad level, capturing the vulnerability inherent in trade for 13,238 directed dyads, over 17 years (from 1984 to 2000). Furthermore, extant exit cost measures are limited by their highly aggregated nature. To alleviate this problem, I create new measures at the Standard International Trade Classification (2 digit) commodity level, and then develop additive indices from these commodity-level exit costs.[21]

I proceed with a discussion of extant literature examining trade and conflict, highlighting the limited explanatory power associated with a focus on trade interaction. I

21 The data I develop are useful for a wide array of research questions in IR and are available from the author; however, in this paper, I focus on the simple, yet enduring question: what is the relationship between trade and conflict?

then discuss the connection between exit costs and vulnerability, linking exit costs to the costs and benefits of conflict. With exit cost measures developed from trade elasticities, and spanning directed dyad years between 1984 and 2000, I test three hypotheses, finding support for the argument that unbalanced exit costs are associated with more dyadic conflict, while high, symmetric exit costs are pacifying.

3.2. Exit Costs, Trade Interaction, and Conflict

International trade conveys benefits and costs to trading states. Liberal arguments tend to focus on trade gains that result from comparative advantage – economic benefits of specialization and cooperation.[22] Indeed, trade gains are also exit costs; and because these trade gains terminate (*i.e.,* as exit costs are paid) at the onset of conflict, they serve as an opportunity cost to violence (Polachek 1980; Oneal, Oneal, Maoz, and Russet 1996; Oneal and Russett 1997, 2001; Russett and Oneal 2001). Conversely, realist arguments focus on the political costs associated with trade, highlighting the potential for asymmetric trade gains to be leveraged as a means of coercion by the less vulnerable state (Taussig 1927; Hirschman 1945; Keohane and Nye 1977; Wagner 1988; Barbieri 1996). Furthermore, realists suggest that states have reason to fear the trade gains of their partners translating into military power to the extent that they may initiate conflict rather than allow adversaries to increase in relative capabilities.[23] Ultimately, exit costs have a dualistic nature. They exist when a trade relationship is at least somewhat beneficial to both parties, yet the fact that they need not be equal between trade partners suggests the

22 Dating back at least as far as Montesquieu (1748) and Kant (1795), the liberal banner actually encompasses several arguments linking trade to reduced conflict.
23 But see Morrow (1997), who suggests that this fear tends not to preclude trade. Furthermore, Powell (2004, 2006) argues that trade gains do not translate to change in relative power quickly enough to incite preemptive violent challenges.

potential for tension between trade partners.

Despite the fact that exit costs are intrinsic elements of both liberal and realist theories linking trade to conflict, the vast majority of empirical studies testing this relationship measure trade as the extent of interaction (trade flows, often weighted by GDP or total national trade). This modeling decision tends to follow from practical concerns, given that measures of trade interaction are easily available.[24] However, because these blunt measures ignore the exit costs associated with cutting off trade relations, they are limited in their explanatory power. For example, a larger volume of dyadic trade may not equate with a larger incentive to avoid conflict (as adherents of the peace through trade hypothesis contend) if one or both dyad members can easily reroute lost trade flows to alternative markets; conversely, smaller volumes of trade may be pacifying if both trade partners cannot reap equivalent gains with third parties. Similarly, large trade volumes may not raise concerns for vulnerability if interrupted trade would be easily replaced. Given that measures of trade interaction are not well suited to answering research questions regarding the costs of cutting off trade, these measures have instead facilitated a second strand of liberal theory,[25] which links trade to peace through increasing information flows that accompany economic interaction, reducing the information asymmetries that lead to conflict (Morrow 1999; Gartzke and Li and Boehmer 2001; Gartzke 2003; see also Fearon 1995).[26]

24 Common sources are available from Barbieri et. al. (2008), Russett and Oneal (2005), and Gleditsch (2004).

25 Additionally, there are realist theories connecting trade interaction to conflict. Waltz (1979) links trade to increased likelihood for conflict simply because more trade interaction equates with more opportunities for conflicts of interest to arise.

26 In fact, proponents of the informational pacifying effect of trade tend to discount the opportunity cost argument, claiming that asymmetric exit cost-based leverage is subsumed into bargaining (Morrow 1999; Gartzke 2003). However, Polachek and Xiang (2010) argue that Gartzke is mistaken to discount the

3.3. The Impact of Exit Cost Extent and Symmetry on Conflict

Montesquieu (1750) famously claimed that "peace is the natural effect of trade. Two nations who traffic with each other become reciprocally dependent; for if one has an interest in buying, the other has an interest in selling." This argument carries the implicit assumption that there is a natural symmetry to trade relationships. At first glance, this assumption appears reasonable, given that individual buyers and sellers both profit from exchange and, therefore, would lose if trade were terminated – *i.e.*, if exit costs are paid. Yet, in the aggregate, there is no guarantee that exit costs are equivalent between trade partners. For example, when terminating trade of a good that is in high demand, the exporter may easily find alternate buyers in other states, whereas the importer would likely have to pay higher prices to obtain that same good elsewhere or produce it domestically.

Keohane and Nye (1977; see also Hirschman 1945; Wagner 1988) argue that trade may spur dyadic conflict because a state reaping trade gains – and therefore facing exit costs – is vulnerable to its trade partner, which can use the threat of terminating this trade relationship in order to coerce change in the dyadic status quo. Crescenzi (2003, 2005), through formal analysis, deduces that higher exit costs are associated with a higher likelihood of low-level conflict (typically economic or political sanctions or threats thereof – characterized by Crescenzi as *economic exit*), but that high exit costs for either the challenger or defender in a bargaining situation are associated with less high-level political conflict and military conflict (*e.g.,* breaking of diplomatic relations; threats, displays, or use of force).

pacifying effect of opportunity costs, leaving this question open for further examination.

However, I contend that the relationship between trade and conflict is conditional on the *relative* extent of exit costs, and specifically, that unbalanced exit costs are aggravating to dyadic relations. For the United States, its allies, and Japan, the lead-up to World War II illustrates the potentially aggravating effect of unbalanced exit costs. Prior to the war, Japan relied on the U.S. for a variety of vital commodities, most importantly oil and steel. Conversely, although the United States benefitted from its exports to Japan, it risked relatively little economic harm if it terminated this trade, given the universally high demand for these commodities. Opposing Japan's imperialist agenda in East Asia, the United States attempted to leverage Japan's higher exit costs as political power. Beginning in July 1940, the U.S. began imposing harsh sanctions on Japan with the threat of more stringent consequences for Japan's continuing hostility (Feis 1950; Hufbauer *et al.* 2007). This attempt at coercion reached a breaking point when, in July 1941, Roosevelt froze Japanese assets in the U.S. and severely limited petroleum exports to Japan. Simultaneously, the United Kingdom renounced its trade treaties with Japan; and the Netherlands, which had previously guaranteed petroleum exports to Japan, strictly limited trade of this vital commodity. The Japanese response, far from submitting to U.S. demands, was "to rush full speed ahead, lest they not have enough oil to reach those distant ports which were marked on the Imperial chart" (Feis 1950, 239). After attacking Pearl Harbor on December 7 in an attempt to eliminate U.S. resistance, the Japanese quickly captured oil and mineral producing territory from the Dutch and British, taking by force that which was denied to them in trade.[27]

27 Although the Japanese attacked the United States in large part to facilitate the conquest of U.S. allies' colonial territory, the capture of the Philippines provided spoils from the U.S. itself, including iron, chrome, manganese, and other minerals, which the U.S. had embargoed in May 1941 (Feis 1950, 205–206; Hufbauer *et al.* 2007).

In Crescenzi's (2003, 2005) formulation of the relationship between exit costs and conflict, higher exit costs for either the challenger or target are associated with reduced likelihood of high level conflict because such conflict would be more costly. Yet this contention ignores Liberman's (1993, 1996) examination of the "spoils of conquest." Specifically, Liberman demonstrates that conquest can be profitable if the value of captured resources outweigh the costs associated with controlling these resources. I contend that high exit costs suggest that spoils would be valuable, *ceteris paribus*, given the difficulty and cost associated with replacing lost trade. Indeed, Japan's high exit costs prior to World War II were connected directly to the benefits of conflict as well as its costs, as Japan had both economic and strategic incentives to capture the commodities on which it so depended.

This connection between exit costs and the benefits of conflict is not addressed in Crescenzi's model, which contains the assumption that states cannot recoup exit costs by force from defeated adversaries. For example, even when victorious in the *crisis equilibrium* of Crescenzi's game (in which political and/or military conflict occurs), a challenger gains only the value of its original demand, paying exit costs as well as additional costs associated with conflict (Crescenzi 2003, 814-815). A victorious target fares even worse, paying exit costs and the costs of conflict, yet gaining nothing. However, Japan gained a considerable economic and strategic benefit from its (temporary) conquests in the Pacific. Crescenzi's parametrization of expected outcomes seems reasonable for the majority of political disputes, in which military conflict is probably not a serious consideration. However, in cases where militarized conflict is a

realistic possibility, the benefits of conquest should be considered in the relationship between exit costs and conflict.

Starting from the contention that exit costs affect *both* the costs and benefits of conflict, I contend that the events leading up to the attack on Pearl Harbor follow from a predictable relationship.[28] First, in accordance with Crescenzi's theory, the opportunity cost of military conflict, and, hence, the incentive to avoid military consequences of political disputes, is lower for a state that faces lower exit costs. Furthermore, given that a state with low exit costs has a trade partner with high exit costs, the differing ability of states to endure lost trade may lead to coercion attempts by the state facing relatively little harm if trade is interrupted.[29] Similarly, a state's relatively low exit costs may facilitate the initiation of militarized disputes against its trade partner in an attempt to gain concessions because it has relatively little to lose and the ability to impose significant economic harm on its adversary. Although the potential initiator could simply terminate trade as a punishment for the target's refusal to submit to its demands, prior research shows that militarized conflict is likely to follow this type of economic coercion

28 Perhaps the most notable examples of this relationship are colonial conquests by the Portuguese, Dutch, and British in South East Asia. These European powers subjugated existing empires (*e.g.*, Mughal India and Qing China) in order to control directly highly demanded commodities. However, even in modern times, the concept that the spoils of conquest pay is evident in early predictions that oil revenue would at least partially pay for the U.S. war in Iraq. Space considerations preclude a detailed discussion of these examples.

29 However, Wagner (1988) demonstrates that asymmetric vulnerability alone is insufficient for political coercion to succeed. Rather, there must be unexploited bargaining advantage in favor of the state attempting coercion; the target of coercion must prefer giving in to the demand rather than enduing the interruption of trade. Given that states do not typically bargain to account for unequal trade gains, relatively lower exit costs suggest that there *is* some degree of unexploited bargaining advantage, ceteris paribus. A rational state facing such an unexploited bargaining advantage should demand just enough from its trade partner such that the partner prefers making political concessions and avoiding economic exit. However, states attempting to leverage the vulnerability of their trade partners are unlikely to know precisely how much they can successfully demand. Yet, for leaders, the belief that “they need us more than we need them” is nonetheless likely to spur such threats when contentious issues arise.

(Drezner 1998; Lektzian and Sprecher 2007). This discussion leads to my first hypothesis:

Hypothesis 3.1: Lower exit costs are associated with a higher likelihood that a state initiates militarized conflict against its trade partner, given that its trade partner's exit costs are high.

Were military force not an option, the target of attempted economic coercion would be rational to concede if the cost thereof is lower than the cost of economic exit. Yet, given the existence of a dyadic dispute in which its trade partner attempts to leverage asymmetric exit costs, the economically vulnerable state has the option to use force in an attempt to recapture as the spoils of war any paid exit costs. Indeed, the very fact that exit costs are high suggests that these potential spoils of war are extremely profitable. As an added benefit, the capture of strategic resources in the short term would preclude future coercion attempts, as the victorious state in this case would eliminate its vulnerability. Even within dyads maintaining relatively good relationships, if a state with high exit costs perceives even the potential for future coercion, then this asymmetric trade relationship may itself serve as a source of political conflict, which may then escalate. This argument leads to my second hypothesis:

Hypothesis 3.2: Higher exit costs are associated with a higher likelihood that a state initiates militarized conflict against its trade partner, given that its trade partner's exit costs are low.

However, exit cost symmetry is not the sole factor associated with peace, as states may have symmetric exit costs because neither state risks any harm if trade is interrupted,

or because both states risk severe harm. I contend that, given exit cost symmetry within a dyad, higher exit costs are associated with a lower likelihood of conflict because, in this case, both trade partners have a lot to lose by terminating trade (high costs) and little reason to coerce the other side. Although attempted conquest of strategic commodities is always an option, there exists, with mutually high exit costs, a peaceful alternative to attempted conquest, as trade in this case provides mutual gains without spurring political coercion, and without the uncertainty and costliness inherent in military conflict (*e.g.*, Rosecrance 1986). Even trade in commodities lacking strategic value, if terminated, involves a loss of income for both sides when exit costs are mutually high. As such, the existence of high and symmetric exit costs suggests that Montesquieu's argument regarding buyers and sellers extends to state relationships. In short, peace is the natural effect of trade when trade gains, and hence, exit costs, are balanced between trade partners. This argument leads to my third hypothesis:

Hypothesis 3.3: Higher exit costs for both trade partners are associated with a lower likelihood that either state initiates militarized conflict.

3.4. Research Design

The operationalization of both trade and conflict continues to occupy the attention of scholars. To test my hypotheses that asymmetric exit costs foster the initiation of dyadic violence, while mutually high exit costs facilitate peace, I code exit costs for each member of a directed dyad *conditional* on those of the other dyad member, and test their impact on a variety of conflict indicators. My unit of analysis is the directed dyad year,

and my analysis spans from 1985 to 2001.[30] I cluster standard errors by the non-directed dyad to account for non-independence by country pairs. Furthermore, I include explanatory variables for peace years, peace years squared, and peace years cubed to account for duration dependence inherent in trade and conflict studies (Carter and Signorino 2007),[31] and I lag all explanatory variables by one year (except for the aforementioned peace years variables) to mitigate simultaneity bias.[32] Given that lagged explanatory variables may not be sufficient to preclude endogeneity with regard to the trade-conflict relationship (Keshk, Pollins, and Reuveny 2004; Kesh, Reuveny, and Pollins 2010), I also ran several robustness checks using Keshk's (2003) simultaneous equation model package for Stata. Results of these models (which are available by request from the author) suggest that my research design does not suffer from endogeneity bias.[33]

I test my hypotheses on a variety of dependent variables capturing dyadic conflict. In order to facilitate comparison of my results to Crescenzi's (2003, 2005), and to address disagreement regarding the appropriateness of using MID initiation to address the extent of dyadic conflict (see Pevehouse 2004), I code the primary conflict variables using

30 To mitigate bias resulting from the use of directed dyads, I rerun all models excluding all B vs. A dyads in cases where A initiates conflict against B (unless B initiates a separate conflict event against A), obtaining equivalent results (Bennett and Stam 2000). I also ran models examining non-directed dyads, using non-directed indicators of exit cost extent and symmetry. Results in these models are consistent with those presented, and are available from the author by request.

31 These cubic polynomials are essentially equivalent to the more common cubic splines (Beck, Katz, and Tucker 1998), yet polynomials are easier to create and interpret, and are (arguably) better measures of duration dependence. Furthermore, whereas cubic splines were developed specifically for binary dependent variables, one can employ cubic polynomials in any statistical model of conflict, as they simply specify a highly non-linear effect of peace duration.

32 It is due to these lags that my analysis spans 1985 to 2001 whereas my exit cost variables span 1984 to 2000.

33 These models also provide evidence that conflict reduces exit costs, most likely because economic exit occurs and, therefore, these exit costs are paid.

events data – specifically the World Events Interaction Survey (WEIS) and the Integrated Data for Events Analysis (IDEA) datasets.[34] Using Crescenzi's (2005) classification, I divide dyadic events into 1) high conflict, which is roughly analogous to MID initiation, 2) low conflict, which captures economic exit or threats thereof, and 3) status quo, associated with cooperation and routine dyadic events.[35] I aggregate these events data such that I have one observation per directed dyad year.I use zero-inflated negative binomial models to estimate the counts of "high conflict" events and "low conflict" events (see Pevehouse 2004 for a discussion of count models in studies of trade and conflict).[36]

Additionally, as a robustness check, I code two dependent variables for MID initiation; specifically, I code the initiation of *any MID* and *fatal MIDs* in order to capture the impact of exit costs on commonly used measures of conflict. I use rare events logit models to address the effect of exit costs on these dependent variables, excluding directed dyad years in which a MID is ongoing (Bennett and Stam 2000).[37] MID initiation is similar to Crescenzi's (2003, 2005) "high level conflict" coding of events data, and also

34 Neither events dataset spans the entire range of years in my sample. As such, I use WEIS for 1985 to 1989, and IDEA for 1990 to 2001. Given that I aggregate events into two comparable categories per dyad year, my final variables are fairly consistent between data sources. However, to be sure that my results are not biased due to data incompatibility, I rerun all events models on each data source separately, obtaining equivalent results.

35 Another option would be to use Goldstein's (1992) cooperation and conflict scale. I choose *not* to employ this scale in accordance with Pevehouse's (2004) contention that the event counts are the critical indicators of cooperation and conflict (see also Schrodt and Gerner 2002). Specifically, given that increased cooperation or conflict typically generates multiple event counts, Goldstein's scale, which attaches weights to specific events, potentially inflates measures that are aggregated over time.

36 On average, there are 1.42 status quo events, 0.16 low conflict events, and 0.07 high conflict events in a given dyad year. However, events tend to cluster, with a maximum of 681 status quo events, 371 low conflict events, and 211 high conflict events. As such, ZINB regressions provides insight into the severity (in terms of frequency) of conflict, as well as whether conflict occurs at all.

37 Use of rare events logit models are justified because MID initiation is an exceedingly rare event (King and Zeng 1999), with a baseline probability equal to 0.0015.

useful to facilitate comparison of my results with other research, given its common use in studies of trade and conflict.

3.4.1. Operationalizing Exit Costs

To capture the extent and similarity of exit costs associated with trade, I employ the measures developed in Chapter 2: yearly measures of *state A's exit costs* with respect to trade with *state B* and *state B's exit costs* with respect to trade with *state A*. Importantly, I am interested in each state's exit costs conditional on the exit costs of the other side. As such, I include an interaction of *A's exit costs* and *B's exit costs*. Each state's exit cost measures incorporate trade elasticities (both import demand and export supply, for imports and exports, respectively) along with an indicator of trade interaction. In order to test for the robustness of my results, I utilize two versions of the exit costs measures. The first uses *trade share* as the interaction component, while the second uses *trade as a percentage of GDP* (commonly refereed to as trade dependence), both of which are outlined in Chapter 2.

Mathematically, the dependence-based measure of exit costs is a weighted version of the typical interaction measure. In fact, if all import and export elasticities for a dyad member were equal to 1 (the most inelastic), then the exit cost measure would be identical to the interaction measure. The trade-share based measure is distinct, however, because I do not divide the summed value by the number of commodities traded within dyads. To do so would generate an *average* exit costs measure, whereas I am more interested in *total* exit costs. To illustrate, it is helpful to imagine a scenario in which one state imports two commodities from a given partner while a second state imports ten.

Assuming that the exit costs are equal across these two states and twelve commodities, a measure of *average* exit costs would rate these two importers as having identical exit costs, while a measure of total dyadic exit costs correctly codes the second state as having much higher exit costs than the first.[38]

For the final measures of exit costs, I include variables for *A's exit costs* and *B's exit costs*.[39] Furthermore, given the conditional nature of hypotheses 3.1 through 3.3, I create a measure of *joint exit costs* – the interaction of each state's exit costs measure. Therefore, the coefficients for the components represents the effect of each state's increasing exit costs given that the other state's exit costs are held at zero, addressing hypotheses 3.1 and 3.2. The interaction term, which must be interpreted with the components, addresses hypothesis 3.3 (Braumoeller 2004; Brambor *et al.* 2006; Kam and Franzese 2007).

Finally, given that commodity-level data provide detailed information regarding what states trade as well as how much they trade,[40] I run additional models on two alternate exit cost variables: one capturing exit costs for trade only in "strategic"

38 To test for robustness, I replicate all models using a trade share-based dyadic exit cost index in which each commodity level exit cost measure is weighted by the proportion of trade within the given commodity relative to total trade from that trade partner (for both imports and exports). Results are essentially unchanged with this weighted average exit costs formulation, although I contend that the measure I present in the text is superior. Specifically, if a given state imports a large share of a given commodity from its dyadic partner, it should not matter that these imports compose only a small part of dyadic trade. As such, using this weighted average might introduce more bias than it eliminates (although, as stated above, it makes little difference empirically).

39 For the trade share-based measure, the raw exit costs index is skewed, varying between 0 and 562, with a mean of 6.0 and a standard deviation of 19.8. Therefore, I take the natural log (of the value plus one) to create variables for *A's exit costs* and *B's exit costs* The logged version varies between 0 and 6.34, with a mean of 0.98 and a standard deviation of 1.12. The dependence measure varies between 0 and 100, with a mean of 0.23 and a standard deviation of 1.63.

40 See Dorussen (2006) for a discussion of the benefit of distinguishing the specific commodities states trade.

commodities, and one capturing exit costs only for trade only in "non-strategic" commodities. Strategic commodities are defined as fuels, iron and steel, industrial machinery, and arms.[41] This distinction between strategic and non-strategic commodities is preliminary, yet it provides some insight into whether commodities that are more easily transferable into military and industrial power are more prone to the causal mechanisms illustrated above. The case of the United States and Japan was almost certainly one where the strategic nature of commodities (oil and steel used to build and fuel warships, armored vehicles, and planes) was critical in determining whether those states would resort to militarized conflict. Yet high exit costs for trade in non-strategic commodities may nonetheless represent significant potential for lost income, even if this trade consists of seemingly innocuous commodities (for example, in textiles or consumer electronics, as constitutes a large portion of U.S.-China trade today).

3.4.2. Additional Explanatory Variables

In models utilizing exit costs measures derived from trade shares, I control for the extent of dyadic trade in order to offset bias that might result if a state conducts a high share of its trade in a number of commodities with a given partner, yet conducts little trade with that partner overall.[42] Specifically, I control for the (logged) trade flow within the dyad. Additionally, I include a measure of the minimum GDP within the dyad to account for the fact that richer states trade more.[43]

41 Specifically, as noted in Chapter 2, strategic commodities encompass SITC 2 digit commodity codes 28, 32, 33, 34, 35, 67, 71, 72, 73, and 74; and SITC 4 digit commodity codes 8911, 8912, 8913 and 8919. Data on arms are extremely limited.

42 Because my exit cost measure is aggregated over many commodities, I cannot create an interactive version as Crescenzi (2003, 2005) does because there are potentially dozens of relevant elasticities and interaction measures per dyad-year.

43 Additionally, results are robust in models where I include trade as a percentage of GDP for each state, as

In all models, I control for typical correlates of conflict, which may also influence trade levels and the overall frequency of dyadic events. Specifically, I control for democracy, distance, alliance similarity, and the dyadic capability ratio. I code democracy as an interaction of each state's combined democracy-autocracy score (rescaled from 0 to 20) from the Polity IV project (Marshall and Jaggers 2009). Democracy is associated with higher likelihood of conflict and larger trade volumes. I code the log of distance (plus one) from EUGene (Bennett and Stam 2000), given that the opportunity for both trade and conflict increases with proximity. Furthermore, I use this variable to control for zero inflation in the negative binomial models that I run on event counts. I code alliance similarity using Signorino and Ritter's (1999) global weighted S score, to account for the extent to which the relationship between trade and conflict may actually result from similar foreign policy preferences (Gartzke 1998). Finally, I code the log of the dyadic capability ratio (plus one) – defined as A's CINC score divided by the sum of A's and B's CINC scores – from EUGene.

3.5. Analysis

In total, I report the results of eighteen models. Table 3.1 contains Models 1 through 6, presenting coefficients for zero-inflated negative binomial regressions on high-level and low-level conflict, utilizing trade share-based exit costs measures. Table 3.2 presents Models 7 through 12, replicating Models 1 through six utilizing exit cost measures derived from trade as a percentage of GDP. Table 3.3 contains Models 13 through 18, presenting rare events logit models examining the impact of exit costs on

well as an interaction of these two variables. I omit the minimum GDP variable in this alternate specification as GDP is incorporated into the trade/GDP variable.

MID initiation. Results of these models support all three hypotheses, suggesting that asymmetric exit costs are aggravating, but that this aggravating influence diminishes as joint exit costs increase. Furthermore, I find that exit costs associated with trade in strategic commodities have a more pronounced impact on dyadic conflict. When these costs are the most asymmetric, they are associated with a large increase in conflict propensity, whereas when both states face high exit costs in strategic goods, the likelihood of conflict falls below the baseline case by more than 90%.

[Table follows on next page]

Table 3.1. Zero-inflated negative binomial regression coefficients, trade share-based exit cost measure

	All commodities		Strategic commodities		Non-strategic commodities	
	1: Count of "high conflict" events	2: Count of "low conflict" events	3: Count of "high conflict" events	4: Count of "low conflict" events	5: Count of "high conflict" events	6: Count of "low conflict" events
A's exit costs	0.693***	0.514***	1.163***	1.085***	0.806***	0.593***
	(0.0882)	(0.0728)	(0.111)	(0.0783)	(0.0922)	(0.0713)
B's exit costs	0.657***	0.562***	1.023***	1.064***	0.770***	0.640***
	(0.0855)	(0.0708)	(0.110)	(0.0754)	(0.0847)	(0.0709)
A's costs X B's costs	-0.138***	-0.0624*	-0.437***	-0.345***	-0.168***	-0.0830**
	(0.0340)	(0.0288)	(0.0695)	(0.0543)	(0.0342)	(0.0302)
ln trade flow	0.0436	0.0613	-0.0339	-0.0331*	-0.0174	0.0220
	(0.0411)	(0.0366)	(0.0189)	(0.0144)	(0.0426)	(0.0380)
Minimum GDP	0.136*	0.336***	0.263***	0.469***	0.180**	0.369***
	(0.0545)	(0.0443)	(0.0523)	(0.0436)	(0.0558)	(0.0472)
ln Distance	-0.0352	-0.124**	-0.105**	-0.170***	-0.0333	-0.127***
	(0.0315)	(0.0387)	(0.0374)	(0.0369)	(0.0310)	(0.0383)
Capability ratio	0.371**	-0.134	0.464***	-0.0384	0.369**	-0.143*
	(0.138)	(0.0699)	(0.130)	(0.0706)	(0.139)	(0.0687)
Democracy in A	-0.0101	0.0279	-0.0243	0.0167	-0.00390	0.0337*
	(0.0194)	(0.0169)	(0.0176)	(0.0157)	(0.0194)	(0.0170)
Democracy in B	-0.00574	0.0209	-0.0179	0.00648	0.000191	0.0258
	(0.0190)	(0.0174)	(0.0173)	(0.0164)	(0.0189)	(0.0172)
Dem. A X Dem. B	-0.00157	-0.00232*	-0.000565	-0.00122	-0.00195	-0.00268**
	(0.00123)	(0.00103)	(0.00111)	(0.000977)	(0.00121)	(0.00103)
Alliance similarity	-2.121***	-2.061***	-2.140***	-2.005***	-2.161***	-2.083***
	(0.289)	(0.216)	(0.297)	(0.200)	(0.289)	(0.213)
Peace years	-0.127***	-0.101***	-0.116***	-0.0907***	-0.126***	-0.101***
	(0.0120)	(0.0116)	(0.0118)	(0.0111)	(0.0120)	(0.0118)
Peace years^2	0.00185***	0.00142***	0.00169***	0.00126***	0.00183***	0.00140***
	(0.000204)	(0.000170)	(0.000199)	(0.000162)	(0.000204)	(0.000175)
Peace years^3	-7.20e-06***	-5.35e-06***	-6.59e-06***	-4.77e-06***	-7.10e-06***	-5.27e-06***
	(9.11e-07)	(6.83e-07)	(8.84e-07)	(6.53e-07)	(9.11e-07)	(7.05e-07)
Constant	-4.208**	-9.425***	-5.615***	-11.24***	-4.815***	-9.893***
	(1.304)	(0.931)	(1.344)	(0.992)	(1.326)	(0.980)
Inflation parameters						
ln Distance	0.321***	0.381***	0.338***	0.436**	0.321***	0.392***
	(0.0436)	(0.102)	(0.0520)	(0.169)	(0.0436)	(0.114)
Constant	-2.185***	-6.072*	-2.441***	-6.906	-2.203***	-6.227*
	(0.308)	(2.678)	(0.387)	(3.642)	(0.311)	(2.811)
ln alpha	2.777***	2.448***	2.892***	2.455***	2.783***	2.457***
	(0.172)	(0.110)	(0.169)	(0.0953)	(0.171)	(0.106)
Observations	165,006	165,006	165,006	165,006	165,006	165,006
Prob χ^2	≤0.0001	≤0.0001	≤0.0001	≤0.0001	≤0.0001	≤0.0001

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

Robust standard errors in parentheses; all variables except peace years lagged 1 year

Tables 3.1 presents coefficients for zero-inflated negative binomial regressions estimating conflict event counts utilizing exit cost measures derived from trade share.[44] Models 1 and 2 test hypotheses 1 through 3 on the count of high-level and low-level conflict events, including measures of exit costs aggregated from all trade within the dyad. Models 3 and 4 replicate these tests, looking only at exit costs in strategic commodities, while Models 5 and 6 examine whether results hold for trade in non-strategic commodities.

At first glance, the coefficients for each state's exit costs, as well as for the interactions, look comparable across all six models presented in Table 3.1. Specifically, the coefficient for each state's exit costs is positive and highly significant, suggesting that, for each state, higher exit costs are associated with higher counts of conflict, when the other state's exit costs are held at zero. These results provide support for hypotheses 3.1 and 3.2. In each model, the interaction term is negative and significant, suggesting that the aggravating impact of each state's exit costs diminishes at higher levels of the other state's exit costs. However, interaction coefficients alone are limited in explanatory power; an examination of marginal effects (e.g. Braumoeller 2004; Brambor *et al.* 2006; Kam and Franzese 2007) reveals important distinctions.

In Model 1, which looks at the impact of exit costs aggregated from all trade on high-level conflict, an examination of marginal effects suggest that the aggravating impact of each state's exit cost diminishes as the exit costs of the other state rise, with the

44 The alpha term is significant in each zero-inflated negative binomial regressions, suggesting that these models are superior to Poisson models to estimate the impact of exit costs on counts of conflict events.

marginal effect eventually becoming negative (but statistically indistinguishable from 0). Model 2, shows a similar pattern, however, marginal effects remain positive for both the initiator or the target, even when exit costs for the other state are at the maximum. In other words, mutually high exit costs appear associated with higher levels of low-level conflict, even relative to cases in which exit costs are highly asymmetric.

Models 3 and 4 replicate Models 1 and 2 looking only at exit costs for strategic commodities (*e.g.,* fuel, iron and steel, industrial machinery, and arms). In Model 3, the effect of exit costs is much more striking than in the baseline model. Specifically, the marginal effect of both the initiator's and target's exit costs becomes negative and statistically significant when the exit costs of the other dyad member is held at higher values. Model 4 looks similar to Model 3, suggesting that even low-level conflict is less likely when joint exit costs associated with trade in strategic commodities are higher. Models 5 and 6 again replicate Models 1 and 2, this time for exit costs associated with non-strategic commodities. In these cases, the impact of exit costs on conflict looks more like the baseline case, suggesting that trade in strategic commodities has a uniquely strong impact on dyadic conflict.

Figures 3.1 and 3.2 show graphically the substantive impact of exit costs on high-level conflict for trade in strategic and non-strategic commodities, respectively. In these three-dimensional graphs, the X axis represents the potential initiator's exit costs, the Z axis represents the potential target's exit costs, and the Y axis represents the expected count of high-level conflict events. Figure 3.1, derived from the results of Model 3 (as discussed above), highlights the aggravating influence of exit costs for strategic

commodities, and also shows a stark difference in the effect of *A's exit costs* and *B's exit costs*, conditional on the exit costs of the other dyad member. Specifically, this graph shows that the highest expected conflict occurs when exit costs are most asymmetric. When the potential initiator's exit costs are held at the maximum, while the potential target's exit costs are held at zero, the expected count of hugh-level conflict is equal to 5.2. Conversely, when the asymmetry is reversed (and it is the conflict target facing high exit costs), the expected count of high-level conflict events is equal to 2.2. This distinction in impact fits with the case of World War II, in which Japan – the state with high exit costs, initiated violent conflict against the United States and its allies, rather than vice versa. Importantly, however, Figure 1 shows that the expected count of high-level conflict events is equal to 0.0003 when both states' exit costs are held at the maximum. This expected count is 94% lower than when both states face no exit costs (in which case the expected count equal to 0.005), providing support for hypothesis 3 that mutually high exit costs facilitate peace.

[Figure follows on next page]

Figure 3.1. Exit Costs and expected high conflict counts: strategic commodities

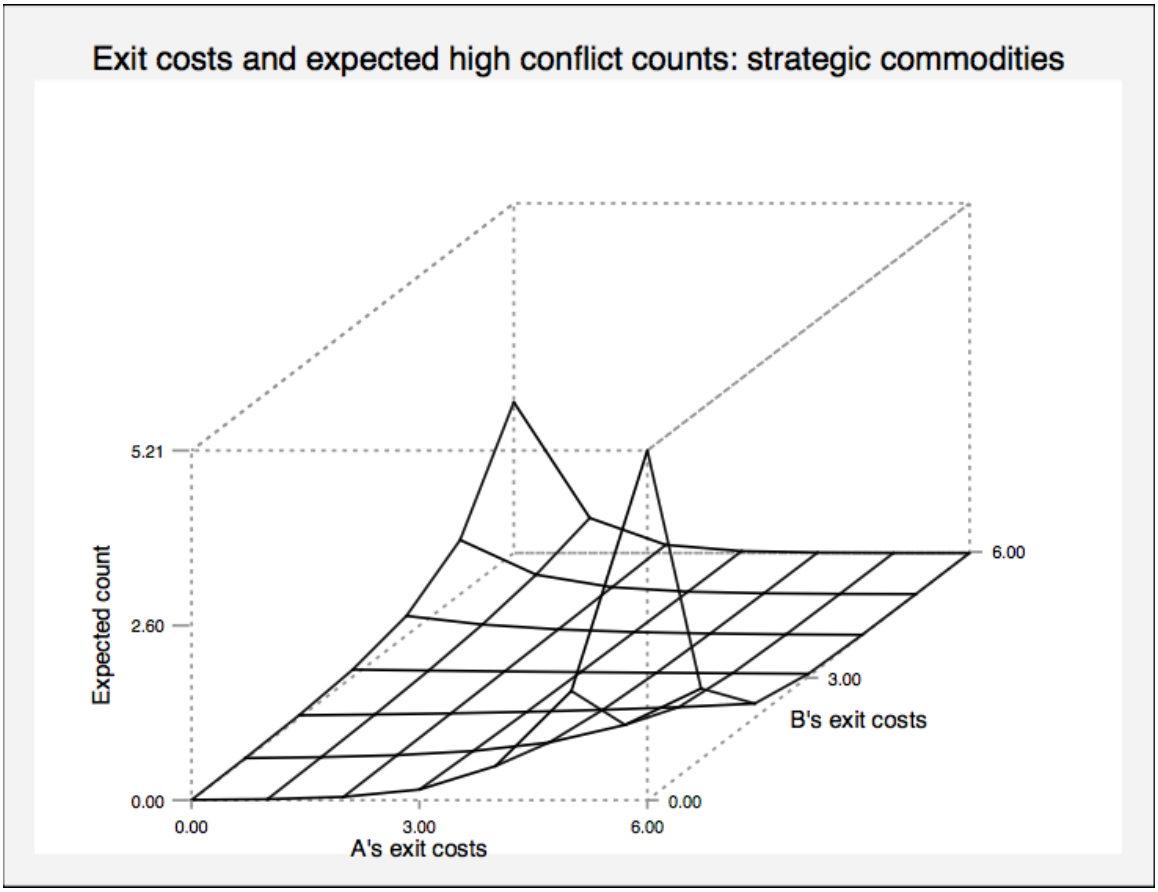
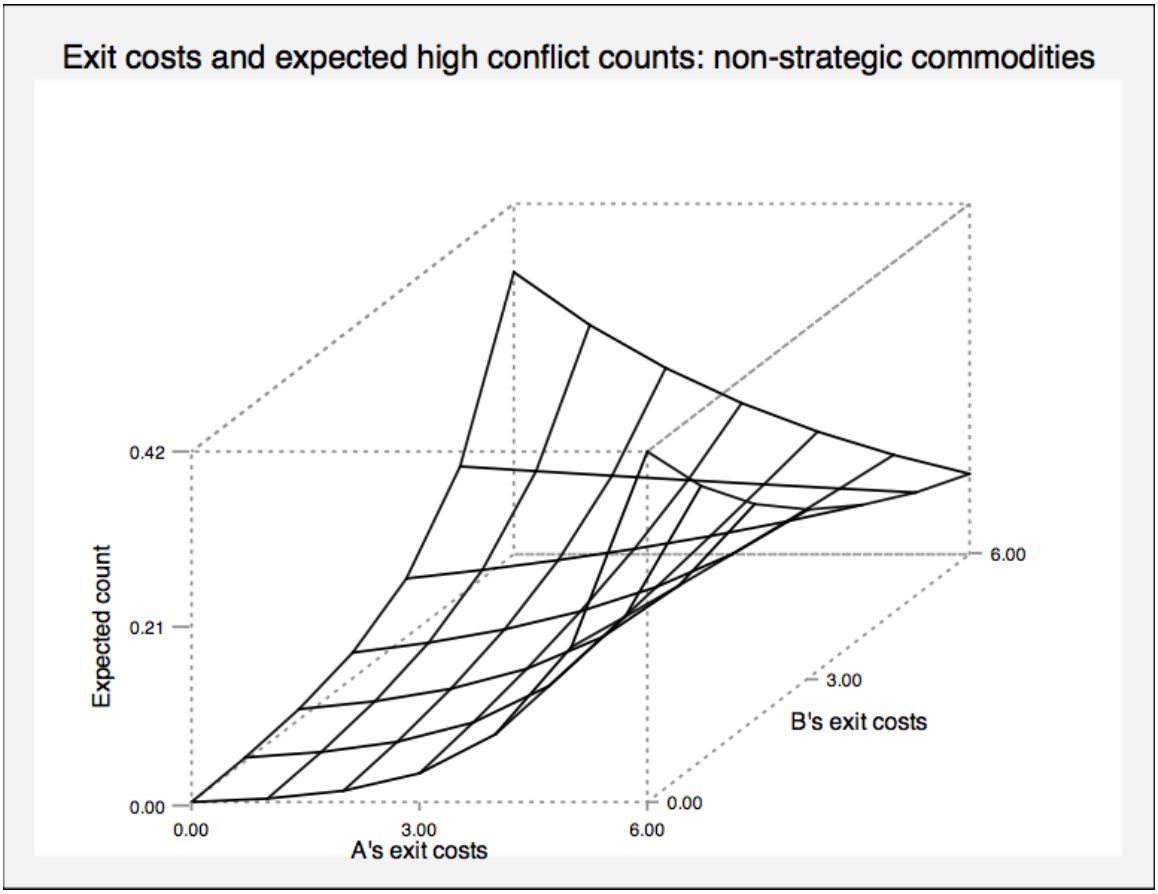


Figure 3.2, derived from Model 5, shows that exit costs for trade in non-strategic commodities have a much smaller substantive impact, as the expected count of high-level conflict events is approximately 0.4 when exit costs are most asymmetric, regardless of whether the initiator or target faces high exit costs. This expected count falls to 0.1 when both states' exit costs are held at the maximum, yet this value is larger than the expected count when neither state faces any exit costs (0.003). Figure 3.2 suggests that, although the expected count of high-level conflict events is lowest when there are mutually no exit costs associated with non-strategic goods, given high exit costs for either side, higher exit costs for the other side is associated with less high-level conflict.

Figure 3.2. Exit costs and expected high conflict event counts: non-strategic commodities



Given that Figures 3.1 and 3.2 are based on abstract examples, I use the case of the United States and China as a concrete demonstration of the impact of exit costs. My data show that China faces higher exit costs than the United States overall (4.86 relative to 3.96 on the share-based index) as well as with regard to trade in strategic commodities (3.14 relative to 1.85 on the share-based index). Model 3 (looking at trade in strategic commodities) suggests that the expected count of high-level conflict events for the United States and China (with the U.S. as the initiator) is 1.8. However, if U.S. exit costs were decreased to 0, this expected count would increase by 50%, to 2.7. Similarly, if China's exit costs doubled while U.S. exit costs remain at current levels, the expected count of

high-level conflict events would nearly double, to 3.5. Conversely, if U.S. exit costs increased to match China's current values, the expected count of high-level conflict events would fall by approximately one-third, to 1.3.

The results of Table 3.2, replicating Table 3.1 using exit costs derived form trade as a percentage of GDP are essentially identical to those obtained from Table 3.1. As such, I omit a detailed discussion of this table due to space considerations.[45] However, results of Table 3.3, which looks at MID initiation using rare event logit models, are distinct enough to merit further discussion. Overall, exit costs for the potential initiator generally behave as they do in count models examining high and low-level conflict events; specifically, *A's exit costs* are associated with increased likelihood that A initiates a MID or uses force against state B in all but Model 17, generally supporting hypothesis 2. The coefficient for *B's exit costs* does not reach statistical significance except in Models 17 and 18 (examining trade of non-strategic commodities), however, suggesting that support for the causal mechanism linking the potential initiator's exit costs to dyadic MID initiation is more robust than that for the potential target's exit costs, *ceteris paribus*. These results, therefore, provide somewhat weaker support for hypothesis 3.1.[46] The coefficient for *joint exit costs* is negative and significant in all but Model 18, however, providing support for hypothesis 3.3 (further confirmed by an examination of marginal effects). Overall, Models 13 through 18 look quite similar to Models 1 through 6. Notably, the substantive results for Models 15 and 16, examining exit costs for trade in strategic goods (which are not presented in detail due to space limitations), match those

45 These results, including 3D graphs, are available from the author.
46 Again, the case of World War II in the pacific supports this finding, given that it was the more vulnerable state that initiated militarized conflict.

from Models 3 and 4 (as well as Models 9 and 10), again suggesting that trade in strategic commodities may sharply aggravate or pacify dyadic relationships, depending on the extent and symmetry of exit costs.

[Table follows on next page]

Table 3.2. Zero-inflated negative binomial regression coefficients, trade "dependence"-based exit cost measure

	All commodities		Strategic commodities		Non-strategic commodities	
	7: Count of "high conflict" events	8: Count of "low conflict" events	9: Count of "high conflict" events	10: Count of "low conflict" events	11: Count of "high conflict" events	12: Count of "low conflict" events
A's exit costs	0.520***	0.641***	1.115**	1.645***	0.658***	0.856***
	(0.123)	(0.0958)	(0.366)	(0.346)	(0.171)	(0.137)
B's exit costs	0.365***	0.588***	0.562**	1.432***	0.491***	0.779***
	(0.0832)	(0.0816)	(0.194)	(0.337)	(0.121)	(0.112)
A's costs X B's costs	-0.0796***	-0.106***	-0.787*	-1.364***	-0.124***	-0.170***
	(0.0183)	(0.0156)	(0.306)	(0.349)	(0.0309)	(0.0264)
Distance	-0.109**	-0.165***	-0.0922**	-0.150***	-0.107**	-0.173***
	(0.0361)	(0.0341)	(0.0350)	(0.0315)	(0.0353)	(0.0348)
Capability ratio	0.328**	-0.129*	0.309**	-0.104	0.290**	-0.140*
	(0.104)	(0.0565)	(0.0965)	(0.0575)	(0.104)	(0.0564)
Democracy in A	-0.0158	0.0141	-0.0211	0.00854	-0.0102	0.0201
	(0.0167)	(0.0164)	(0.0167)	(0.0165)	(0.0167)	(0.0164)
Democracy in B	-0.00476	0.00729	-0.0119	0.00244	0.00121	0.0130
	(0.0167)	(0.0168)	(0.0167)	(0.0168)	(0.0166)	(0.0168)
Dem. A X Dem. B	0.000506	0.00125	0.00194	0.00268*	-0.000145	0.000602
	(0.00110)	(0.00107)	(0.00114)	(0.00107)	(0.00111)	(0.00108)
Alliance similarity	-2.325***	-2.412***	-2.399***	-2.462***	-2.347***	-2.441***
	(0.242)	(0.206)	(0.243)	(0.208)	(0.237)	(0.199)
Peace years	-0.114***	-0.0866***	-0.108***	-0.0815***	-0.116***	-0.0869***
	(0.0108)	(0.00993)	(0.0107)	(0.00993)	(0.0108)	(0.00989)
Peace years^2	0.00174***	0.00129***	0.00166***	0.00121***	0.00176***	0.00130***
	(0.000188)	(0.000152)	(0.000190)	(0.000153)	(0.000188)	(0.000152)
Peace years^3	-6.83e-06***	-4.91e-06***	-6.59e-06***	-4.65e-06***	-6.92e-06***	-4.94e-06***
	(8.57e-07)	(6.25e-07)	(8.67e-07)	(6.28e-07)	(8.58e-07)	(6.26e-07
Constant	1.577***	1.343***	1.723***	1.433***	1.609***	1.394***
	(0.416)	(0.380)	(0.418)	(0.373)	(0.406)	(0.373)
Inflation parameters						
ln Distance	0.457***	0.534***	0.478***	0.515***	0.462***	0.547***
	(0.0697)	(0.0794)	(0.0611)	(0.0621)	(0.0717)	(0.0849)
Constant	-2.670***	-4.313***	-2.544***	-3.798***	-2.700***	-4.458***
	(0.561)	(0.680)	(0.481)	(0.512)	(0.580)	(0.738)
ln alpha	2.818***	2.435***	2.680***	2.339***	2.813***	2.459***
	(0.167)	(0.0983)	(0.162)	(0.103)	(0.169)	(0.102)
Constant	165,026	165,026	165,026	165,026	165,026	165,026
Prob χ^2	≤0.0001	≤0.0001	≤0.0001	≤0.0001	≤0.0001	≤0.0001

*** p<0.001, ** p<0.01, * p<0.05
Robust standard errors in parentheses

Table 3.3. Rare events logit coefficients, trade share-based exit cost measure

	All commodities		Strategic commodities		Non-strategic commodities	
	13: Any MID	14: Fatal MID	15: Any MID	16: Fatal MID	17: Any MID	18: Fatal MID
A's exit costs	0.510***	0.935**	0.500***	0.907*	-0.00599	-0.0849*
	(0.133)	(0.286)	(0.150)	(0.390)	(0.0329)	(0.0372)
B's exit costs	0.101	0.489	0.103	0.337	0.676***	0.746**
	(0.132)	(0.299)	(0.140)	(0.298)	(0.137)	(0.277)
A's costs X B's costs	-0.106**	-0.191*	-0.175*	-0.521*	0.261*	0.232
	(0.0383)	(0.0885)	(0.0785)	(0.206)	(0.125)	(0.296)
ln trade flow	0.129	-0.340**	0.0440	-0.0746	-0.135**	-0.171
	(0.0697)	(0.106)	(0.0317)	(0.0388)	(0.0430)	(0.0896)
Minimum GDP	0.220***	0.260	0.296***	0.206	0.288***	0.160
	(0.0654)	(0.142)	(0.0675)	(0.137)	(0.0643)	(0.138)
ln Distance	-0.264***	-0.314***	-0.284***	-0.360***	-0.253***	-0.326***
	(0.0353)	(0.0629)	(0.0345)	(0.0612)	(0.0355)	(0.0607)
Capability ratio	1.825***	1.564*	1.642***	1.500*	1.811***	1.616*
	(0.300)	(0.699)	(0.264)	(0.688)	(0.291)	(0.687)
Democracy in A	0.00354	0.0103	-0.00317	0.0107	0.00626	0.0159
	(0.0202)	(0.0324)	(0.0214)	(0.0323)	(0.0202)	(0.0337)
Democracy in B	0.0171	-0.0172	0.0181	-0.0149	0.0212	-0.0150
	(0.0243)	(0.0402)	(0.0247)	(0.0392)	(0.0237)	(0.0399)
Dem. A X Dem. B	-0.00412**	-0.00398	-0.00365*	-0.00384	-0.00422**	-0.00433
	(0.00147)	(0.00291)	(0.00154)	(0.00280)	(0.00149)	(0.00283)
Alliance similarity	-0.880**	-1.182	-0.999**	-0.864	-0.982**	-0.981
	(0.332)	(0.729)	(0.325)	(0.690)	(0.327)	(0.691)
Peace years	-0.163***	-0.509***	-0.159***	-0.501***	-0.162***	-0.500***
	(0.0261)	(0.0699)	(0.0262)	(0.0703)	(0.0261)	(0.0675)
Peace years^2	0.00237***	0.0129***	0.00231***	0.0126***	0.00235***	0.0125***
	(0.000670)	(0.00237)	(0.000669)	(0.00242)	(0.000671)	(0.00234)
Peace years^3	-9.32e-06*	-8.58e-05***	-9.10e-06*	-8.40e-05***	-9.27e-06*	-8.29e-05***
	(3.90e-06)	(2.22e-05)	(3.88e-06)	(2.29e-05)	(3.91e-06)	(2.23e-05)
Constant	-10.20***	-6.605	-10.38***	-7.309*	-10.78***	-6.691
	(1.530)	(3.444)	(1.595)	(3.526)	(1.537)	(3.553)
Observations	164,722	164,722	164,722	164,722	164,722	164,722
Prob χ^2	≤0.0001	≤0.0001	≤0.0001	≤0.0001	≤0.0001	≤0.0001

*** p<0.001, ** p<0.01, * p<0.05
Robust standard errors in parentheses

The fact that my results look quite similar to Barbieri's (1996) finding that asymmetric trade share is aggravating suggests the question: do my results support the argument that symmetry of exit costs is pacifying to dyadic relationships, or is it simply symmetry of trade interaction (relative to total trade or GDP) that precludes hostility? Given that rational individuals should trade specifically when they stand to gain from it, one can imagine a scenario in which exit costs correlate with measures of trade interaction, and that symmetry of trade interaction is, therefore, as pacifying as is symmetry of exit costs. However, further analysis suggest that this is not the case. Correlations of my exit cost index to typical measures of trade interaction – specifically, trade *share* and *dependence* – are quite low (for example, my share-based exit costs index correlates at 0.21 with *trade share*, and at 0.16 with *trade dependence*). Furthermore, in Models 1 through 6 and 13 through 18, there is little evidence that trade flow is pacifying. Finally, I find null results in models replacing exit cost interaction with an interaction of each state's trade share or trade as a percentage of GDP.[47] Overall, my results suggest that trade interaction alone is not associated with dyadic conflict – particularly violent conflict.

3.6. Conclusion and Discussion

In this chapter, I find strong evidence in support of a conditional relationship between exit costs and the initiation of dyadic conflict. Asymmetric exit costs – particularly when the potential conflict initiator has higher exit costs – are associated with a higher count of conflict events as well as a higher probability of MID initiation, yet this

47 These models are available from the author by request.

aggravating influence disappears – and in some cases, reverses - as joint exit costs increase. Furthermore, the impact of exit costs on conflict is more prominent when looking specifically at trade in strategic commodities.

Given my results, how might the perceived pacifying effect of trade that is found in so many studies be explained? The simplest explanation is that states attempt to structure trade relationships to avoid asymmetric exit costs, such that the conditions associated with the highest chance of conflict (according to my mechanisms) are rare. Yet, given that states are not always immediately able to control trade by their citizens, these conditions favoring conflict are bound to arise at least occasionally.[48]

This chapter demonstrates that there are many opportunities in which to examine the impact of exit costs on international interactions. First, this chapter only begins to assess the relationship between exit costs and conflict. Future research can better assess the impact of individual commodities on dyadic conflict, perhaps by better distinguishing commodities that are considered "strategic," as this consideration likely varies by dyad. Additionally, future research can benefit from the commodity-level exit cost measures provided in this chapter to address a wide array of research questions. For example, research on sanctions can utilize these data to better determine the cost of sanctions, both to the sender and target, potentially better isolating cases in which sanctions or threats thereof, through higher imposed costs to the target, are more likely to succeed in changing policy of sanctioned states. I turn to this question in the following chapter. Also,

48 Perhaps the simplest way for states to preclude becoming too vulnerable to trade partners is to enact tariffs or other trade barriers, reducing consumer surplus and therefore decreasing the demand for imports. However, membership in the WTO has as a stipulation that states must eliminate non-tariff barriers (although exceptions apply) and extend most-favored-nation status to all other WTO members, and therefore removes a means by which states can prevent vulnerability.

studies looking at protectionism can control for the gains from trade associated with imports. I address this question in Chapter 5.

CHAPTER 4. EXIT COSTS AND THE OUTCOME OF SANCTION THREATS

4.1. Introduction

Although conventional wisdom suggests that more costly sanctions are more likely to succeed in coercing the target, there is little systematic study of sanction costs, as cost data are not readily available in anything but a rather basic estimation. In fact, the ideal operationalization of sanction costs is far from apparent. Although trade volume that would be lost with the imposition of sanctions appears, at first glance, to be a reasonable approximation of sanction costs, this measure omits the difficulty by which the sender and target can reroute lost trade to third party markets. Measures of trade interaction prior to sanction imposition ignore the exit costs for both the sender and target (*e.g.,* Crescenzi 2003, 2005).

In this chapter, I examine the effectiveness of sanctions threats with regard to the exit costs imposed on the sender and target. I operationalize the cost of sanctions with regard to the ease by which both the sender and target can adapt to the loss of dyadic trade. That is, the cost for the target to replace each additional unit of trade lost. I begin with the pre-threat stage, arguing that exit costs affect whether sanctions are threatened, as well as the response to, and, therefore, the outcome of, the threat. I find that exit costs for the potential target are associated with a greater likelihood of threat onset, yet targets facing high costs are no less likely to stand firm against economic coercion. My results have important implications for sanctions research; I find that the costs of potential sanctions matter when sanctions are selected as a policy tool by the sanctioning state, but targets do not choose whether to acquiesce to sanctions to avoid the exit costs they would

endure.

This chapter proceeds as follows. First, I discuss extant theories regarding the effectiveness of sanctions threats. Then, I develop five hypotheses linking the onset and outcome of sanction threats to the exit costs faced by senders and targets. I test these hypotheses on a sample spanning from 1984 to 2001, finding mixed support for my expectations. Finally, I discuss the implications of my findings for the literature on sanctions effectiveness.

4.2. Sanction Effectiveness

Although the effectiveness of sanctions is debated, scholars are largely in agreement that sanctions typically do not succeed in coercing policy change in the target. Beginning with an archetypal and foundational example of the literature, Doxey (1980) asserts that economic sanctions will most likely be effective when they put tremendous pressure on the target (Doxey, 1980: 77-79). While others have approached the question of success differently (e.g., Wallensteen 1968; Daoudi and Dajani 1983; Nossal 1989; Morgan 1995; Morgan & Schwebach 1996; Drury 1998; Hufbauer et al. 2007), the overriding conclusion is that for sanctions to be successful, they must be costly.

Galtung (1967) refers to the idea that sanction cost would lead to target capitulation as the naïve theory of sanctions. He suggests that sanctions tended to unite a the target populace behind the regime because they saw the sanctions as foreign meddling. Thus, he suggested that sanctions would rarely succeed. His argument, however, still rested on the idea that cost was the key factor to explain effectiveness. Only when the sanctions had become brutally severe would they work, he argued.

Importantly, Galtung suggests that the costs of lost trade must be compared to the costs of compliance, as well as to the potential benefits (in terms of national unity) that can result from imposed sanctions.

The idea that sanctions commonly failing is a dominant aspect of the literature. Hufbauer *et al.* (1990, 2007) argue throughout their work that sanctions must be costly to be effective, but that success only occurs one third of the time. Pape (1997, 1998) suggests that sanctions succeed only five percent of the time because they cannot incur the costs needed to compel the target. Again, the argument suggests that cost is the key to effectiveness.

Some scholars suggest that sanctions may have alternative goals such as placating the sender's domestic public of sending an international message (*e.g.,* Barber 1979; Lindsay 1986; Ang and Peksen 2007). This research does not argue, however, that costs do not matter. Instead, it suggests that sanctions are multifaceted policies that cannot be judged simply on the economic impact and political outcome they have in the target. Indeed, imposing high costs may be an incentive to sanction, a punishment for misbehavior by the target (*e.g.,* Nossal 1989). If true, this motivation for sanctioning implies that compliance with sender demands is immaterial to the calculus whether to impose sanctions. However, costs retain their importance, as an ideal punishment would inflict high costs on the target and low – or no – costs on the sender.

Beyond the question of imposed sanction effectiveness, a developing literature on sanctions threats suggests that if an imposed sanction will be successful, the target will likely give in to the sender's demands after the threat but before the imposition (*e.g.,*

Nooruddin 2002; Drezner 2003; Lacy and Niou 2004; Drury and Li 2005; Morgan, Bapat, and Krustev 2009). The threat argument is a significant advancement for the sanction effectiveness literature, as it suggests that prior research overlooks the mechanisms through which economic coercion occurs, instead focusing on the outcomes that follow when coercion has already failed. However, like the earlier literature, it does depend upon the idea of costs, as threats that are potentially more costly are most likely to be effective in coercing the target, rendering sanction imposition unnecessary.

4.3. Exit Costs and Sanction Threats

Consistent with recent work on sanction threats, I model the effect of exit costs on the sender's decision to initiate a threat and on the outcome of the threat. I contend that relative exit costs, which influence bargaining power, will affect both the likelihood that a sender threatens and imposes sanctions, as well as the target's response to the sender's demand. As the target's exit costs increase, holding the sender's exit costs constant, the sender will perceive greater bargaining power. As such, when the sender wishes to coerce the target to make some policy change, it will be more likely to threaten sanctions than would a sender with less to threaten. Although this logic is intuitive, Krustev (2010) demonstrates that looking at costs when determining sanction effectiveness may be problematic specifically because these costs are endogenous to the initial demand made by the sender.

Additionally, the sender's exit costs should be associated with a decreased likelihood that it initiates a sanction threat when the target has low exit costs, as in this case the sender would be hurting itself and not the target. Furthermore, I highlight the fact

that it is important to look at the interaction of each side's exit costs. Higher exit costs for the target do not represent bargaining advantage for the sender if the sender's costs are also high. Conversely, low exit costs for the target may be associated with lower likelihood of threat onset unless the sender likewise has low exit costs. This logic leads to my first hypotheses:

Hypothesis 4.1: Higher exit costs for the potential target, given low exit costs for the potential sender, are associated with a higher likelihood of threat onset.

Hypothesis 4.2: Higher exit costs for the potential sender, given low exit costs for the potential target, are associated with a lower likelihood of threat onset.

Given that the sender initiates a threat, I suggest that exit costs will also influence the outcome of that threat. First, if the target has high exit costs, *ceteris paribus*, it will find it cheaper to concede to the sender's demand rather than endure economic exit. Similarly, the sender, having initiated a threat, should be more likely to back down rather than endure its own exit costs when these costs are high. Finally, given mutually high exit costs, I expect the sender and target should be more likely to reach a negotiated settlement, as neither wishes to endure exit costs resulting from the imposition of sanctions. This logic leads to my final three hypotheses:

Hypothesis 4.3: Higher exit costs for the target, given low exit costs for the sender, are associated with a higher likelihood that the target concedes to the sender's demand.

Hypothesis 4.4: Higher exit costs for the sender, given low exit costs for the target, are associated with a higher likelihood that the sender backs down, rather than impose the

sanction.

Hypothesis 4.5: Mutually high exit costs for the sender and target are associated with a higher likelihood that the parties reach a negotiated settlement.

4.4. Research Design

To test my hypotheses regarding the onset and outcome of sanction threats, I utilize a series of Heckman probit models, which estimate the likelihood of a given outcome of sanction threats, controlling for selection into the threat. Controlling for this potential selection effect is critical, as, for example, to test whether a sender with high exit costs is more likely to back down, it is important to account for the fact that, given its vulnerability, it was probably less willing to threaten sanctions at all. I utilize a sample of directed dyad years spanning from 1985 to 2001. This relatively short time span for a sanction study follows because the data necessary to compute exit costs are available only during this time span. To obtain my sample, I convert sanction threat data from the TIES project (Morgan, Bapat, and Krustev 2006) into a directed dyad year format. I exclude cases in which the sender imposes sanctions without first making a threat to coerce the target.

The dependent variable of the selection stage is *threat onset*, a binary variable equal to 1 when the potential sender demands a specific concession from the target, with the implication that sanctions may follow if the target does not comply (Morgan, Bapat, and Krustev 2006). I look at several dependent variables for the various outcomes of sanction threats. First, *sender backs* down is a binary variable that equals 1 when the sender threatens sanctions, but then backs down after the target refuses to give in to its

demands. Second, *target capitulates* is equal to 1 when the target gives in to sender demands before sanctions are imposed. Third, *negotiated settlement* is equal to 1 when the sender and target come to an mutually satisfactory agreement prior to sanction imposition. Finally, *imposed sanction* is a binary variable taking the value of 1 when a threat is followed by sanction imposition, regardless of the outcome following this imposition. Importantly, imposed sanction is not the same as the sender *not* backing down, as there are additional cases of "stalemates" in which sanctions are not imposed, but are, essentially, continuously pending, as the sender does not officially back down from its threat.

It is important to note that, because I condense the TIES data into a directed dyad year format, the outcome variables are not necessarily mutually exclusive in a given directed dyad year. This follows from the conversion of sanction data from case-level into directed dyad-year level. For example, the sender may make several threats against the target in a given year, imposing sanctions in some subset of these but backing down in others. As such, the variable for *threat*, *imposition*, and *sender backs down* would all equal one for that directed dyad year.

4.4.1. Operationalizing Exit Costs

My primary explanatory variables capture the exit costs associated with trade for each state in a directed dyad. Specifically, I utilize the trade share-based measures of exit cost developed in Chapter 2. accordingly, I include controls for (the natural log of) *trade flow* and *lower GDP*. As in Chapter 3, I run model for 1: exit costs aggregated from trade in all commodities, 2: exit costs from trade in strategic commodities, and 3: exit costs for

trade in non-strategic commodities.[49] Furthermore, I replicate all models utilizing exit cost measures derived from trade as a percentage of GDP, although these models are excluded for space considerations.[50]

4.4.2. Other Explanatory Variables

I control for several correlates of the onset and outcome of sanction threats. In the selection stage, to capture willingness for political conflict, I include variables for *alliance similarity*, to capture common underlying preferences within the dyad. Similarly, I also control for the relative levels of *democracy* within the dyad with an interaction of each states 21-point democracy-autocracy score (rescaled to range between 0 [most autocratic] and 20 [most democratic]) from the Polity IV project (Marshall and Jaggers 2009). To capture opportunity for interaction, I code the dyadic *capability ratio* as the potential sender's CINC score divided by the sum of both states' CINC scores, and (logged) *distance* between states, both from EUGene (Bennett and Stam 2000a). In the second stage of the Heckman models, I include variables capturing aspects of the specific threat. First, I include a dummy variable for *IO-backed sanction*. I also code *misbehavior by the target* – a dummy variable which is equal to 1 when the the issue at stake is human abuse violations, nuclear proliferation, support of non-state actors (such as terrorists), or drug trafficking by the target. Finally, I include a variable for *trade dispute*, a dummy variable equal to 1 when the sanction threat is in response to disagreements over trade policy, which I view as relatively minor.

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49 Consistent with previous chapters, strategic commodities are defined as fuels, iron and steel, industrial machinery, and arms. Specifically, strategic commodities encompass SITC 2 digit commodity codes 28, 32, 33, 34, 35, 67, 71, 72, 73, and 74; and SITC 4 digit commodity codes 8911, 8912, 8913 and 8919.
50 Results are consistent in these models, which are available from the author by request.

4.5. Analysis

Results of twelve Heckman probit models provide mixed support for my hypotheses. First, I find that higher exit costs for the target are associated with a higher likelihood that the sender makes a sanction threat. Yet, counter to my expectations, this effect becomes stronger as the sender's exit costs increase. Second and unexpectedly, higher exit costs for the target are associated with a higher incidence of sanction imposition, but not associated with the target backing down. Additionally, the target's exit costs are negatively associated with the sender backing down, while the sender's exit costs are associated with higher incidence of negotiated settlements.

[Table follows on next page]

Table 4.1. Heckman probit coefficients, exit costs aggregated across all commodities					
	Model 1 Target capitulates	Model 2 Sender backs down	Model 3 Sanctions imposed	Model 4 Negotiated settlement	Models 1-4 Threat issued
Sender exit costs	0.0865	-0.230	0.129	0.454	-0.145*
	(0.180)	(0.159)	(0.147)	(0.298)	(0.0663)
Target exit costs	0.0198	-0.240*	0.175	0.00455	0.152**
	(0.131)	(0.120)	(0.107)	(0.283)	(0.0480)
Sender costs X target costs	-0.0385	0.0465†	0.00547	-0.0783	0.0689***
	(0.0336)	(0.0241)	(0.0299)	(0.0531)	(0.0191)
Trade flow	0.0291	0.131	-0.0544	0.124	0.0558*
	(0.0872)	(0.0977)	(0.0744)	(0.151)	(0.0241)
Minimum GDP	0.0308	-0.0547	-0.00951	-0.110	0.152***
	(0.0905)	(0.0681)	(0.0615)	(0.0985)	(0.0257)
IO backs sanctions	0.502***	0.129	0.255*	0.455*	
	(0.144)	(0.149)	(0.122)	(0.210)	
Trade dispute	-0.0996	-0.228	-0.286	0.379	
	(0.178)	(0.217)	(0.175)	(0.316)	
Misbehavior in target	0.160	0.392*	0.0664	-0.0332	
	(0.180)	(0.197)	(0.164)	(0.240)	
Alliance similarity					-0.670***
					(0.108)
Capability ratio					0.427***
					(0.0928)
Distance					0.0844***
					(0.0227)
Sender polity					0.0220
					(0.0165)
Target polity					-0.0103
					(0.0183)
Sender polity X target polity					0.000518
					(0.000983)
Constant	-0.975	0.180	-1.100	0.315	-8.597***
	(2.756)	(2.425)	(1.953)	(2.836)	(0.699)
rho	-0.711*	-0.352	0.454*	-0.899**	
	(0.286)	(0.245)	(0.207)	(0.324)	
Observations	507	507	507	507	165,236
Prob χ^2	≤0.0032	≤0.0116	≤0.0005	≤0.0033	
*** p<0.001, ** p<0.01, * p<0.05, † <0.10 (0.1 level considered significant in imposition stage only)					
Robust standard errors in parentheses					

Table 4.1 presents coefficients for four Heckman probit models looking at trade in all commodities (strategic and non-strategic). Each of the four models addresses the four threat outcomes I assess: target capitulation (Model 1); sender backs down (Model 2); sanction imposition (Model 3); and negotiated settlements (Model 4). All four models

include a selection stage. However, I present the selection stage coefficients once as they are identical across all four second-stage outcomes.[51]

Turning first to threat onset, the sender's exit costs appear to be associated with a lower likelihood that it initiates a threat given that the target faces no exit costs, as predicted in hypothesis 4.2. The coefficient for the target's exit costs is positive and significant, suggesting, in accordance with hypothesis 4.1, that potential senders are more likely to make threats as they have more to threaten and little to lose (as this coefficient represents the effect of target exit costs when sender exit costs are held at zero). Unexpectedly, the interaction term is positive and significant, suggesting that the impact of the each state's exit costs becomes associated with an increasingly positive influence on sanction threats as the other state's exit costs increase. With regard to the sender's exit costs, this result makes intuitive sense, as the negative impact of the sender's exit costs is likely to decline as the target's exit costs increase. However, unexpectedly, the positive impact of the target's exit costs becomes even stronger as the sender's exit costs increase. Interpretations of marginal effects for the interaction (e.g. Braumoeller 2004; Brambor *et al.* 2006; Kam and Franzese 2007) confirm this interpretation, as the marginal effect of the target's exit costs becomes larger, with higher statistical significance, as the sender's exit costs are held at increasingly large values.

Substantive probability changes show that the effect of the target's exit costs increases sharply as the senders exit costs increase. For example, the probability of threat

51 Occasionally, there are slight differences, typically in the hundredths or thousandths decimal place of coefficients and standard errors. However, these differences never affect significance levels (even in the hundredths decimal place) and are far too small to warrant including selection coefficients for all four models.

onset increases by 22 times moving the target's exit costs from min to max, holding the sender's exit costs at zero. Yet this same change in the target's exit costs, when the sender's exit costs are held at the mean, results in a probability increase in threat onset by 70 times. When the sender's exit costs are held at one standard deviation above the mean, this probability increases again by 210 times. These results run counter to conventional wisdom, suggesting that, while senders threaten sanctions against vulnerable targets, they are more likely to do so when they are likewise vulnerable.

There are at least three potential explanations of this counter-intuitive behavior. First, given that high exit costs signify that there are domestic interests that would benefit from protectionism, the sender may be more likely to threaten sanctions when it is itself vulnerable due to political pressure from these groups. Kaempfer and Lowenberg (1988, 1989, 1992, 2000) have long made this argument. This result also suggests that these groups are less successful in lobbying for protectionism when the target has no exit costs, which suggests that senders do not enact protectionism for purely domestic reasons, but rather when this domestic benefit is complemented with a strategic benefit derived from harming a given target. The second possibility is that the sender is more likely to threaten sanctions when it is itself vulnerable in order to send a signal to the target. If the sender is itself vulnerable, yet demands concessions from the target, it signals that it is resolved to endure costs in order to coerce policy change (Schweback 2000). Essentially, the sanctioning state can send a stronger, more credible signal with the sanctions because the sender shows that it is willing to hurt itself to get what it wants. Finally, it is possible that the impact of the target's exit costs is highest when potential senders also face high exit

costs because these vulnerable senders are choosing to threaten mutual vulnerability on their own terms, rather than wait for their trade partner to attempt similar coercion.

The coefficient for *trade flow* and *minimum GDP* and both positive and significant in the selection stage of Models 1 through 4. Importantly, this result suggest that the existence of trade interaction and larger economies is associated with higher incidence of sanction threats. With regard to trade flow, these results may reflect the fact that, for sanction threats to be a foreign policy option, there must be pre-existing trade relationships. Trade is a necessary, if not sufficient condition for sanctions to be feasible at all, as exemplified by comments by President George W. Bush, who, regarding threatening behavior by the Iranian government, said that "[w]e're relying upon others, because we've sanctioned ourselves out of influence with Iran" (Financial Times 2005).

Turning to the second stage of Models 1 through 4, I find, in Model 1, that neither state's exit costs (regardless of the level of exit costs for the other side) are associated with target capitulation. Although these are null results, they carry important implications because they signify that successful sanction threats are not the result of the economic costs imposed on the target. In Model 2, the target's exit costs, holder the sender's at zero, are associated with a lower likelihood that the sender backs down. Substantively, the conditional probability that the sender backs down falls from 0.0344 to 0.0068 as the target's exit costs are increased from its minimum to its maximum.[52] This result suggests that, if the sender cannot coerce the target, it is more likely to impose sanctions when it stands to do more harm. In these cases, sanction imposition may serve to punish targets

52 The conditional probability is defined as the probability of a 1 in the second stage given a 1 in the selection stage. All control variables are held at their means or modes, with interaction terms set accordingly to the product of the components.

and deter others by example. Or, conversely, failure to impose sanctions might encourage other potential targets not to worry about sanctions themselves. Importantly, the interaction term is positive and significant, although only at the 0.1 level, suggesting that this impact diminishes as sender exit costs increase. An examination of marginal effects confirms this expectation. As such, high exit costs for the sender mitigates its likelihood of standing firm rather than backing down when it stands to harm the target through sanction imposition.

Results of Models 3 and 4, looking at the imposition of sanctions and negotiated settlements respectively, suggest that exit costs, overall, appear unrelated to these outcomes. Specifically, none of the coefficients for either state's exit costs, nor the interaction, is significant in either Models 3 or 4. I turn next to an examination of exit costs disaggregated to strategic and non-strategic commodities. This disaggregated analysis facilitates an understanding of whether the impact of exit costs is constant, or whether exit costs for strategic commodities – the impact of which transcends lost income – have a greater impact on the issuance and outcome of sanction threats.

[Table follows on next page]

Table 4.2. Heckman probit coefficients, exit costs for strategic commodities					
	Model 5 Target capitulates	Model 6 Sender backs down	Model 7 Sanctions imposed	Model 8 Negotiated settlement	Models 5-8 Threat issued
Sender exit costs	-0.0517	-0.00628	0.100	0.493†	0.0397
	(0.192)	(0.152)	(0.137)	(0.253)	(0.0609)
Target exit costs	-0.123	-0.0865	0.231*	-0.0517	0.311***
	(0.137)	(0.132)	(0.110)	(0.243)	(0.0465)
Sender costs X target costs	-0.0351	0.0222	0.0124	-0.132†	0.0790*
	(0.0638)	(0.0409)	(0.0480)	(0.0684)	(0.0323)
Trade flow	0.0823†	-0.00844	-0.00560	0.0834	0.0100
	(0.0496)	(0.0440)	(0.0349)	(0.108)	(0.0100)
Minimum GDP	-0.00336	-0.0165	-0.00389	-0.126	0.190***
	(0.0790)	(0.0672)	(0.0630)	(0.0917)	(0.0237)
IO backs sanctions	0.502***	0.115	0.244*	0.408*	
	(0.141)	(0.143)	(0.118)	(0.182)	
Trade dispute	-0.0805	-0.165	-0.283†	0.445	
	(0.180)	(0.200)	(0.166)	(0.287)	
Misbehavior in target	0.185	0.388*	0.0499	0.0231	
	(0.184)	(0.190)	(0.157)	(0.211)	
Alliance similarity					-0.720***
					(0.113)
Capability ratio					0.528***
					(0.0849)
Distance					0.0813***
					(0.0216)
Sender polity					0.0222
					(0.0175)
Target polity					-0.0110
					(0.0192)
Sender polity X target polity					0.000652
					(0.00103)
Constant	-0.421	0.653	-1.784	2.060	-9.023***
	(2.343)	(2.144)	(1.862)	(2.158)	(0.681)
rho	-0.712**	-0.458*	0.533**	-1.069***	
	(0.261)	(0.217)	(0.197)	(0.297)	
Observations	507	507	507	507	165,236
Prob χ^2	<0.0007	<0.0151	<0.0001	<0.0001	
*** p<0.001, ** p<0.01, * p<0.05, † <0.10 (imposition stage only)					
Robust standard errors in parentheses					

The results of Table 4.2 suggest that breaking down exit costs does affect the results obtained. First, at the threat stage, the coefficient for the sender's exit costs is not significant, counter to the results from Models 1 through 4. This result suggest that there is more error regarding the impact of the sender's exit costs for strategic commodities and the likelihood that it threatens sanctions against a trade partner. Differences in the

outcome stage are important as well. In Model 7, looking at sanction imposition, results suggest that the target's exit costs, holding the sender's at zero, are associated with a higher likelihood of sanction imposition.

Substantively, the conditional probability of sanction imposition approximately doubles, from 0.4197 to 0.8217, as the target's exit costs increase from the minimum to the maximum, holding all other variables at their means or modes. This result is compatible with that from Model 2 in the all-exit costs model, given that, if the sender does not back down, it is more likely to impose sanctions, *ceteris paribus*. However, the fact that the target's exit costs were not significant in Model 3 suggests that the sender is more likely to use sanctions as punishment not just when it stands to impose economic harm on the target, but when it also has the means to deprive the target of strategic commodities. Additionally, however, Model 7 supports the overall pattern that exit costs for the target are not associated with the target conceding to sender pressure, contrary to the expectations of hypothesis 3, given that these high exit costs for the target are not associated with it capitulating to the sender's demands.

Model 8 suggests that sender exit costs for strategic commodities are associated with negotiated settlement, holding the target's exit costs at zero. Substantively, the probability of a negotiated settlement increases from essentially 0 to 0.8357 as the sender's exit costs increase from min to max, holding all other variables at their means and medians. However, the interaction term is negative and significant in Model 8, suggesting that this effect diminishes as target exit costs for strategic commodities increase. It is no surprise that a sender may be more willing to negotiate on an issue

rather than impose sanctions when it stands to be harmed (and especially when the target does not). As such, this model suggests that, with regard to trade in strategic commodities, sanction threats may serve as a prelude to negotiation when the sender has something to lose (keeping in mind that higher target exit costs are associated with increased threat incidence).

[Table follows on next page]

Table 4.3. Heckman probit coefficients, exit costs for non-strategic commodities					
	Model 9 Target capitulates	Model 10 Sender backs down	Model 11 Sanctions imposed	Model 12 Negotiated settlement	Models 9-12 Threat issued
Sender exit costs	0.0249	-0.255	0.185	0.454	-0.148*
	(0.208)	(0.175)	(0.154)	(0.287)	(0.0677)
Target exit costs	0.00401	-0.245*	0.205†	0.0116	0.142**
	(0.140)	(0.123)	(0.109)	(0.271)	(0.0487)
Sender costs X target costs	-0.0344	0.0496†	-0.000401	-0.0772	0.0716***
	(0.0372)	(0.0263)	(0.0317)	(0.0544)	(0.0201)
Trade flow	0.0659	0.151	-0.0899	0.0883	0.0699**
	(0.104)	(0.111)	(0.0826)	(0.147)	(0.0239)
Minimum GDP	0.0336	-0.0523	-0.00177	-0.0931	0.150***
	(0.0919)	(0.0673)	(0.0603)	(0.0972)	(0.0253)
IO backs sanctions	0.520***	0.134	0.259*	0.463*	
	(0.150)	(0.151)	(0.124)	(0.215)	
Trade dispute	-0.130	-0.264	-0.257	0.383	
	(0.192)	(0.225)	(0.181)	(0.328)	
Misbehavior in target	0.160	0.389†	0.0761	-0.0367	
	(0.186)	(0.199)	(0.167)	(0.247)	
Alliance similarity					-0.655***
					(0.107)
Capability ratio					0.447***
					(0.0935)
Distance					0.0829***
					(0.0225)
Sender polity					0.0227
					(0.0164)
Target polity					-0.0116
					(0.0182)
Sender polity X target polity					0.000490
					(0.000976)
Constant	-1.562	-0.194	-0.869	0.386	-8.628***
	(2.972)	(2.525)	(1.962)	(2.849)	(0.702)
rho	-0.650*	-0.318	0.418*	-0.882**	
	(0.299)	(0.260)	(0.210)	(0.321)	
Observations	507	507	507	507	165,236
Prob χ^2	<0.0051	<0.0143	<0.0004	<0.0102	
*** p<0.001, ** p<0.01, * p<0.05, † <0.10 (0.1 level considered significant in imposition stage only)					
Robust standard errors in parentheses					

Table 4.3, presenting Models 9 through 12 using exit cost measures derived from trade in non-strategic commodities, looks much like Table 4.1, although target exit costs retain their association with higher likelihood of sanction imposition, similar to results in models looking at trade in strategic goods. Like Model 4, Model 12 suggests that exit costs are not associated with negotiated settlements. Finally, similar to both Tables 4.1

and 4.2, exit costs for non-strategic commodities have no bearing on target concession to the sender. This overwhelming lack of evidence in support of such a relationship suggests that targets do not respond to costs alone when deciding on a response to sanction threats. Most likely, targets balance the cost of capitulation to the cost of economic exit, a calculation that likely does not follow a systematic pattern across sanction threats.

Finally, it is important to note that the rho coefficient is negative and significant in most models. Substantively, this significance suggests a negative correlation between the error terms of the threat onset and outcome stages. The significance of the rho term suggests that a selection effects does operate regarding sanction threats and outcome, justifying the use of a selection model. Additionally, the rho term is very sensitive to model specification, further supporting my contention that selection models are most appropriate to test my research design.

4.6. Conclusion and Discussion

The results of this chapter suggest that exit costs are integral in the decision to threaten sanctions as well as the outcome thereof, yet not necessarily in the ways that conventional wisdom would suggest. First, the target's exit costs appear associated with the onset of a sanction threat, yet this positive association becomes higher still as the sender's exit costs increase. Thus, the sender seems to be likely to threaten sanctions when it can hurt the target and also when its own costs are high enough to send a more powerful signal.

Target exit costs are also associated with the sender not backing down, and with sanction imposition. Conversely, there is some evidence that sender exit costs are

associated with negotiated settlements prior to sanction onset. Future research can benefit from better tracing the process between threat onset and ultimate outcome. Most importantly, future research should connect the sanction threat to conflict outcomes, given findings in Chapter 3 showing that asymmetric exit costs are associated with elevated risk of dyadic conflict. In fact, the results presented here are complementary to those of Chapter 3 because they suggest that higher exit costs are associated with coercion attempts and, yet, not associated with *successful* coercion attempts. Proponents of a bargaining perspective have suggested that the costs associated with cutting off trade are subsumed into the bargaining process (Morrow 1997). If true, we should expect to find that asymmetric exit costs lead to higher incidence of sanction threats and higher incidence of target compliance. The lack of such a finding suggests that the classical bargaining model of war is incomplete, at least with regard to trade and conflict.

Furthermore, the results presented here have important implications for the sanctions literature, and particularly for the impact of resolve. my findings suggest that sanction threats are more likely to be followed by imposition when sanctions are more costly to the target. This result suggest that targets tend to be resolved to endure high costs rather than concede to sender demands. Related, this chapter raises important questions for the importance of costs and sanction use and effectiveness. It is likely that the relationship between target exit costs and sanction imposition reflects the use of sanctions as punishment, and perhaps as signals to third parties contemplating proscribed behavior. Indeed, my results suggest that costs associated with sanctions are critical with regard to all stages of the sanction coercion process, as well as with ultimate outcomes.

CHAPTER 5. THE DEMAND FOR PROTECTIONISM: COMMODITY INELASTICITY AND IMPORT BARRIERS TO TRADE

> TARIFF, n. A scale of taxes on imports, designed to protect the domestic producer against the greed of his consumer. - Ambrose Bierce, *The Devil's Dictionary*

5.1. Introduction

A wide body of literature spanning economics and political science examines the causes of protectionism. Yet a large number of these studies focus on factors affecting the ability of organized interests to overcome the collective action problem to lobby for protectionism against cheaper foreign imports that would harm them, to the benefit of consumers (e.g. Pincus 1975; Esty and Caves 1983; Hansen 1990; Trefler 1993; Aggarwal, Keohane and Yoffie 1987; Busch and Reinhardt 1999; Gowa 1988). For example, despite considerable liberalization overall, agricultural protection remains high in developed countries, despite the fact that it benefits a small number of farmers and results in higher prices for consumers.

Conversely, the shape of import demand is typically given little attention in studies of protectionism. Most studies simply follow Grossman and Helpman's (1994) model in which inelastic demand suggests higher revenue from tariffs, and, therefore, higher tariff rates. However, in this chapter, I examine the conditioning impact of regime type on the relationship between demand inelasticity for imports and tariff rates. I contend, somewhat counter to the expectations of the Grossman and Helpman model, that democracies are likely to have lower tariff rates when demand for a commodity is inelastic, while the opposite is true for non-democratic regimes. This effect follows

because democracies are relatively more responsive to consumer demands, evidence for which is found by Milner and Kubota (2005), who cite the examples of Bolivia, the Philippines, Bangladesh, and Zambia, as well as many states in Latin America.

This chapter is designed to overcome shortcomings in extant studies of protectionism both in economics and political science. For example, economic models tend to hold politics constant. These assumptions are often limiting, as, for example, the assumption that states attempt to maximize revenue ignores a wide body of literature on regime type demonstrating that democracies actually forgo optimal revenue extraction (e.g. Olson 1993). As a consequence, economic studies may not be applicable to an increasingly large group of democratic states. Accordingly, I contend that the institutional impact of regime type within importing countries conditions the influence of economics variables.

Similarly limited, studies in political science often look at protectionism at the country level, ignoring useful commodity disaggregation developed by economists. As such, these studies are unable to distinguish whether protectionism (or a lack thereof) results from distinguishing characteristics of potential imports, as commodity-level nuances are often lost in aggregation. Finally, within both disciplines, there is a focus on cleavages between industries or sectors of the economy that influence domestic interests regarding protectionism, rather than on the structure of demand, despite the fact that the latter has important economic and strategic consequences. For example, a lack of import barriers for a commodity on which a state is dependent may result in higher volumes of imports that the exporter may use as leverage for coercion, if that trade partner does not

rely as much on dyadic trade.

As such, my findings suggest implications for the studies of economic coercion, as well as trade and conflict. The fact that democracies and non-democracies respond to import demand in different ways suggests the potential for asymmetry in exit costs to accrue, as, for example, given a mixed dyad in which trade partners equally vulnerable to dyadic trade, the democratic state would be likely to accrue higher exit costs. As such, regime type, in conjunction with the structure of demand, may affect the likelihood that coercion attempts and military conflict occur – a phenomenon that policy-makers can attempt to mitigate if they can foresee it. In fact, my results suggest that, depending on the circumstances trade partners face, either increased protectionism (for the democratic state in a mixed dyad) or movement towards free trade (for the autocratic state in a mixed dyad) may be useful to reduce the likelihood of dyadic conflict.

This chapter proceeds as follows. First, I review work examining the demand for and supply of protectionist trade policy, highlighting the relative lack of attention paid to import demand. Then, I describe the mechanisms by which democracy conditions the impact of import elasticities on trade barriers. I outline my research design and test two hypotheses with a sample of 97 commodities and 113 countries in the year 2000. Finally, I discuss the implications of my findings for the study of protectionism, as well as for the study of international coercion and conflict.

5.2. The literature on Protectionism

5.2.1. Preference Formation and Lobbying

Classical economic models suggest that gains from trade make states better off

than they would be under autarky, and, as such, free trade is always the utility maximizing trade policy (Ricardo 1817). However, subsequent economic models look inside states to groups that benefit or lose due to trade. The Stolper-Samuelson theorem (1941), building off the Heckscher–Ohlin model of international trade (Heckscher 1919; Ohlin 1933), demonstrates that returns to the holders of the abundant factor of production will increase under free trade while returns to the holders of the scarce factor will fall. The fact that domestic actors with stake in a given factor of production "will have their fortunes altered in predictable ways by trade opening or protectionism" (Berger 2000, 49, citing Jones 1971; Magee 1978), suggests that preferences and domestic political competition can be predicted with knowledge of underlying economic position among trading states (e.g. Gourevitch 1977). Rogowski (1987, 1989) demonstrates this logic with historical examples, finding that class or urban vs. rural political cleavages follow from a state's distribution of abundant and scarce factors of production. For example, in the United States prior to the twentieth century, land was relatively abundant while capitol and labor were relatively scarce. As such, rural farmers supported free trade while urban labor and factory owners lobbied for protection.

The Stolper-Samuelson model requires that factors of production be perfectly mobile between industries. Conversely, the specific factors model (Jones 1971), also known as the Ricardo-Viner model (Samuelson 1971), holds that factors tend to be immobile, resulting in political cleavages that reflect industry-based rather than class-based divisions. For example, the specific factors model suggest that labor and holders of capital within the U.S. automotive industry should join forces opposing free trade if they

stand to suffer from competing imports. Synthesizing these two theories, Hiscox (2002) shows that factor mobility is better modeled as a variable than bound as an assumption, finding that political cleavages tend to form around classes in cases where factors of production are mobile, and around industries in cases where factors are immobile.

If political cleavages reflect the demand for protectionism, then policy-makers control its supply. Following from the Stolper-Samuelson or Ricardo-Viner models of preference formation, scholars typically model the translation of preferences into policy in terms of lobbying elected representatives, who consider trade barriers as commodities to bargain (Grossman and Helpman 1994; see also Hillman 1982, Stigler 1971). The literature on endogenous protection connects preferences to policy outcomes, arguing that trade policy is a function of the ease with which potential protectionist interests can organize and lobby successfully against import competition (Brock and Magee 1978; Findlay and Wellisz 1982; Hillman 1982; Baldwin 1985; see also Olson 1965).[53] Proponents of endogenous protection argue that the relative benefits of organizing are increased either by political dispersion, allowing access to a larger the pool of potential allies in Congress (Pincus 1975; Esty and Caves 1983), geographic proximity, because face-to-face contact lessens the incentives to free ride (Pincus 1975; Hansen 1990; Trefler 1993; Alt et al. 1996), or the size of the domestic industry, because larger industries will have more resources with which to affect the policy process (Aggarwal, Keohane and Yoffie 1987; Busch and Reinhardt 1999).

There is relatively little attention paid to the impact of import demand on the

53 Gowa (1988) argues that, relative to consumer groups, protectionist groups should be able to more easily overcome barriers to organization, explaining why protectionism occurs at all despite the fact that there is almost always a majority that would benefit from liberalization.

supply of and demand for protectionism. The best known model of this relationship comes from Grossman and Helpman's (1994) “protection for sale” model, in which more inelastic demand suggests higher levels of protectionism, *ceteris paribus*, given that higher prices for goods facing inelastic demand will cause less trade distortion and lower deadweight costs relative to cases in which demand is elastic, while also providing government revenue. This argument has seen empirical support looking at U.S. imports (e.g. Gawande and Li 2009), although I contend that this simplistic assumption is better modeled as a conditioning variable, similar to Hiscox's (2002) treatment of asset specificity.

Indeed, given the literature examining the impact of democracy on liberalization, I contend that Grossman and Helpman's (1994) assumption is too simplistic. First, there are serious strategic implications of inelastic demand, as larger import flows in this case suggest that more exit costs will accrue, potentially leading states to become vulnerable to trade partners (e.g. Crescenzi 2003, 2005). Second, there is considerable evidence that democratic institutions affect incentives for protectionism in several ways. I turn now to a discussion of democracy and protectionism.

5.2.2. Democracy and Protectionism

Essentially all of the causes of preference formation, lobbying, and resulting policy listed above exclude the impact of political institutions (tending to hold these constant as legislative democracies). Yet, as Thies and Porche (2007a) demonstrate, despite typically being ignored, there is a considerable impact of politics on protectionism. Several explanations have been advanced for why domestic institutional

arrangement in general, and democracy in particular, is argued to be associated with trade liberalization. First, democracies tend to be less interested in revenue extraction relative to autocracies, which are often little more than "stationary bandits" (Olson 1993). Olson demonstrates that, because democratic governments represent a majority, revenue-maximizing taxation would actually harm the very citizens that vote the leadership into office. Given that tariffs are taxes on their own citizens, democracies should rely less on this government revenue-increasing, yet welfare-decreasing policy.

Similarly, Milner and Kubota (2005) suggest that a movement towards democracy has as a consequence that leaders are less able to use protectionist trade policies. This is so because "the benefits of protectionism are highly concentrated while its costs are diffuse" (108), a redistribution of welfare that complements regimes in which leaders depend on a a small selectorate. Conversely, democracy implies a large electorate, a majority of which should always benefit from welfare-increasing liberalization. However, starting from a Stolper-Samuelson framework, scholars have reasoned that whether democracy translates to free trade depends on wether labor, assumed to be the largest group in terms of sheer numbers, is the relatively abundant or scarce factor of production (e.g. O'Rourke and Taylor 2005, 2006).[54] Others suggest that democracy may be associated with liberalization even when scarce factors of production comprise a majority; for example, if labor is the scarce factor, democracies can redistribute wealth

54 Early research suggests that new democracies are less likely to enact trade liberalization for this reason, given that lower trade barriers in such fragile regimes would be unpopular with a large portion of the electorate holding jobs in import competing sectors of the economy (e.g., Geddes 1995). Furthermore, movement toward liberalization in "third-wave" democracies (Huntington 1991), many of which were relatively undeveloped and dependent on foreign assistance, is often attributed to the influence of international organizations like the World Bank and International Monetary Fund (e.g. Kahler 1989), rather than to democratization.

efficiently through welfare policies such that they enjoy the welfare increasing benefits of free trade while compensating labor (Baldwin 1989).

Complementing the view that democracy is associated with less policy designed to increase the welfare of narrow interests, Thies and Porche (2007b) suggest that democracy facilitates free trade by providing the appearance of responsiveness to narrow demands for protectionism without actually translating those demands into substantive protectionist policy. However, Kono (2006) makes the opposite argument, demonstrating the democracies enact lower tariffs in order to provide the illusion of liberalization, while actually maintaining higher non-tariff barriers (in the forms of quotas and quality standards).

Scholars have also looked to variation within democracy that might explain variation in protectionism. For example, within the U.S., the existence of divided government (Karol 2000), or participation in international trade agreements (Goldstein and Martin 2000) is cited as influence on trade policy. Additional, strong parties may encourage more free trade by by precluding local interests from translating into policy (Hanka 2006; Ehrlich 1007). Rogowski (1987b) suggests that proportional representation with large districts maximizes stability and mitigates pork-barrel politics, conditions favoring free trade (but see Ehrlich 2007, who finds that PR is not associated with protectionism when controlling for the number of parties, party disciple, and presidential systems).

Finally, some studies have posited a conditional relationship of democracy on trade liberalization. Mansfield, Milner, and Rosendorf (2000) suggest that democratic

pairs would be more likely to engage in free trade in order to preclude trade wars. Kono (2009) finds that democracies discriminate, such that trade barriers (typically non-tariff barriers) are raised against poorer trade partners, while liberalization favors wealthier trade partners.

5.3. Regime Type and the Impact of Import Demand Elasticities on Protectionism

Whereas many inquiries into protectionism look to domestic interests and competition, I focus on the impact of import demand on government willingness to liberalize trade or enact protectionist policy. As discussed in Chapter 2, the price elasticity of demand is the response in quantity imported given a 1% increase in price. Accordingly, an inelastic demand suggests that quantity imported will not decrease significantly if prices rise. When import demand is inelastic, higher tariffs are a lucrative source of government revenue because consumers would not adjust down their demand for a given commodity given the higher prices following from a tariff. Accordingly, Grossman and Helpman's (1994) model suggests that more inelastic demand is associated with higher levels of protectionism because trade flows are less distorted due to rising price, resulting in higher revenue relative to cases in which trade flows decline as tariffs rise. Additionally, the GH model expects that higher tariffs are associated with inelastic demand because deadweight losses – allocative inefficiency, or foregone consumer and producer surplus following from reduced trade flows – are lower when demand is inelastic (again, because trade flows are not reduced as much as when demand is elastic).

However, I argue that the GH model of the relationship between elasticities and

protectionism is limited. Specifically, I question whether governments are interested primarily in revenue, and whether deadweight losses are more salient than distributional consequences of tariffs. In fact, I suggest that there is variation in government preferences for revenue, efficiency, and the distributional consequences of protectionism. Regime type is a conditioning influence on government preferences, and, therefore, on the impact of import elasticity of demand. Interestingly, the GH model assumes strong democratic institutions, leading Milner and Kubota (2005) to note that it may apply only to advanced, Western-style democracies. Conversely, modeling regime type as a conditioning variable that affects the impact of the price elasticity of demand, I argue that the GH assumption is actually least likely to hold for democracies.

First, the response of governments to the trade-offs posed by inelastic demand is likely to vary by institutional arrangement – and specifically, on democratization. As mentioned above, demand inelasticity captures the extent to which protectionism affects government revenue, allocative efficiency, and the distribution of wealth among domestic groups (industries, classes, etc.). All else equal, more inelastic demand suggests that governments can increase revenue with higher tariffs. However, the consequence of this higher tariff is higher prices for consumers of imports facing protectionism. Similarly, although deadweight losses are lower in cases of inelastic demand, wealth is transferred away from domestic consumers to the government. As such, tariff revenue is a private good to be distributed to the selectorate (e.g. Bueno de Mesquita et al. 2003). Autocracies are more likely to favor government revenue over easing the burden on consumers. Conversely, consumers compose the electorate in democracies, and would respond

negatively to decreased welfare due to tariffs, rendering tariffs a poor policy choice (e.g. Olson 1993).

Second, demand elasticity suggests implications for the type of domestic political conflict that occurs, the policy outcome resulting from which depends on regime type. All else equal, an inelastic demand suggests asset specificity (Crescenzi 2003, 2005), which implies a lack of domestic alternatives to imported goods. Asset specificity, although not synonymous with factor mobility, is closely connected to the latter concept, as both measure the degree to which resources can be employed to alternate uses. For example, in the U.S., a high tariff on imported crude oil would result in harsh adjustment because the U.S. infrastructure depends so heavily on hydrocarbons. Overall, because inelastic demand corresponds to assets limited to few uses, and, therefore, to factor immobility, it implies industry-based rather than class-based political conflict regarding protectionism, following from the Stolper-Samuelson model (Hiscox 2002).[55] In the above example, the ethanol industry would likely benefit from protectionism on crude oil because their product would become more affordable, whereas this generally inferior oil substitute would not be in high demand if oil imports were unrestricted (environmental concerns aside). As such, democracies should enact lower tariffs when demand is inelastic because industry-based demand for protectionism typically reflects the political preferences of a small segment of the population. Conversely, if asset specificity were very low (and hence, factor mobility were high – for example, if labor within a state was united in opposition to free trade), then democracies should be more likely to be responsive to

55 Asset specificity is typically viewed on a state basis, rather than by commodity. However, varying asset specificity by industry or commodity makes intuitive sense.

these demands (O'Rourke and Taylor 2005, 2006).

This is not to say that narrow interests for protectionism never win out in democracies, as even a casual glance at the U.S. tariff schedule would confirm otherwise. Yet, when import demand is inelastic, the consumer demand for free trade is more likely to win out in democracies because it is very unlikely that an entire class (e.g. labor) is unified in support of restricting trade. Additionally, although Gowa (1988), following Olson's (1965) logic, shows that producers should be better organized than consumers for collective action, inelastic demand for a given commodity suggests the lack of domestic production for that commodity. As such, consumer demand for free trade, easily comprising a majority, should be translated into policy. Conversely, the preference of majorities is largely immaterial in non-democratic states, where the causal mechanisms of the GH model are more likely to hold.[56] This argument leads to two hypotheses:

Hypothesis 5.1: among democracies, a more inelastic demand for imports will be associated with lower levels of protectionism.

Hypothesis 5.2: among non-democracies, a more inelastic demand for imports will be associated with higher levels of protectionism.

5.4. Research Design

To assess the relationship between import elasticities and trade barriers, I employ a sample of traded commodities and tariff rates. My unit of analysis is the country-commodity, with commodities aggregated to the Standard International Trade

56 Extant work in economics looking at the U.S. case finds evidence that I associate with non-democracies. I argue that the U.S. is a special case because of particularly strong local interests. In fact, these local interests were even stronger prior to passage of the Reciprocal Trade Agreements Act in 1934, which gave the president, who arguably has a national constituency, greater influence over trade policy.

Classification (SITC) 2-digit level. To measure protectionism, I take the average tariff rate at the SITC 2-digit level from the United Nations Conference on Trade and Development (UNCTAD) Trade Analysis and Information System (TRAINS). As demonstrated in Chapter 2, my elasticity data are invariant over time (1984-2000) by country and commodity, precluding time series analysis. As such, I use tariff data from 2000.[57]

5.4.1. Measuring Protectionism

My dependent variable is the *import-weighted applied tariff rate* for imports of a given commodity. This variable captures the percentage of the value of given import that is paid as a tariff. I average this variable at the SITC 2-digit level. In theory, these rates are also averaged over trade partners (exporters) as well. However, I restrict the analysis to most favored nation (MFN) tariffs. By granting a trade partner MFN status, a state agrees that it will offer tariffs as low as it grants to any other trade partner.[58] As such, there is no variation in tariff rates by trade partner in my data.[59] Importantly, however, MFN rates not capped by the WTO are set by states themselves. As a result, my dependent variable captures the extent to which a state allows others outside of its preferential trade partners access to its markets.

It is difficult to create a comprehensive yet parsimonious measure of trade

57 Furthermore, the European Union is treated as one country, given that, with a common market, MFN tariff rates of member states are identical. As such, I average explanatory variables across EU member states. Additionally, results are consistent when I use average tariff rates over the 1996-2000 period.
58 Although, in reality, there are agreements, both unilateral and bilateral, granting tariffs lower than MFN level.
59 Variation arises from Preferential Trading Arrangements, in which states agree to lower (or no) trade barriers, and from the Generalized System of Preferences (GSP), which grants lower tariff rates to developing countries.

barriers. In addition to studies employing weighted average tariffs as I do in this study, another common measure of protectionism non-tariff barriers (NTB) coverage rates.Ultimately, both of these measures have limitations. Regarding average tariff rates, a primary concerns is that patterns of trade liberalization have resulted in increased usage of non-tariff barriers, particularly by developed states. However, Ehrlich (2007, 589) demonstrates that tariffs and NTBs tend to be complements rather than substitutes.[60] Indeed, looking at NTBs results in am imperfect measure of protectionism as well, given that NTB coverage assumes implicitly that al tariff lines are equally important (Ehrlich 2007, 590).

As discussed in Chapter 2, tariffs and elasticities are both components of the Trade Restrictiveness Index (TRI) (e.g. Anderson and Neary 2005; Feenstra 1995; Kee, Nicita, and Olareaga 2006, 2009; Irwin 2007), which is designed to mitigate problems associated with using tariffs as a measure of welfare loss. However, by looking at the impact of elasticities on tariff rates, I avoid problems associated with using tariffs as a measure of welfare loss. Essentially, I am testing for whether cases in which trade restriction *would* lead to more or less welfare loss are associated with higher or lower levels of protection. Importantly, however, the definition of "welfare loss" used here refers to lowered trade volumes and deadweight loss (*e.g.,* Grossman and Helpman 1994). These consequences of protectionism should be weighed against potential distributional impacts of tariffs, which may be highest when demand is inelastic, given that consumers in this case must pay higher prices that the government receives as

60 Ehrlich cites Ray 1981; Ray and Marvel 1984; Trefler 1993; and Lee and Swagel 1997, who demonstrate that tariffs and NTBs are correlated even within industries.

revenue.

Aggregation introduces error into measurements of protection, raising concern for the validity of results using measures at the SITC 2-digit level. Ultimately, this level of aggregation is necessary however, given that elasticity data is unavailable at more disaggregated levels.

5.4.2. Explanatory Variables

My primary independent variable is the *import inelasticity* developed in Chapter 2. This variable captures the extent to which import demand adjusts down as price rises. I use the standardized version of this variable discussed in Chapter 2. As such, elasticity varies from 0 – the most elastic, to 1 – the most inelastic.

I hypothesized that democracies are more responsive to popular pressure for reduced protectionism than are non-democracies. However, democracy varies by country, but not by commodity. As such, rather than include a variable for democracy, interacted with commodity inelasticity, I run models on two subsamples. 1: for *democracies*, defined as states scoring at least a 6 on the Polity IV combined democracy-autocracy scale, and 2: for *non-democracies*, defined as states scoring less than a 6 on the Polity IV combined democracy-autocracy scale.[61]

I control both for economic and political determinants of demand for protectionism. First, I capture *intra-industry trade* using the Grubel and Lloyd index (1975). Intra-industry trade is associated with exchange of similar, yet distinctive commodities (*e.g.,* Hondas for Volkswagens), whereas inter-industry trade is associated with exchange of different commodities (*e.g.,* oil for wheat). Although both forms of

61 Results are robust to variations in this cut-off point.

trade provide valuable gains, inter-industry trade, which stems from comparative advantage, is more likely to carry strategic dependence as a consequence. Conversely, intra-industry trade, which follows from economies of scale and consumer preferences for variety, does not invoke these concerns. As such, intra-industry trade may be associated with lower levels of protectionism (but see Kono 2009, who shows that intra-industry trade may, under specific conditions, be associated with higher levels of protectionism). I control for *bound tariffs* with a dummy variable equal to 1 if the WTO caps the maximum allowable tariff for a given commodity. I also control for *import penetration*, coded as the value of imports of a given commodity divided by the importer's GDP.

To capture political determinants of protectionism (in addition to democracy), I include dummy variables for *allies exporting this commodity*, *rivals exporting this commodity*, and *MIDs with states exporting this commodity*. Research shows that states tend to trade more with allies and less with rivalries, specifically routing trade to countries in order to obtain positive security externalities (Gowa 1994; Gowa and Mansfield 1993). Trade barriers may also reflect these strategic concerns. I take alliance data from ATOP (Leeds 2005), strategic rivalry data from Thompson (2001), and MID data from EUGene (Bennett and Stam 2000).

I employ two different statistical models to capture the impact of import elasticities on tariff rates. First, I use regression models with fixed effects by importer. Second, I use Heckman selection models to capture the fact that there may be a selection effect with regard to the presence of a tariff and the tariff rate. At first glance, my models

appear amenable to a hierarchical model including the commodity level (at which economic determinants of tariffs, rivalry, alliance, and MIDs vary) nested within the state level (at which regime type varies). However, hierarchical models are ultimately not appropriate because commodities are *not* nested within importing states. Rather, most commodities are imported by numerous states. This data structure informs the choice of a sub-sampling method to test the conditioning impact of regime type.[62]

5.5. Analysis

I find mixed support for my hypotheses that regime type conditions the impact of import elasticity of demand. Specifically, I find that, within democracies, a more inelastic demand is associated with lower tariff rates, while, in non-democracies, this relationship is reversed. The results of fixed effects regression models and heckman regression models follow below.

[Table follows on next page]

62 Other benefits of the sub-sampling method include an easier interpretation and the fact it presents results equivalent to those that would be obtained by interacting *all* explanatory variables with regime type.

Table 5.1. Fixed effects regression coefficients, DV=average tariff rate

	Non-democracies			Democracies		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Import inelasticity	11.59*	10.99*	11.39*	-6.176***	-5.737***	-6.251***
	(5.476)	(5.457)	(5.482)	(1.591)	(1.543)	(1.592)
Intra-industry trade	-9.469		-7.792	3.542		3.679
	(8.221)		(8.221)	(1.903)		(1.908)
Bound tariff	2.527		3.230	3.098		3.103
	(11.01)		(10.99)	(1.773)		(1.774)
Import dependence	1.483		4.595	-29.16		-27.95
	(64.64)		(64.56)	(22.10)		(22.15)
Alliance with exporter		-1.287	-1.232		0.635	0.534
		(3.938)	(3.945)		(1.994)	(2.018)
Rivalry with exporter		-33.96**	-33.41**		-1.772	-1.799
		(11.17)	(11.20)		(2.301)	(2.325)
MID with exporter		1.291	1.417		-3.133	-3.247
		(10.86)	(10.87)		(2.559)	(2.588)
Constant	12.03***	12.93**	13.17**	15.62***	17.18***	15.79***
	(3.517)	(4.002)	(4.146)	(1.244)	(1.914)	(2.110)
Observations	1629	1629	1629	2642	2702	2642
countries	51	51	51	62	63	62

Standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 5.1 presents coefficients and robust standard errors for six models assessing the relationship between import elasticity of demand and tariff rates in non-democracies (Models 1 through 3) and democracies (Models 4 through 6). In Models 1 through 3, run on a subset of non-democracies (polity2 score lower than 6), the coefficient for important elasticity of demand is positive and significant ($p<0.05$). This finding is robust in a specification controlling for other economic determinants of tariff rates (Model 1), political determinants of protection (Model 2), and in a full specification controlling for economic and political factors (Model3). Substantively, a minimum-to-maximum increase in demand inelasticity is associated with an increase in average tariff rate of 11 percentage points of the commodity price (averaged over the three models), approximately 60% of the mean rate in non-democracies (18%). Conversely, in Models 4

through 6, looking at a subset of democracies, the coefficient for import elasticity of demand is negative and significant at the 0.001 level. Substantively, a minimum-to-maximum increase in demand inelasticity is associated with a decrease in average tariff rate of 6 percentage points of the commodity price, more than one-third of the mean average tariff rate in democracies (16%).

These results suggest that, for democracies, the relationship between inelastic demand and tariff rates is the reverse of what Grossman and Helpman (1994) predict. Importantly, however, extant empirical evidence supporting the GH model (*e.g.* Gawande and Bandyopadhyay 2000) looks only at the U.S. case. When rerunning all three specifications examining only the United States, results look more like those I find for autocracies, matching GH expectations. There may be a number of reasons for this odd finding. First, given the immense size of the United States, it may be that factor specificity is less likely to be a problem. Also possible is that U.S. history as a hegemon results in unique reactions to demand elasticities. Specifically, given that a hegemon typically favors economic openness (e.g. Krasner 1976), it may be that the U.S. is more likely to enact tariffs when import demand is inelastic because trade distortions are minimized in these cases.

[Table follows on next page]

Table 5.2. Heckman regression coefficients				
	Non-democracies		Democracies	
	Tariff rate	Non-zero tariff	Tariff rate	Non-zero tariff
Import inelasticity	8.555	0.173	-8.028	-0.346*
	(8.338)	(0.185)	(4.825)	(0.156)
Import dependence		-17.09		0.0125***
		(10.46)		(0.00218)
Intra-industry trade		-1.151		-0.00667***
		(0.792)		(0.00116)
Alliance with exporter	-5.870	0.242	-12.65*	-0.538**
	(4.833)	(0.321)	(5.088)	(0.170)
Rivalry with exporter	3.528	0.477	11.02*	0.451*
	(3.406)	(0.619)	(4.844)	(0.230)
MID with exporter	-5.396	0.674*	0.0762	0.00845
	(5.876)	(0.315)	(3.941)	(0.169)
Bound tariff	-4.791		0.0595***	
	(2.996)		(2.91e-06)	
Constant	19.38***	1.142***	26.66**	1.140***
	(4.095)	(0.264)	(8.606)	(0.196)
rho	-0.0268		18.31***	
	(0.0161)		(0.0867)	
Observations	1429	1629	2354	2642
*** p<0.001, ** p<0.01, * p<0.05 Robust standard errors in parentheses				

As a sensitivity analysis, Table 5.2 presents coefficients and robust standard error for Models 7 and 8, Heckman regression models in which the first stage dependent variable captures the presence or absence of tariffs, while the second stage dependent variable is a continuous measure of tariff rate (the DV in Models 1 through 6). Model 7, run on a subset of autocracies, shows that import elasticity of demand is associated with higher incidence of tariffs, but not with specific tariff rates. Conversely, among democracies, a more inelastic demand is associated with a lower incidence of tariffs, but not with tariff rate. These results provide additional evidence in support of hypotheses 5.1 and 5.2. Furthermore, however, the Heckman models suggest that inelasticity does not affect tariff rate specifically, but rather, more inelastic demand affects the probability that a state has a non-zero tariff.

Control variables generally behave as expected. *Intra-industry trade* appears unassociated with tariff levels overall. This result may follow from patterns described by Kono (2009). Specifically, although intra-industry trade is generally associated with lower adjustment costs resulting from imports, it may also be associated with higher incentives to organize for collective action. *Bound tariffs* appear associated with higher tariff rates in some instances. Although unintuitive at first glance, this result is likely due to the fact that tariffs are capped specifically where states wish to keep tariffs high, and, furthermore, states typically do not agree to low caps. For example, agriculture tariffs tend to exceed 100% *ad valorem*, and developed democracies in particular tend to set tariffs at this cap.[63]

The impacts of political determinants appear mixed overall. For non-democracies in Models 1 through 3, rivalries are associated with higher tariff rates. Yet, for democracies, alliances, rivalries, and MIDs appear unrelated to tariff rates in fixed effects models. Conversely, political variables appear more influential for democracies in Heckman regressions models. In Model 8, for democracies, alliances with exporters of a given commodity appears associated with lower incidence and rates of tariffs, while rivalries appear associated with higher incidence and rates. Finally, import penetration appears associated with higher incidence of tariffs among democracies, but with lower incidence of tariffs among non-democracies. This result is difficult to interpret given the likelihood of endogeneity between tariff rate and import penetration, although it may suggests that high import penetration is less likely to result in the imposition of tariffs in

63 Less developed states tend to set applied rates for agriculture well below the bound rate. Interestingly, this lower tariff represents uncertainty to exporters, who are uneasy regarding the potential for these less developed states to raise tariffs often and unpredictably.

non-democracies.

5.5.1. Robustness Checks: Exit Costs and Protectionism

Chapters 3 and 4 look at the impact of exit costs rather than elasticities alone. Whereas import elasticities measure the response of quantity to be imported due to a change in price, by interacting the import elasticity by import penetration, I can measure the potential costs to a state of cutting off trade for political reasons. States may enact higher tariffs on commodities with inelastic demand when trade flow is high in order to mitigate potential strategic vulnerability due to high exit costs that would otherwise accrue. Given that demand is inelastic, however, trade is unlikely to decline substantially due to increases in price that accompanies a tariff. Even so, a high tariff in these instances may function as a form of insurance, as states attempt to gain short-term revenue from imports of commodities vulnerable to use as leverage in the future.

Furthermore, testing for the impact of inelasticity conditional on import level helps account for a source of spurious correlation in which the negative association between inelasticity and tariff rates in democracies stems from the fact that democracies simply tend to trade more, perhaps employing lower protectionism because they derive significant income from trade.

[Table follows on next page]

Table 5.3. Fixed effects regression coefficients including exit cost interaction, DV=average tariff rate						
	Non-democracies			Democracies		
	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14
Import inelasticity	11.88*	11.36*	11.73*	-7.120***	-6.828***	-7.155***
	(5.579)	(5.566)	(5.587)	(1.683)	(1.673)	(1.683)
Import dependence	42.10	51.68	52.39	-175.2*	-165.7	-168.3
	(163.8)	(163.4)	(163.5)	(87.86)	(88.03)	(87.98)
Elasticity X depend	-66.82	-84.15	-78.65	224.0	214.5	215.1
	(247.7)	(247.0)	(247.2)	(130.4)	(130.6)	(130.5)
Intra-industry trade	-9.422		-7.734	3.607		3.736
	(8.225)		(8.225)	(1.902)		(1.907)
Bound tariff	2.507		3.209	3.045		3.051
	(11.02)		(10.99)	(1.773)		(1.774)
Alliance with exporter		-1.270	-1.215		0.731	0.517
		(3.944)	(3.946)		(2.016)	(2.017)
Rivalry with exporter		-34.03**	-33.48**		-1.778	-1.770
		(11.18)	(11.21)		(2.325)	(2.324)
MID with exporter		1.322	1.446		-2.838	-3.090
		(10.87)	(10.87)		(2.589)	(2.589)
Constant	11.85***	12.68**	12.94**	16.25***	18.07***	16.38***
	(3.583)	(4.072)	(4.208)	(1.295)	(2.005)	(2.139)
Observations	1629	1629	1629	2642	2642	2642
countries	51	51	51	62	62	62
*** p<0.001, ** p<0.01, * p<0.05 Standard errors in parentheses						

Accordingly, to test whether the impact of demand inelasticity is conditional on import level, I rerun Models 1 through 8 including an interaction between these two variables. Table 5-3 presents Models 9 through 14, replicating Models 1 through 6. Results look essentially identical to those presented in Table 5-1, suggesting that import level, and, therefore, exit costs, do not influence tariff levels. Rather, the nature of demand alone is responsible. Importantly, import penetration, as well as the exit cost interaction, are not significant generally. Additionally, Heckman models with exit cost interactions look essentially identical to the non-interacted specifications. Again, import penetration and the interaction term are not significant in these models.

Given the lack of significance for import penetration and exit cost interactions in

Models 9 through 16, it is important to note the potential for endogeneity between import penetration and tariff levels in, given that higher tariffs are likely to coincide with lower trade. However, including instrumental variables for imports would be difficult in this case, given that trade is import penetration is interacted with inelasticity.[64] Furthermore, the inclusion of inelasticity should mitigate concerns for endogeneity, since this variable captures the extent to which trade responds to tariff levels.

Table 5.4. Heckman regression coefficients, with exit cost interaction

	Non-democracies		Democracies	
	Tariff rate	Non-zero tariff	Tariff rate	Non-zero tariff
Import inelasticity	8.436	0.238	-9.223	-0.405*
	(9.167)	(0.200)	(5.122)	(0.164)
Import dependence	64.33	-8.879	-222.3	-10.42
	(233.9)	(4.644)	(132.8)	(5.961)
Elasticity X dependence	150.7	-18.65	291.4	13.71
	(516.9)	(13.73)	(169.0)	(7.526)
Bound tariff	-4.705		0.192***	
	(2.996)		(0.0181)	
Alliance with exporter	-6.014	0.253	-12.49*	-0.530**
	(4.802)	(0.318)	(5.403)	(0.176)
Rivalry with exporter	3.706	0.461	10.80*	0.443
	(3.412)	(0.618)	(4.820)	(0.228)
MID with exporter	-5.207	0.668*	0.151	0.0208
	(5.816)	(0.316)	(3.932)	(0.168)
Intra-industry trade		-1.140		-0.0200***
		(0.796)		(0.00240)
Constant	19.15***	1.105***	27.40**	1.185***
	(4.190)	(0.257)	(8.575)	(0.194)
rho	-0.0295		17.60***	
	(0.0169)		(0.152)	
Observations	1429	1629	2354	2642

*** p<0.001, ** p<0.01, * p<0.05
Robust standard errors in parentheses

5.6. Discussion and Conclusion

In this chapter, I look at the demand for protectionism in terms of economic costs and benefits both to narrow interests and wide publics, furthermore, demonstrating the conditioning impact of institutional structures (a measure of supply). Results of statistical

64 In a non-interacted model, I ran a simultaneous models, finding essentially identical results.

tests suggest that the relationship between import elasticity (i.e. the demand for protectionism) is dependent on regime type (i.e. the supply of protectionism). Specifically, democracies are more likely to have lower tariffs when demand for a given commodity is inelastic. This relationship is reversed among non-democracies, which are likely to raise tariffs specifically when they stand to gain significant revenue from them. Results support previous work suggesting that democracies provide public goods to a wide electorate, while autocracies provide private goods to a small selectorate (Bueno de Mesquita et al. 2003). While I provide an imperfect measure of the shape of demand, it is useful nonetheless to capture whether protectionism would favor narrow interests or a large portion of a state's citizens.

This chapter has important implications for coercion and conflict. The results of tests in this chapter hold consequences for the distribution of exit costs among trade partners and, therefore, for the likelihood of coercion and conflict among them. Given that democracies are likely to lower trade barriers when demand is at it most inelastic, it follows that exit costs are likely to be higher in democracies, all else equal. Given a pair of democracies, these mutually higher exit costs should be associated with lower incidence of conflict (according to Chapter 3). Conversely, mixed dyads might be more likely to experience conflict if exit costs are high in democracies and low in autocracies (although the tendency for democracies to be richer with more diversified economies suggests the reverse case). Similarly, two autocracies might have mutually lower exit costs, reducing incentives for coercion, and, therefore, leading to lower levels of conflict associated with the "autocratic peace." Ultimately, the robust empirical finding of the

democratic peace (e.g. Dixon 1994) and of peace through similarity (e.g. Gartzke 1998) may reflect, at least in part, the conditioning impact of political institutions on trade policy, which, in turn, affects patterns of vulnerability, coercion, and conflict.

Additionally, future research can benefit from looking at protectionism and demand inelasticity at more disaggregated commodity levels. Additionally, examinations of differences within regime types – for example, the difference between proportional representation and majoritarian democracy – may provide better understanding of the impact of political institutions. Also, the potential variation between developed and undeveloped states may be informative, particularly when compared to the impact of democracy. This comparison may shed light on whether externally-imposed structural adjustment programs in less-developed democracies (which are typically newly democratized) are responsible for the negative relationship between demand inelasticity and protectionism in democracies.

CHAPTER 6. CONCLUSION

6.1. The Contribution of This Research Project

Adam Smith famously quoted that self-interested economic behavior can contribute to immense markets that make everyone better off, seemingly coordinated as if guided by an "invisible hand." It is no surprise both that governments are affected by international trade and that they attempt to control this powerful force to their benefit. Indeed, trade is a fundamental aspect of international relations, deserving considerable attention from scholars in the attempt better to understand the political ramifications of economic exchange.

The preceding chapters suggest that there is considerable room to improve our understanding of the impact of trade on international politics. Attention to the shape of supply and demand, addressing the gains associated with trade flows as well as the costs associated with losing trade ties (when combined with a measure of trade interaction), provides scholars and policy-makers with crucial information regarding the degree to which trade will result in asymmetry in the opportunity and willingness to engage in coercion, as well as the likelihood that military conflict results. This study is a preliminary attempt to connect trade potential to trade policy, behavior, and international outcomes.

Looking to the economics literature, I operationalize and measure trade potential in terms of price elasticities of demand and supply – the degree to which states would adjust quantity imported or exported resulting from changing prices – or, in other words,

how much they would gain from increased trade. By combining elasticities with measures of trade interaction (specifically trade share and trade as a percentage of GDP), I produce exit cost measures that capture the degree to which states would be harmed if trade is interrupted. I provide estimates of the costs and benefits associated with trade across 158 countries, spanning the period from 1984 to 2000, highlighting three important areas in which we can gain from an understanding of trade potential.

6.1.1. Conflict

In Chapter 3, I show that, within dyads, the potentially disparate costs of terminating trade affects incentives for dyadic conflict. Asymmetric costs are associated with higher conflict event counts and a higher likelihood of MID initiation. Conversely, mutually high exit costs are associated with decreased likelihood of conflict. Furthermore, this pattern is particularly evident with regard to exit costs for strategic commodities. I Illustrate this argument with the case of the United States and Japan prior to World War II, showing that Japan, rather than conceding to U.S. pressure, attempted to recapture lost trade by force.

Results of Chapter 3 carry important implications for the study of trade and conflict. First, I demonstrate that looking only the extent of trade relationships is problematic because trade flows do not convey the relative degree to which each state gains from, and, therefore, would suffer from losing, a given trade tie. Looking at trade as percentage of national income has become the standard in IR research, and, although this measure certainly provides some useful information regarding interstate interaction, care must be taken when interpreting this variable in terms of trade gains or opportunity cost

to be foregone if trade is terminated.

The most important of implication of my results is an admonition against scholars and policy-makers holding the view that "more is better" with regard to the impact of trade on prospects for peace. Rather than advocating unrestricted expansion of global trade, I argue that the likely impact of this trade should be studied. Trade-offs between increased well-being and potential vulnerability should be weighed before recommendations for expanding trade relationships are made.[65]

6.1.2. Sanctions

In Chapter 4, I demonstrate that exit costs are important predictors of sanction threats. Potential senders are more likely to threaten trade partners when these partners have more to lose from terminating trade ties. Additionally, this effect becomes stronger when senders themselves have higher exit costs, perhaps because higher sender exit costs signal resolve. Importantly, however, exit costs for the target do not affect the likelihood that the target concedes to sender pressure.

The results in Chapter 4 extend the understanding of the trade-conflict relationship beyond the ideas presented in Chapter 3. Specifically, whereas results of Chapter 3 suggest that imbalance of vulnerability predicts incentives to coerce and, therefore, militarized conflict that results, Chapter 4 focuses specifically on the form that coercion attempts take. Importantly, results in this chapter suggest that, while exit costs are strong predictors or coercion attempts, the outcomes of the attempts are not as easily predictable. In fact, these results for the impact of exit costs on coercion complement

65 This implication assumes that the costs of conflict would outweigh the trade gains associated with increased trade. States may risk conflict if it appears manageable and trade gains are highly valuable.

those regarding exit costs and conflict, proving evidence that the coercion attempts predicted to occur when exit costs are unbalanced do, in fact, occur. Furthermore, these results suggest that targets of such coercion do not concede to the sender's pressure (again, as Japan refused to concede to U.S. demands in 1941). The relatively high error with regard to threat outcomes suggests that exit cost-based coercion attempts do not reliably succeed, leading instead to escalated conflict, including military conflict, as demonstrated in Chapter 3.

The results from Chapter 4 advance the study of sanctions by illustrating that costs associated with imposed sanctions – which have typically been measured quite poorly – do affect systematically the likelihood that economic coercion is attempted, yet not the outcome thereof. My findings also address recent literature addressing the threat stage of sanctions. While it is common to read studies advancing the claim that sanctions likely to be effective will not need to be implemented (because the target will give in at the threat stage), my results suggest that higher costs for the target in terms of lost trade gains do not affect its likelihood of conceding to the sender. Instead, it appears that other factors are behind the selection effect commonly observed with regard to sanction success. Relative issue salience is likely a more important factor than exit costs for threat success (Ang and Peksen 2007), even though exit costs do affect threat onset. Future research can benefit from observing the interaction of exit costs and issue salience in order to capture the relative cost of losing trade with respect to the cost of giving in to the sender's demands.

6.1.3. Protectionism

In Chapter 5, I show that more inelastic demand is associated with higher tariff rates for non-democracies, but with lower tariff rates for democracies. This finding runs somewhat counter to extant studies testing the Grossman and Helpman (1994) "protection for sale" model. Importantly, these results suggest that policy-makers in democracies tend not to respond to potential exit costs in ways that the "rational" unitary actor conceptualization of the state should. Instead, in democracies, trade likely to provide valuable welfare gains – and, simultaneously, bargaining leverage for trade partners – is in fact likely to invoke liberalized trade policies – public goods that have as a consequence the facilitation of exit cost accumulation. Furthermore, given that this behavior varies between democracies and autocracies, the results of Chapter 5 suggest that exit cost asymmetry may vary by the regime composition within dyads. All else held equal, one would expect mutually democratic dyads to invoke the lowest tariffs, encouraging mutually high exit costs, while mutually autocratic dyads would raise mutually high tariffs, resulting in symmetrically low exit costs. Mixed dyads, conversely, through implementation of differing trade policy, are more likely to experience unbalanced exit costs, leading to higher likelihood of dyadic conflict. In fact, these expectations match those presented in Quackenbush and Rudy (2009), who show that, while democratic dyads appear most peaceful, similarly autocratic states may be more peaceful than mixed dyads (see also Gartzke 1998). Given evidence that mixed dyads face higher incidence of conflicts of interest, the fact that dissonant trade policy leads to unequal exit costs may further exacerbate quarrelsome behavior.

My results are important for the study of protectionism because they look to a

source of demand for trade barriers outside of those the typically studied. Rather than looking at the political strength of import competitors, I have shown that the shape of demand for a given commodity, in conjunction with a state's willingness to extract revenue from its citizens, has important implications for the level of protectionism that results.

6.2. Implications for policy-makers

Taken as a whole, my results have important implications for policy-makers, who, through domestic and foreign policy, influence the degree to which states trade and, importantly, the extent of exit costs that accrue. Contrary to the large body of literature in economics, as well as most U.S. policy-makers, my results suggest that free trade may not be universally beneficial for interstate relationships. Contrary to McDonald (2004), who suggests that free trade leads to peace between states, my results suggest that, at least with regard to the trade-off between trade gains and conflict potential, whether states should practice free trade or protectionism depends on two factors: the practices of their trade partners, and the relative elasticities for supply and demand between trade partners. If a state finds itself in a disadvantageous position with high exit costs, then higher protectionism (particularly in the form of non-tariff barriers, which will have a greater impact on trade flows) may provide the balance that precludes future coercion attempts. Conversely, if two trade partners who currently have high trade barriers face relatively similar supply and demand elasticities on the goods the trade, then reduced protectionism, and the increased trade that follows, should result in mutually higher exit costs, a situation of mutual dependence that my results suggest are associated with the

greatest propensity for peace.

6.3. Where do we go from here?

My results raise many new avenues for research. I focus on two particularly lucrative potential research areas. First, future research can benefit from more directly connecting sanctions and conflict, utilizing the concept of exit costs developed here. For example, while extant research suggests that sanction imposition and military conflict tend to be complements (e.g. Drezner 1998; Lektzian and Sprecher 2007), future research can trace the process from sanction threats to the outcome of that threat, and then to conflict propensity in order to isolate the characteristics of threats, with regard to exit costs, that are most likely to lead to military conflict, controlling for target response to the initial threat, and the outcome thereof (*i.e.,* whether sanctions are imposed, one state backs down, or the target and sender reach a negotiated settlement).

Second, further studying trade protectionism with regard to the structure of import demand will provide scholars and policy-makers alike with tools to understand how international trade affects foreign policy and international political relationships. I have shown that democracies and non-democracies respond in radically opposed ways to more inelastic demand for imports. Future research can look beyond regime type to other important determinants of policy response to commodity inelasticity. Perhaps most importantly, the conditioning impact of wealth should be account for, as the majority of countries in my democratic sample are less developed (and, indeed, an examination of the U.S. alone leads to results looking more like those for autocracies). It may be that liberal regimes imposed by outside powers – particularly in the form of structural adjustment

programs necessitated by IMF and World Bank loans to developing states – is in fact responsible for behavior apparently opposed to that predicted by Grossman and Helpman (1994).

As trade volumes are expanding globally, it is crucial to understand the underlying forces that shape both the degree to which states benefit from trade and the degree of harm they stand to suffer from trade restriction. This dissertation lays a foundation for a research program integrating work on how trade potential – rather than simply its extent – influence conflict, coercion, and trade policy. Future research would benefit from extending all three lines of work begun here, as well as by combining the insights I have laid out.

APPENDIX

Table A.1. Summary statistics for elasticities, by commodity code

SITC2 Code, Description		Import demand Raw elast	Import demand Std. elast	Export supply Raw elast	Export supply Std. elast
	Mean	-15.07	0.56	1.81	0.53
LIVE ANIMALS OTHER THAN FISH,	Std.				
CRUSTACEANS, MOLLUSCS AND AQUATIC	Dev	177.04	0.18	10.18	0.25
00 INVERTEBRATES OF DIVISION 03	N	126	126	98	98
	Mean	-0.26	0.48	0.39	0.53
	Std.				
	Dev	1.32	0.22	3.21	0.26
01 MEAT AND MEAT PREPARATIONS	N	147	147	109	109
	Mean	0.01	0.56	0.06	0.55
	Std.				
	Dev	1	0.25	1.4	0.23
02 DAIRY PRODUCTS AND BIRDS' EGGS	N	156	156	95	95
	Mean	-0.17	0.52	0.17	0.54
FISH (NOT MARINE MAMMALS), CRUSTACEANS,	Std.				
MOLLUSCS AND AQUATIC INVERTEBRATES, AND	Dev	0.81	0.21	1.14	0.18
03 PREPARATIONS THEREOF	N	147	147	138	138
	Mean	-0.77	0.34	1.08	0.67
	Std.				
	Dev	0.77	0.22	5.19	0.22
04 CEREALS AND CEREAL PREPARATIONS	N	157	157	120	120
	Mean	-0.3	0.47	0.37	0.62
	Std.				
	Dev	0.58	0.17	1.51	0.17
05 VEGETABLES AND FRUIT	N	157	157	145	145
	Mean	-0.64	0.39	0.02	0.6
	Std.				
	Dev	1.24	0.27	4.17	0.27
06 SUGARS, SUGAR PREPARATIONS AND HONEY	N	155	155	121	121
	Mean	0.11	0.61	0.36	0.5
	Std.				
COFFEE, TEA, COCOA, SPICES AND	Dev	0.89	0.18	0.91	0.18
07 MANUFACTURES THEREOF	N	155	155	141	141
	Mean	0.24	0.56	1.26	0.5
	Std.				
FEEDING STUFF FOR ANIMALS (NOT INCLUDING	Dev	3.43	0.29	8.19	0.33
08 UNMILLED CEREALS)	N	139	139	132	132
	Mean	0.58	0.72	0.34	0.45
	Std.				
MISCELLANEOUS EDIBLE PRODUCTS AND	Dev	1.26	0.28	2.93	0.24
09 PREPARATIONS	N	154	154	90	90
11 BEVERAGES	Mean	-0.09	0.65	0.05	0.54
	Std.	4.4	0.18	2.94	0.22
	Dev				

Table A.1. Summary statistics for elasticities, by commodity code

SITC2 Code, Description		Import demand Raw elast	Import demand Std. elast	Export supply Raw elast	Export supply Std. elast
	N	156	156	113	113
	Mean	0.37	0.7	0.5	0.46
	Std. Dev	1.31	0.24	1.32	0.2
12 TOBACCO AND TOBACCO MANUFACTURES	N	156	156	111	111
	Mean	0.4	0.61	0.04	0.55
	Std. Dev	2.73	0.22	1.11	0.14
21 HIDES, SKINS AND FURSKINS, RAW	N	85	85	145	145
	Mean	-0.8	0.39	0.72	0.53
	Std. Dev	2.87	0.31	6.84	0.29
22 OIL SEEDS AND OLEAGINOUS FRUITS	N	116	116	118	118
	Mean	0.55	0.68	0.94	0.4
	Std. Dev	1.33	0.29	1.67	0.25
23 CRUDE RUBBER (INCLUDING SYNTHETIC AND RECLAIMED)	N	114	114	85	85
	Mean	0.39	0.58	0.42	0.58
	Std. Dev	2.54	0.28	3.97	0.31
24 CORK AND WOOD	N	128	128	123	123
	Mean	0.33	0.59	1.68	0.42
	Std. Dev	2.79	0.35	5.96	0.37
25 PULP AND WASTE PAPER	N	112	112	93	93
	Mean	0	0.56	0.66	0.47
	Std. Dev	0.87	0.2	1.69	0.21
26 TEXTILE FIBERS (OTHER THAN WOOL TOPS AND OTHER COMBED WOOL) AND THEIR WASTES (NOT MANUFACTURED INTO YARN OR FABRIC)	N	154	154	140	140
	Mean	-0.65	0.42	0.06	0.6
	Std. Dev	1.98	0.27	12.43	0.33
27 CRUDE FERTILIZERS (IMPORTS ONLY), EXCEPT THOSE OF DIVISION 56, AND CRUDE MINERALS (EXCLUDING COAL, PETROLEUM AND PRECIOUS STONES)	N	144	144	123	123
	Mean	-0.23	0.46	0.32	0.61
	Std. Dev	3.97	0.29	1.28	0.17
28 METALLIFEROUS ORES AND METAL SCRAP	N	116	116	152	152
	Mean	0.18	0.63	0.3	0.51
	Std. Dev	0.4	0.13	0.56	0.11
29 CRUDE ANIMAL AND VEGETABLE MATERIALS, N.E.S.	N	139	139	145	145
	Mean	-7.77	0.32	7.61	0.56
	Std. Dev	44.42	0.42	78.23	0.39
32 COAL, COKE AND BRIQUETTES	N	103	103	76	76
	Mean	-1.22	0.25	0.82	0.72
	Std. Dev	1.13	0.26	6.03	0.36
33 PETROLEUM, PETROLEUM PRODUCTS AND RELATED MATERIALS					

Table A.1. Summary statistics for elasticities, by commodity code

SITC2 Code, Description		Import demand Raw elast	Import demand Std. elast	Export supply Raw elast	Export supply Std. elast
	N	156	156	129	129
	Mean	-2.01	0.45	0.88	0.44
	Std. Dev	10.84	0.4	8.86	0.38
34 GAS, NATURAL AND MANUFACTURED	N	103	103	74	74
	Mean	6.32	0.52	26.16	0.44
	Std. Dev	34.19	0.47	74.5	0.37
35 ELECTRIC CURRENT	N	12	12	14	14
	Mean	-0.11	0.54	1.18	0.5
	Std. Dev	3.62	0.35	4.15	0.31
41 ANIMAL OILS AND FATS	N	112	112	62	62
	Mean	-0.81	0.36	0.29	0.54
	Std. Dev	1.35	0.29	4.66	0.29
42 FIXED VEGETABLE FATS AND OILS, CRUDE, REFINED OR FRACTIONATED	N	155	155	108	108
ANIMAL OR VEGETABLE FATS AND OILS PROCESSED; WAXES AND INEDIBLE MIXTURES	Mean	-0.42	0.45	0.13	0.58
	Std. Dev	2.38	0.31	2.64	0.26
43 OR PREPARATIONS OF ANIMAL OR VEGETABLE FATS OR OILS, N.E.S.	N	144	144	75	75
	Mean	-0.17	0.54	0.39	0.59
	Std. Dev	0.99	0.13	6.03	0.16
51 ORGANIC CHEMICALS	N	156	156	116	116
	Mean	-0.23	0.5	-0.03	0.59
	Std. Dev	0.63	0.16	2.27	0.17
52 INORGANIC CHEMICALS	N	153	153	112	112
	Mean	0.18	0.63	0.22	0.53
	Std. Dev	0.39	0.12	0.89	0.15
53 DYEING, TANNING AND COLORING MATERIALS	N	156	156	97	97
	Mean	-1.65	0.36	2.39	0.58
	Std. Dev	3.4	0.29	48.1	0.25
54 MEDICINAL AND PHARMACEUTICAL PRODUCTS	N	155	155	104	104
	Mean	0.1	0.61	0.06	0.55
	Std. Dev	0.29	0.09	0.94	0.14
ESSENTIAL OILS AND RESINOIDS AND PERFUME MATERIALS; TOILET, POLISHING AND CLEANSING 55 PREPARATIONS	N	156	156	109	109
	Mean	-2.33	0.44	0.57	0.56
	Std. Dev	20.44	0.37	7.21	0.38
FERTILIZERS (EXPORTS INCLUDE GROUP 272; 56 IMPORTS EXCLUDE GROUP 272)	N	149	149	101	101
57 PLASTICS IN PRIMARY FORMS	Mean	0.11	0.6	0	0.57
	Std. Dev	0.63	0.15	0.72	0.14

Table A.1. Summary statistics for elasticities, by commodity code

SITC2 Code, Description		Import demand Raw elast	Import demand Std. elast	Export supply Raw elast	Export supply Std. elast
	N	130	130	58	58
	Mean	-0.38	0.45	0.29	0.63
	Std. Dev	0.37	0.12	0.99	0.18
58 PLASTICS IN NONPRIMARY FORMS	N	156	156	103	103
	Mean	0.23	0.65	0.78	0.53
	Std. Dev	0.31	0.1	4.86	0.14
59 CHEMICAL MATERIALS AND PRODUCTS, N.E.S.	N	156	156	103	103
	Mean	-0.03	0.56	0.23	0.53
	Std. Dev	0.45	0.13	0.75	0.13
61 LEATHER, LEATHER MANUFACTURES, N.E.S., AND DRESSED FURSKINS	N	135	135	130	130
	Mean	-0.3	0.48	2.2	0.6
	Std. Dev	0.39	0.12	20.83	0.16
62 RUBBER MANUFACTURES, N.E.S.	N	157	157	99	99
	Mean	0.06	0.59	0.08	0.58
	Std. Dev	0.48	0.13	2.15	0.18
63 CORK AND WOOD MANUFACTURES OTHER THAN FURNITURE	N	149	149	120	120
	Mean	-0.24	0.5	0.11	0.61
	Std. Dev	0.4	0.13	1.33	0.19
64 PAPER, PAPERBOARD, AND ARTICLES OF PAPER PULP, PAPER OR PAPER BOARD	N	157	157	114	114
	Mean	0.04	0.59	0.01	0.58
	Std. Dev	0.25	0.08	0.82	0.09
65 TEXTILE YARN, FABRICS, MADE-UP ARTICLES, N.E.S., AND RELATED PRODUCTS	N	157	157	137	137
	Mean	-0.19	0.51	0.25	0.61
	Std. Dev	0.24	0.07	3.24	0.15
66 NONMETALLIC MINERAL MANUFACTURES, N.E.S.	N	157	157	112	112
	Mean	-0.29	0.48	0.6	0.68
	Std. Dev	0.28	0.09	1.02	0.17
67 IRON AND STEEL	N	156	156	126	126
	Mean	0.04	0.59	0.11	0.58
	Std. Dev	0.44	0.13	1.39	0.18
68 NONFERROUS METALS	N	154	154	121	121
	Mean	0.03	0.59	0.01	0.57
	Std. Dev	0.18	0.06	0.42	0.08
69 MANUFACTURES OF METALS, N.E.S.	N	157	157	126	126
71 POWER GENERATING MACHINERY AND EQUIPMENT	Mean	0.19	0.64	0.32	0.51
	Std. Dev	0.23	0.07	0.43	0.09

Table A.1. Summary statistics for elasticities, by commodity code					
		Import demand		Export supply	
SITC2 Code, Description		Raw elast	Std. elast	Raw elast	Std. elast
	N	157	157	137	137
	Mean	0	0.58	0.08	0.55
	Std. Dev	0.21	0.07	0.23	0.05
72 MACHINERY SPECIALIZED FOR PARTICULAR INDUSTRIES	N	157	157	132	132
	Mean	-0.02	0.57	0.04	0.56
	Std. Dev	0.3	0.1	0.44	0.09
73 METALWORKING MACHINERY	N	151	151	91	91
	Mean	-0.08	0.55	0.03	0.56
	Std. Dev	0.16	0.05	0.31	0.06
74 GENERAL INDUSTRIAL MACHINERY AND EQUIPMENT, N.E.S., AND MACHINE PARTS, N.E.S.	N	157	157	130	130
	Mean	0.29	0.67	0.22	0.52
	Std. Dev	0.29	0.09	0.57	0.09
75 OFFICE MACHINES AND AUTOMATIC DATA PROCESSING MACHINES	N	156	156	101	101
	Mean	0.44	0.7	0.28	0.51
	Std. Dev	0.76	0.1	0.47	0.1
76 TELECOMMUNICATIONS AND SOUND RECORDING AND REPRODUCING APPARATUS AND EQUIPMENT	N	157	157	113	113
	Mean	0.05	0.59	0.06	0.56
	Std. Dev	0.22	0.07	0.46	0.09
77 ELECTRICAL MACHINERY, APPARATUS AND APPLIANCES, N.E.S., AND ELECTRICAL PARTS THEREOF (INCLUDING NONELECTRICAL COUNTERPARTS OF HOUSEHOLD TYPE)	N	157	157	129	129
	Mean	0.35	0.69	0.17	0.52
	Std. Dev	0.34	0.11	1.02	0.11
78 ROAD VEHICLES (INCLUDING AIR-CUSHION VEHICLES)	N	157	157	127	127
	Mean	0.39	0.7	0.37	0.49
	Std. Dev	0.27	0.08	0.67	0.13
79 TRANSPORT EQUIPMENT, N.E.S.	N	154	154	124	124
	Mean	0.42	0.7	8.51	0.51
	Std. Dev	0.65	0.18	57.97	0.15
81 TRANSPORT EQUIPMENT, N.E.S.	N	152	152	89	89
	Mean	-0.14	0.53	0.33	0.62
	Std. Dev	0.49	0.15	1.17	0.14
82 FURNITURE AND PARTS THEREOF; BEDDING, MATTRESSES, MATTRESS SUPPORTS, CUSHIONS AND SIMILAR STUFFED FURNISHINGS	N	147	147	110	110
	Mean	1.93	0.65	4.21	0.47
	Std. Dev	13.58	0.22	33.37	0.16
83 TRAVEL GOODS, HANDBAGS AND SIMILAR CONTAINERS	N	112	112	87	87
84 ARTICLES OF APPAREL AND CLOTHING ACCESSORIES	Mean	0.04	0.59	0.19	0.57
	Std. Dev	0.28	0.09	2.78	0.11

Table A.1. Summary statistics for elasticities, by commodity code

SITC2 Code, Description		Import demand Raw elast	Import demand Std. elast	Export supply Raw elast	Export supply Std. elast
	N	157	157	139	139
	Mean	17.62	0.64	1.13	0.52
	Std. Dev	120.38	0.23	9.55	0.21
85 FOOTWEAR	N	151	151	105	105
	Mean	0.17	0.63	0.24	0.52
PROFSSIONAL, SCIENTIFIC AND CONTROLLING	Std. Dev	0.35	0.09	0.39	0.08
87 INSTRUMENTS AND APPARATUS, N.E.S.	N	157	157	126	126
	Mean	-0.05	0.56	10.12	0.53
PHOTOGRAPHIC APPARATUS, EQUIPMENT AND	Std.				
SUPPLIES AND OPTICAL GOODS, N.E.S.; WATCHES	Dev	0.35	0.11	91.03	0.11
88 AND CLOCKS	N	145	145	84	84
	Mean	0.01	0.58	0.1	0.55
MISCELLANEOUS MANUFACTURED ARTICLES,	Std. Dev	0.23	0.07	0.33	0.07
89 N.E.S.	N	157	157	126	126
	Mean	0.18	0.61	0.69	0.46
SPECIAL TRANSACTIONS AND COMMODITIES	Std. Dev	1	0.22	2.64	0.19
93 NOT CLASSIFIED ACCORDING TO KIND	N	100	100	56	56
	Mean	0.46	0.67	0.92	0.57
COIN, INCLUDING GOLD COIN; PROOF AND	Std. Dev	1.11	0.2	5.98	0.17
95 PRESENTATION SETS AND CURRENT COIN	N	37	37	36	36
	Mean	-0.38	0.53	0.61	0.47
COIN (OTHER THAN GOLD COIN), NOT BEING	Std. Dev	4.09	0.41	1.79	0.32
96 LEGAL TENDER	N	28	28	6	6
	Mean	0.09	0.51	0.51	0.48
GOLD, NONMONETARY (EXCLUDING GOLD ORES	Std. Dev	2.68	0.31	1.47	0.25
97 AND CONCENTRATES)	N	39	39	52	52

Table A.2. Summary statistics for elasticities, by country (COW country code)					
		Import demand		Export supply	
Country		Raw elasticity	Std. elasticity	Raw elasticity	Std. elasticity
United States of America	Mean	0.26	0.59	-0.15	0.59
	Std. Dev	2.42	0.19	0.94	0.16
	N	67	67	69	69
Canada	Mean	-0.54	0.54	-0.12	0.59
	Std. Dev	3.39	0.27	3.14	0.2
	N	62	62	68	68
Cuba	Mean	-0.18	0.47	1.6	0.49
	Std. Dev	2.48	0.25	5.13	0.24
	N	64	64	39	39
Haiti	Mean	-6.74	0.54	0.59	0.53
	Std. Dev	51.01	0.25	2.36	0.18
	N	59	59	30	30
Dominican Republic	Mean	-0.36	0.49	-0.08	0.54
	Std. Dev	2.7	0.23	2.4	0.23
	N	64	64	54	54
Jamaica	Mean	-0.36	0.52	0.15	0.54
	Std. Dev	1.86	0.22	2.03	0.23
	N	65	65	44	44
Trinidad and Tobago	Mean	0	0.56	-3.75	0.54
	Std. Dev	1.48	0.22	32.73	0.3
	N	64	64	42	42
Mexico	Mean	-0.2	0.53	-0.06	0.58
	Std. Dev	0.84	0.18	1	0.18
	N	63	63	66	66
Guatemala	Mean	-0.1	0.56	5.25	0.5
	Std. Dev	1.14	0.23	34.18	0.25
	N	65	65	51	51
Honduras	Mean	-0.33	0.5	0.57	0.56
	Std. Dev	2.79	0.25	4.6	0.29
	N	63	63	39	39
El Salvador	Mean	-0.35	0.53	0.57	0.54
	Std. Dev	1.96	0.22	4.17	0.24
	N	62	62	37	37
Nicaragua	Mean	-0.13	0.54	17.28	0.51
	Std. Dev	0.91	0.23	91.49	0.3
	N	56	56	29	29
Costa Rica	Mean	0.08	0.53	0.31	0.52
	Std. Dev	2.24	0.22	1.54	0.19
	N	65	65	57	57
Panama	Mean	-0.03	0.56	1.19	0.56
	Std. Dev	1	0.22	10.25	0.18
	N	65	65	60	60
Colombia	Mean	-0.28	0.52	0.1	0.59
	Std. Dev	1.08	0.22	3.18	0.18
	N	64	64	64	64
Venezuela	Mean	-0.11	0.55	-0.01	0.55

Table A.2. Summary statistics for elasticities, by country (COW country code)					
		Import demand		Export supply	
Country		Raw elasticity	Std. elasticity	Raw elasticity	Std. elasticity
	Std. Dev	0.83	0.23	1.8	0.2
	N	65	65	62	62
Guyana	Mean	-0.28	0.49	-0.61	0.58
	Std. Dev	1.03	0.24	13.06	0.31
	N	52	52	20	20
Ecuador	Mean	-0.01	0.58	0.07	0.55
	Std. Dev	2.39	0.19	2.39	0.25
	N	62	62	60	60
Peru	Mean	-0.25	0.5	-0.86	0.62
	Std. Dev	1.56	0.25	4.63	0.16
	N	63	63	60	60
Brazil	Mean	-0.17	0.54	-0.2	0.61
	Std. Dev	0.95	0.22	1.61	0.19
	N	65	65	65	65
Bolivia	Mean	0.11	0.59	-0.8	0.59
	Std. Dev	0.89	0.21	4.91	0.25
	N	61	61	42	42
Paraguay	Mean	0.33	0.58	-1	0.51
	Std. Dev	3.06	0.23	13.78	0.27
	N	64	64	50	50
Chile	Mean	-0.17	0.53	0.87	0.55
	Std. Dev	0.86	0.23	6.47	0.18
	N	64	64	63	63
Argentina	Mean	0.01	0.59	0.03	0.59
	Std. Dev	0.81	0.18	1.53	0.18
	N	65	65	66	66
Uruguay	Mean	0.17	0.59	-0.17	0.59
	Std. Dev	1.1	0.18	1.7	0.21
	N	67	67	60	60
United Kingdom	Mean	-0.02	0.6	-0.32	0.56
	Std. Dev	1.32	0.23	3.47	0.15
	N	63	63	72	72
Ireland	Mean	0.06	0.59	0.16	0.53
	Std. Dev	0.64	0.18	0.72	0.12
	N	62	62	64	64
Netherlands	Mean	1.52	0.57	0	0.57
	Std. Dev	12.53	0.23	0.7	0.14
	N	63	63	70	70
Belgium	Mean	-0.6	0.56	0.15	0.57
	Std. Dev	4.09	0.23	1.75	0.15
	N	63	63	69	69
France	Mean	-0.01	0.59	-0.02	0.57
	Std. Dev	1	0.23	0.65	0.13
	N	63	63	70	70
Switzerland	Mean	0.26	0.65	0.18	0.53
	Std. Dev	0.82	0.22	0.49	0.1
	N	62	62	68	68

Table A.2. Summary statistics for elasticities, by country (COW country code)					
		Import demand		Export supply	
Country		Raw elasticity	Std. elasticity	Raw elasticity	Std. elasticity
Spain	Mean	-0.1	0.56	-0.01	0.57
	Std. Dev	0.97	0.22	0.54	0.11
	N	62	62	67	67
Portugal	Mean	-0.05	0.58	0.04	0.55
	Std. Dev	1.18	0.23	1.06	0.15
	N	66	66	64	64
Germany	Mean	-0.07	0.6	0.07	0.56
	Std. Dev	1.69	0.22	0.6	0.12
	N	62	62	71	71
German Democratic Republic	Mean	0.07	0.56	-0.67	0.63
	Std. Dev	1.78	0.22	2.98	0.2
	N	61	61	63	63
Poland	Mean	-0.22	0.54	-0.02	0.56
	Std. Dev	1.25	0.21	0.98	0.13
	N	62	62	64	64
Austria	Mean	0.1	0.6	-0.07	0.56
	Std. Dev	0.78	0.21	1.51	0.13
	N	62	62	68	68
Hungary	Mean	-0.64	0.56	0.24	0.55
	Std. Dev	3.72	0.2	2.59	0.17
	N	62	62	65	65
Czechoslovakia	Mean	.	.	-0.17	0.58
	Std. Dev	.	.	1.84	0.23
	N	0	0	63	63
Czech Republic	Mean	-0.21	0.57	0.14	0.54
	Std. Dev	2.06	0.21	1	0.18
	N	62	62	65	65
Slovakia	Mean	-0.18	0.58	0.27	0.55
	Std. Dev	2.04	0.16	2.46	0.22
	N	64	64	63	63
Italy	Mean	0.04	0.59	0.2	0.55
	Std. Dev	0.74	0.22	1.28	0.14
	N	62	62	70	70
Albania	Mean	-0.14	0.55	-0.27	0.47
	Std. Dev	1.47	0.21	7.21	0.24
	N	63	63	44	44
Macedonia	Mean	0.23	0.56	0.49	0.54
	Std. Dev	1.57	0.23	6.74	0.26
	N	64	64	49	49
Croatia	Mean	-0.04	0.56	0.37	0.53
	Std. Dev	0.75	0.21	2.32	0.25
	N	64	64	62	62
Yugoslavia	Mean	-0.25	0.56	0.23	0.55
	Std. Dev	1.96	0.23	1.94	0.22
	N	64	64	66	66
Bosnia and Herzegovina	Mean	0	0.52	1.81	0.5
	Std. Dev	2.27	0.24	8.06	0.28

Table A.2. Summary statistics for elasticities, by country (COW country code)					
		Import demand		Export supply	
Country		Raw elasticity	Std. elasticity	Raw elasticity	Std. elasticity
	N	58	58	34	34
Kosovo	Mean	0.23	0.52	0.25	0.56
	Std. Dev	2.71	0.25	2.42	0.19
	N	47	47	56	56
Slovenia	Mean	-0.04	0.58	0.74	0.53
	Std. Dev	1.34	0.21	3.8	0.2
	N	64	64	62	62
Greece	Mean	-0.07	0.56	0.02	0.57
	Std. Dev	0.91	0.22	0.61	0.12
	N	65	65	62	62
Cyprus	Mean	0.07	0.58	-0.07	0.56
	Std. Dev	0.89	0.22	1.81	0.18
	N	66	66	56	56
Bulgaria	Mean	-0.1	0.54	0.08	0.55
	Std. Dev	0.37	0.12	1.3	0.2
	N	65	65	64	64
Moldova	Mean	0.02	0.58	0.53	0.52
	Std. Dev	8.18	0.23	3.61	0.28
	N	56	56	47	47
Romania	Mean	-0.03	0.54	-0.12	0.59
	Std. Dev	0.89	0.15	1.1	0.18
	N	63	63	62	62
Russia	Mean	-0.05	0.55	-0.47	0.58
	Std. Dev	0.98	0.21	2.97	0.16
	N	66	66	66	66
Estonia	Mean	-0.83	0.51	-0.19	0.54
	Std. Dev	3.49	0.25	3.28	0.22
	N	64	64	54	54
Latvia	Mean	-1.17	0.52	-0.75	0.58
	Std. Dev	5.32	0.24	4.17	0.21
	N	64	64	52	52
Lithuania	Mean	-0.57	0.59	0.36	0.57
	Std. Dev	4.48	0.23	2.87	0.22
	N	65	65	58	58
Ukraine	Mean	-1.57	0.52	-0.67	0.59
	Std. Dev	8.62	0.22	5.22	0.21
	N	65	65	62	62
Belarus	Mean	0.08	0.56	0.31	0.58
	Std. Dev	1.13	0.21	5.09	0.24
	N	59	59	53	53
Armenia	Mean	-0.06	0.55	-10.33	0.5
	Std. Dev	1.13	0.28	48.86	0.24
	N	44	44	20	20
Georgia	Mean	-0.48	0.53	1.54	0.55
	Std. Dev	4.8	0.23	8.88	0.29
	N	50	50	37	37
Azerbaijan	Mean	-0.41	0.51	-1.78	0.59

Table A.2. Summary statistics for elasticities, by country (COW country code)					
		Import demand		Export supply	
Country		Raw elasticity	Std. elasticity	Raw elasticity	Std. elasticity
	Std. Dev	1.84	0.22	7.6	0.21
	N	53	53	38	38
Finland	Mean	-0.31	0.57	0.98	0.55
	Std. Dev	2.38	0.22	11.17	0.16
	N	65	65	66	66
Sweden	Mean	0.05	0.59	0.06	0.56
	Std. Dev	0.81	0.22	0.52	0.11
	N	62	62	69	69
Norway	Mean	-0.19	0.57	-0.17	0.59
	Std. Dev	1.6	0.22	0.97	0.14
	N	67	67	65	65
Denmark	Mean	0.08	0.6	4.01	0.55
	Std. Dev	0.66	0.2	32.73	0.15
	N	63	63	68	68
Iceland	Mean	0.15	0.59	0.01	0.54
	Std. Dev	1.15	0.21	1.37	0.17
	N	61	61	48	48
Guinea-Bissau	Mean	-0.21	0.61	-2.09	0.53
	Std. Dev	3.38	0.2	9.72	0.34
	N	54	54	16	16
Equatorial Guinea	Mean	-0.35	0.54	0.15	0.44
	Std. Dev	1.42	0.23	3.03	0.39
	N	42	42	8	8
Gambia	Mean	17.8	0.55	0.97	0.38
	Std. Dev	122.45	0.24	1.25	0.24
	N	48	48	12	12
Mali	Mean	0	0.56	0.39	0.54
	Std. Dev	1.07	0.21	1.77	0.2
	N	53	53	17	17
Senegal	Mean	0.12	0.53	0.84	0.47
	Std. Dev	1.89	0.26	2.62	0.29
	N	62	62	35	35
Benin	Mean	-0.13	0.55	1.55	0.45
	Std. Dev	1.06	0.24	4.19	0.21
	N	51	51	13	13
Mauritania	Mean	-0.16	0.56	-0.62	0.5
	Std. Dev	1.35	0.24	5.6	0.29
	N	55	55	14	14
Niger	Mean	-0.05	0.55	0.56	0.5
	Std. Dev	1.29	0.25	2.53	0.29
	N	49	49	25	25
Ivory Coast	Mean	-0.16	0.53	0.88	0.51
	Std. Dev	0.78	0.23	3.73	0.24
	N	60	60	50	50
Guinea	Mean	-0.05	0.55	2.57	0.42
	Std. Dev	2.22	0.23	5.74	0.36
	N	52	52	17	17

Table A.2. Summary statistics for elasticities, by country (COW country code)					
		Import demand		Export supply	
Country		Raw elasticity	Std. elasticity	Raw elasticity	Std. elasticity
Burkina Faso	Mean	-0.07	0.55	-0.51	0.63
	Std. Dev	1.09	0.22	1.49	0.21
	N	51	51	14	14
Liberia	Mean	0	0.62	-0.19	0.53
	Std. Dev	2.46	0.23	2.55	0.3
	N	51	51	18	18
Sierra Leone	Mean	-0.12	0.58	1	0.5
	Std. Dev	2.06	0.2	3.03	0.29
	N	54	54	23	23
Ghana	Mean	0.21	0.57	0.77	0.44
	Std. Dev	1.47	0.23	1.61	0.27
	N	62	62	37	37
Togo	Mean	-0.18	0.54	2.39	0.35
	Std. Dev	1.39	0.27	6.25	0.29
	N	52	52	20	20
Cameroon	Mean	0.01	0.55	0.19	0.53
	Std. Dev	1.32	0.22	1.37	0.23
	N	61	61	33	33
Nigeria	Mean	0.01	0.58	0.13	0.51
	Std. Dev	0.59	0.17	4.93	0.25
	N	67	67	47	47
Gabon	Mean	-0.01	0.55	0.53	0.5
	Std. Dev	0.87	0.2	3.39	0.35
	N	56	56	24	24
Central African Republic	Mean	-0.29	0.57	-0.13	0.59
	Std. Dev	1.57	0.25	1.31	0.26
	N	47	47	15	15
Chad	Mean	0.2	0.56	2.63	0.35
	Std. Dev	1.95	0.23	4.43	0.32
	N	44	44	6	6
Congo	Mean	-0.21	0.58	2.52	0.42
	Std. Dev	1.82	0.19	8.14	0.27
	N	53	53	21	21
Democratic Republic of the Congo	Mean	-0.04	0.57	5.71	0.46
	Std. Dev	1.22	0.23	28.22	0.25
	N	56	56	30	30
Uganda	Mean	0.01	0.57	0.39	0.49
	Std. Dev	0.97	0.19	0.68	0.14
	N	51	51	13	13
Kenya	Mean	0.08	0.57	0.15	0.55
	Std. Dev	1.2	0.2	1.01	0.16
	N	65	65	52	52
Tanzania	Mean	-0.32	0.52	0.04	0.49
	Std. Dev	1.36	0.23	4.89	0.24
	N	60	60	38	38
Burundi	Mean	-0.23	0.59	1.68	0.35
	Std. Dev	2	0.23	2.56	0.18

Table A.2. Summary statistics for elasticities, by country (COW country code)					
		Import demand		Export supply	
Country		Raw elasticity	Std. elasticity	Raw elasticity	Std. elasticity
	N	43	43	9	9
Rwanda	Mean	0.37	0.62	0.01	0.56
	Std. Dev	2.03	0.2	1.21	0.24
	N	46	46	6	6
Somalia	Mean	-0.33	0.55	-0.59	0.64
	Std. Dev	2.04	0.24	1.6	0.24
	N	45	45	15	15
Djibouti	Mean	0.7	0.55	0.98	0.43
	Std. Dev	4.98	0.24	1.9	0.25
	N	50	50	7	7
Ethiopia	Mean	-0.29	0.52	1.26	0.45
	Std. Dev	1.08	0.21	5.05	0.26
	N	60	60	28	28
Angola	Mean	-0.05	0.55	0.15	0.52
	Std. Dev	1.36	0.18	1.82	0.28
	N	59	59	17	17
Mozambique	Mean	0.26	0.56	-0.42	0.55
	Std. Dev	1.82	0.23	3.79	0.26
	N	60	60	40	40
Zambia	Mean	-0.22	0.54	0.35	0.53
	Std. Dev	1.18	0.21	2.83	0.21
	N	57	57	28	28
Zimbabwe	Mean	0.14	0.59	6.47	0.54
	Std. Dev	1.88	0.27	42.23	0.22
	N	62	62	55	55
Malawi	Mean	-0.4	0.53	-0.04	0.55
	Std. Dev	1.96	0.24	9.89	0.32
	N	50	50	20	20
South Africa	Mean	1.2	0.57	-0.01	0.57
	Std. Dev	13.76	0.19	1.09	0.17
	N	61	61	66	66
Madagascar	Mean	-0.25	0.53	28.99	0.54
	Std. Dev	1.26	0.24	154.94	0.25
	N	58	58	29	29
Mauritius	Mean	-2.68	0.58	0.66	0.53
	Std. Dev	23.63	0.21	3.11	0.21
	N	64	64	38	38
Morocco	Mean	-0.3	0.48	0.28	0.58
	Std. Dev	1.12	0.26	3.18	0.19
	N	65	65	60	60
Algeria	Mean	-0.21	0.52	0.52	0.55
	Std. Dev	0.63	0.18	4.23	0.25
	N	62	62	49	49
Tunisia	Mean	-0.26	0.51	-0.07	0.58
	Std. Dev	1.18	0.23	0.75	0.14
	N	65	65	57	57
Libya	Mean	0.01	0.53	-0.13	0.55

Table A.2. Summary statistics for elasticities, by country (COW country code)					
		Import demand		Export supply	
Country		Raw elasticity	Std. elasticity	Raw elasticity	Std. elasticity
	Std. Dev	1.4	0.2	6.8	0.3
	N	65	65	31	31
Sudan	Mean	-0.05	0.56	1.01	0.51
	Std. Dev	2.84	0.23	8.03	0.32
	N	60	60	25	25
Iran	Mean	-0.16	0.53	1.33	0.5
	Std. Dev	0.85	0.2	5.89	0.25
	N	65	65	61	61
Turkey	Mean	-0.33	0.52	0.04	0.56
	Std. Dev	1.45	0.24	0.66	0.13
	N	62	62	61	61
Iraq	Mean	-0.05	0.54	0.72	0.57
	Std. Dev	1.02	0.22	5.77	0.27
	N	61	61	30	30
Egypt	Mean	-0.1	0.53	0.42	0.58
	Std. Dev	0.96	0.24	5.05	0.15
	N	68	68	59	59
Syria	Mean	-0.02	0.54	-0.97	0.56
	Std. Dev	1.54	0.23	7.53	0.22
	N	64	64	44	44
Lebanon	Mean	-0.05	0.55	0.18	0.54
	Std. Dev	1.12	0.2	3.58	0.21
	N	65	65	52	52
Jordan	Mean	-0.09	0.55	-0.11	0.57
	Std. Dev	0.64	0.21	1.95	0.23
	N	66	66	49	49
Israel	Mean	-3.75	0.5	0.06	0.55
	Std. Dev	14.1	0.38	0.8	0.14
	N	29	29	61	61
Saudi Arabia	Mean	0.08	0.57	-0.22	0.58
	Std. Dev	0.94	0.21	2.27	0.21
	N	62	62	61	61
Yemen Arab Republic	Mean	-2.22	0.44	5.74	0.36
	Std. Dev	12.04	0.28	13.31	0.36
	N	54	54	16	16
Yemen	Mean	-0.36	0.51	-0.72	0.53
	Std. Dev	1.95	0.26	11.57	0.3
	N	57	57	26	26
Yemen People's Republic	Mean	0.07	0.53	2.33	0.29
	Std. Dev	1.62	0.26	3.42	0.27
	N	48	48	8	8
Kuwait	Mean	0.36	0.64	0.56	0.54
	Std. Dev	1.64	0.23	2.91	0.26
	N	58	58	58	58
Bahrain	Mean	-0.05	0.57	0.77	0.51
	Std. Dev	1.16	0.24	2.79	0.24
	N	63	63	48	48

Table A.2. Summary statistics for elasticities, by country (COW country code)					
		Import demand		Export supply	
Country		Raw elasticity	Std. elasticity	Raw elasticity	Std. elasticity
Qatar	Mean	0.08	0.6	1.03	0.53
	Std. Dev	0.57	0.18	3.97	0.3
	N	58	58	32	32
United Arab Emirates	Mean	-0.23	0.58	-0.16	0.6
	Std. Dev	2.71	0.26	1.32	0.2
	N	57	57	65	65
Oman	Mean	0.03	0.6	0.91	0.51
	Std. Dev	1.72	0.2	4.72	0.22
	N	61	61	52	52
Afghanistan	Mean	-5.05	0.57	-0.33	0.52
	Std. Dev	33.35	0.28	4.41	0.27
	N	47	47	20	20
Turkmenistan	Mean	0.14	0.63	-0.94	0.49
	Std. Dev	1.69	0.23	7.92	0.29
	N	50	50	22	22
Tajikistan	Mean	-0.21	0.54	-1.4	0.47
	Std. Dev	2.55	0.29	13.16	0.34
	N	45	45	23	23
Kyrgyzstan	Mean	-0.58	0.51	0.7	0.55
	Std. Dev	3.4	0.26	3.86	0.25
	N	52	52	31	31
Uzbekistan	Mean	0.32	0.55	1.3	0.52
	Std. Dev	4.1	0.24	7.34	0.27
	N	58	58	45	45
Kazakhstan	Mean	0.71	0.59	-0.02	0.57
	Std. Dev	4.05	0.2	3.26	0.25
	N	59	59	52	52
China	Mean	-0.57	0.51	-0.1	0.57
	Std. Dev	8.4	0.25	1.2	0.16
	N	62	62	67	67
Mongolia	Mean	0.11	0.57	1.53	0.45
	Std. Dev	5.85	0.23	5.79	0.31
	N	51	51	17	17
Taiwan	Mean	0.94	0.52	0.06	0.56
	Std. Dev	10.86	0.3	0.85	0.17
	N	57	57	66	66
North Korea	Mean	-0.16	0.54	1.71	0.56
	Std. Dev	1.22	0.22	14.92	0.22
	N	62	62	54	54
South Korea	Mean	-0.18	0.54	0.05	0.56
	Std. Dev	1.07	0.21	0.64	0.13
	N	62	62	66	66
Japan	Mean	-0.11	0.59	0.12	0.55
	Std. Dev	1.65	0.22	0.67	0.13
	N	62	62	68	68
India	Mean	0.16	0.53	-0.22	0.6
	Std. Dev	16.23	0.24	0.95	0.15

Table A.2. Summary statistics for elasticities, by country (COW country code)					
		Import demand		Export supply	
Country		Raw elasticity	Std. elasticity	Raw elasticity	Std. elasticity
	N	59	59	63	63
Pakistan	Mean	0.13	0.5	-0.98	0.58
	Std. Dev	5.08	0.27	6.67	0.17
	N	61	61	58	58
Bangladesh	Mean	1.18	0.51	82.94	0.55
	Std. Dev	10.51	0.21	525.31	0.29
	N	62	62	41	41
Myanmar	Mean	-29.47	0.54	-7.26	0.52
	Std. Dev	253.01	0.26	51.76	0.28
	N	62	62	40	40
Sri Lanka	Mean	-0.22	0.52	0.71	0.49
	Std. Dev	1.1	0.21	3.05	0.22
	N	67	67	57	57
Nepal	Mean	0.3	0.58	12.78	0.46
	Std. Dev	1.6	0.23	64.81	0.33
	N	58	58	40	40
Thailand	Mean	0.45	0.55	-0.09	0.59
	Std. Dev	5.02	0.2	1.4	0.18
	N	62	62	65	65
Cambodia	Mean	11.73	0.51	1.28	0.46
	Std. Dev	85.32	0.26	3.92	0.24
	N	52	52	16	16
Laos	Mean	19.01	0.53	-25.5	0.57
	Std. Dev	142.16	0.28	121.97	0.32
	N	53	53	22	22
Republic of Vietnam	Mean	0.5	0.56	-0.08	0.57
	Std. Dev	4.6	0.21	1.85	0.18
	N	64	64	57	57
Malaysia	Mean	1.1	0.5	-0.26	0.61
	Std. Dev	16.89	0.22	1.07	0.19
	N	62	62	65	65
Singapore	Mean	0.81	0.55	-0.02	0.57
	Std. Dev	7.01	0.23	0.72	0.13
	N	60	60	66	66
Philippines	Mean	-0.25	0.52	-0.13	0.58
	Std. Dev	1.02	0.24	1.59	0.18
	N	66	66	62	62
Indonesia	Mean	-0.08	0.55	-0.37	0.63
	Std. Dev	0.66	0.2	1.12	0.18
	N	67	67	65	65
Australia	Mean	-1.35	0.53	-0.3	0.6
	Std. Dev	7.24	0.25	1.49	0.16
	N	58	58	66	66
Papua New Guinea	Mean	-0.21	0.54	-1.07	0.55
	Std. Dev	1.16	0.24	6.22	0.25
	N	58	58	28	28
New Zealand	Mean	-0.1	0.55	-0.2	0.61

Table A.2. Summary statistics for elasticities, by country (COW country code)					
		Import demand		Export supply	
Country		Raw elasticity	Std. elasticity	Raw elasticity	Std. elasticity
	Std. Dev	0.7	0.18	1.3	0.16
	N	62	62	64	64
Fiji	Mean	-0.16	0.55	3.47	0.55
	Std. Dev	1.28	0.21	19.3	0.3
	N	61	61	26	26

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