Dispute Initiation in the World Trade Organization

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Abstract

We examine the effects of economic power, trade dependence, and domestic politics (democracy) on dispute initiation in the World Trade Organization (WTO). The analysis is based on zero-inflated count models and data for all WTO membership dyads in 1995-2003. We show that bilateral trade volume is necessary for trade dispute initiation, but does not have a substantive effect on the number of dispute initiations. The results also demonstrate that economic power and dependence matter in WTO dispute settlement. Monadic forms of these variables are better predictors than dyadic ones. The principal reason why economically more powerful and less trade-dependent countries are more likely to get involved in a trade dispute is that they are less likely to give in to demands for trade concessions outside the WTO and thus become targets of dispute initiation. Domestic politics is very important in explaining dispute initiation, and, arguably, more important than economic power and trade dependence. More democratic countries clearly pursue more aggressive trade policies because democratic governments are particularly susceptible to political pressure from interest groups.

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1. Introduction

The dispute-settlement mechanism of the World Trade Organization (WTO) and its predecessor, the General Agreement on Tarriffs and Trade (GATT) have attracted a lot of attention by students of international institutions. The intellectual driver of this interest is the desire to understand the conditions under which international institutions can be established and sustained, and what factors, including institutional design features (such as dispute settlement mechanisms), are conducive to mitigating international problems (such as protectionism and trade disputes). The normative driver is a liberal perspective on the global economy and the desire to understand the conditions that move states towards an open world trading system. More generally, it is also based on the view that the rule of law, which is characteristic of advanced democracies, should be extended beyond its cradle, the liberal-democratic nation state, to solve international problems through legal means rather than power alone.

Most research in this area concentrates on describing and explaining when and why trade disputes escalate and when and why they are resolved (e.g., Busch 2000; Busch and Reinhardt 2001; Reinhardt 2001; Guzman and Simmons 2002; Busch and Reinhardt 2003, 2006). Escalation is usually defined in terms of a dispute moving from the consultation stage to formal adjudication (panel) within GATT or the WTO, and/or the defendant making concessions to the plaintiff in this process (trade liberalization, which can be viewed as de-escalation and successful conflict resolution).

With very few exceptions (notably Reinhardt 1999; Davis and Blodgett Bermeo 2007) such research focuses on trade disputes from the point in time when they have entered the WTO (or GATT) system. Studies explaining trade dispute forum choice (e.g. Davis 2006; Busch 2007) examine how trade disputes emerge and find their way into the WTO (or other institutions or mechanisms). However, these study concentrate on very few countries, and usually only one country, the USA. As a consequence, we know very little about whether and how the driving forces differ along the way from the pre-WTO stage throughout the WTO process.

The few studies examining dispute initiation for a large number of countries (as opposed to dispute escalation or settlement) generally focus on competing hypotheses about the role of state power and legal capacity (Horn et al. 1999; Guzman and Simmons 2005; Davis and Blodgett Bermeo 2007). Based on rather few actual WTO disputes, Horn et al. provide an early assessment of whether strong countries target weak countries disproportionately often (power hypothesis) or vice versa (capacity hypothesis).[1] Guzman and Simmons study the same question for a longer time period, but their analysis is based on a sample that only includes the subset of country pairs that were in fact involved in a WTO dispute. Davis and Blodgett Bermeo examine how prior experience in litigation and democracy affect state behavior in the developing world, but their examination is restricted to plaintiff characteristics and ignores potentially important information about defendants.[2]

It is important to understand why WTO disputes are launched in the first place before studying the subsequent escalation dynamics of the selected conflicts. A comprehensive assessment of dispute initiation requires the analysis of *all* potential conflict dyads and not

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[1] Their dataset includes 155 requests for consultation in 1995 - 1998.
[2] Besides Reinhardt (1999), Davis and Blodgett Bermeo is the most comprehensive analysis so far because it not only encompasses conflict dyads, but also dyads that are not involved in a conflict.

only those cases in which a complaint was filed at the WTO. The analysis of "the selection of defendants in WTO disputes" (Guzman and Simmons 2005) is not entirely complete as long as the underlying sample only includes defendants that were in fact selected and ignores the potential defendants that were not selected. Moreover, none of the previous studies takes into account that trade disputes can only emerge when countries actually trade with each other.[3] Analyzing whether or not two countries become involved in one or more disputes thus requires that we control for bilateral trade between the potential opponents.

To complement the existing work, we study all WTO member country pairs to examine the conditions under which disputes are taken to the WTO. Unlike the existing studies (e.g., Reinhardt 1999; Davis and Blodgett Bermeo 2007), we follow a two-step approach that first accounts for the probability of a trade dispute and then also distinguishes between dyads with different numbers of disputes within a given time-period. The zero-inflated count models used to that end simultaneously estimate the possibility that a trade dispute can occur and the expected number of disputes once a dyad has crossed the threshold beyond which a conflict is actually possible.[4] Our work also complements Davis and Blodgett Bermeo in that we compare dyadic and monadic effects, and include also target country characteristics. We will show that WTO dispute initiation depends considerably on the (un)willingness of defendants to back down and comply with demands from the plaintiff outside the WTO.

We find that trade flows are essential to understand when a trade dispute is possible, but more trade does not necessarily increase the number of disputes. Rather more surprising is the result that more bilateral trade does not produce more trade dispute initiations. The distinction of dispute-enabling conditions and determinants of the number of disputes is only visible in a model that separates the effects of explanatory variables on the number of conflicts from their effects on the possibility of a conflict. Moreover, controlling for trade is fundamental in analyses of dispute initiation because omitting this important variable has considerable effects on the results for other determinants of trade dispute initiation.

The analysis shows that economic power and trade dependence do matter for WTO dispute initiation. The evidence supports explanations focusing on absolute (monadic) economic power and trade dependency rather than relative (dyadic) versions of these concepts. The possibility that a trade dispute occurs is larger when the plaintiff is more powerful, but the number of expected disputes does not change when plaintiff power increases. Economically more powerful defendants, however, are involved in a greater number of trade disputes. The principal reason is that economically more powerful and less trade dependent countries are more likely to resist demands for trade concessions by other countries outside the WTO.

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[3] Reinhardt (1999) discusses the role of trade volume (p.8 and other instances), but his empirical specifications do not include a direct measure of bilateral trade (pp. 14-16; 30-32).

[4] The binary models used by Reinhardt (1999) only distinguish between those cases in which no dispute occurred and those where at least one disputes was filed at the WTO. They treat dyads with one or more disputes in the same way and do not make use of important information about country pairs that are involved in a different number of trade conflicts. Davis and Blodgett Bermeo (2007) also use count models, but do not account for excess zeros present in the dataset (see discussion in the research design section). Our approach essentially combines these two types of models. The first stage of zero-inflated count models (the inflation equation) encompasses a binary specification, while the second stage (the count equation) accounts for differences among those cases that have a positive probability of a dispute.

Domestic politics appears to be very important for dispute initiation and is, arguably, more important than economic power and trade dependence. More democratic countries are much more likely to become involved in trade disputes. Democratic countries both initiate significantly more trade disputes and also become the target of a dispute significantly more often. We interpret this evidence in the sense that interest groups in democracies have more opportunities to lobby against (in case of the plaintiff) or in favor (in case of the defendant) of trade restrictions. The strong effect of democracy on dispute initiation leads to a subset of conflictive WTO dyads that almost exclusively includes democratic countries.

2. Theory

The existing literature offers several propositions on the driving forces of trade disputes. Explanatory variables range from economic conditions and political system characteristics to changes in dispute settlement procedures to retaliation. The literature is largely in agreement that revisions of the dispute settlement procedure during the GATT (notably, in 1989) and with the advent of the WTO have had only minor effects on dispute initiation, escalation, and outcomes (Reinhardt 1999; Busch 2000). There is less agreement, in terms of theory, empirical evidence and relative importance, on trade, economic power and dependence, political system characteristics, and retaliation. The literature also is based on diverging, implicit assumptions about the behavior of the relevant actors, which then yields different propositions about the impact of power, dependence and political systems.

In the remainder of this section we discuss the theoretical foundations of these factors and then outline four types of propositions, namely propositions on preconditions for a trade dispute, systemic factors (economic power and trade dependence), domestic factors (democracy), and retaliation.

2.1 Preconditions for a Trade Dispute

With very few exceptions (Horn et al. 1999), existing studies do not examine the effect of trade on trade disputes. This is rather surprising because we should expect that the relationship between trade and disputes is fundamental in several respects. First, trade plays the same important role in explaining trade disputes as traffic plays in explaining traffic accidents: more trade increases the probability that one partner in a trading dyad implements some trade-restricting measure that is then challenged by the exporting country. Hence, trade is a mere precondition for a dispute and analyzing trade disputes requires that we control for the trade volume between two countries in an empirical analysis.

Second, the volume of bilateral trade should not only affect whether a trade dispute is possible, it should also influence the number of disputes that we observe between two countries. Horn et al.'s (1999) analysis is based on the assumption that the diversity and value of exports have a positive effect on trade dispute initiation. Countries that export products to many different countries and across different sectors are more likely to encounter a disputable trade measure than countries with less export diversity. More diverse traders thus are more likely to be involved in a WTO trade dispute. Although trade diversity and trade volume are

not identical, the two are likely to be highly correlated.[5] By implication, trade should not only be a precondition for trade disputes, but we can also expect that more bilateral trade is associated with a higher number of trade disputes.

<u>Proposition 1: Dyads with zero trade will never experience a trade dispute initiation. The number of dyadic trade dispute initiations increase with the bilateral trade volume.</u>

2.2 Systemic Factors: Economic Power and Trade Dependence

Although economic power and trade dependence have been discussed considerably in the existing literature, it is unclear how the mechanism works that connects these variables with dispute initiation. The literature has generated different models and hypotheses that are based on diverging, implicit assumptions about the behavior of actors when it comes to WTO dispute initiation. Thus, it is unclear a priori whether directed or undirected relative, or absolute trade dependence and economic power matters for dispute initiation. This question is relevant, however, for the specification of the empirical model because different empirical specifications follow from dyadic and monadic arguments. We present dyadic and monadic arguments about trade dependence and economic power and will test empirically which specification following from these different theoretical versions better represents the data-generating process.

The dyadic versions of the power and trade dependency arguments emphasize the relative, directed economic power of the plaintiff and the defendant. This dyadic argument has been expressed repeatedly throughout various studies. An example is Conybeare's analysis which, among others, aims at explaining "a 10-year tariff war between France and Italy in the 1880s and 1890s … in terms of the effects of structural asymmetry of payoffs on cooperation; to put more simply, it will show that big powers can coerce small powers" (Conybeare 1985: 147).[6] The "power hypothesis" that has been discussed in the more recent literature also belongs into this category. It states that "politically weak countries will refrain from filing complaints against politically powerful states for fear of costly retaliation" (Guzman and Simmons 2005: 557). The hypothesis thus is implicitly based on the idea that the differences in power between the potential plaintiff and the potential defendant matters.

In this view, the costs that the plaintiff incurs when filing a complaint against a defendant depends on the plaintiff's economic power and trade dependency relative to the defendant's power and dependency resulting in asymmetric payoffs. The underlying idea is that the defendant can punish the plaintiff more easily and more heavily without harming its own economy when asymmetries increase. At the same time, the benefits that the defendant can gain from a WTO ruling in its favor are essentially independent of the defendant's relative power and dependency. The plaintiff thus fears the high costs of retaliating measures from the defendant when it considers filing a dispute against a relatively strong and less dependent country. Overall, the cost-benefit analysis changes in favor of the defendant when asymmetry increases in favor of the potential defendant making makes a dispute between a weak and dependent plaintiff and a strong and independent defendant less likely.

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[5] Horn et al. show that in their sample, export volume has a very strong effect on export diversity, and that this relationship is very precise (Horn et al. 1999: 8).
[6] Conybeare refers to the bilateral conflict between the United States and Switzerland during the Hawley-Smoot period as an example of a strategic situation that produces asymmetric payoffs.

<u>Proposition 2a: Economically more powerful and less trade dependent countries relative to a target country are more likely to initiate disputes.</u>

To a considerable extent, the directed, dyadic hypothesis above rests on the assumption that states do not or not much interact outside the WTO before they file a complaint. Conybeare's statement can be interpreted in a different manner in the context of WTO dispute initiation if we consider that asymmetric countries negotiate bilaterally about disputable trade measures before filing a WTO complaint. Suppose strong states, plaintiffs and defendants, coerce weak states to behave according to their interests outside the WTO. This means that the strong, potential plaintiff country forces the weak, potential defendant country to lift the disputed trade restriction without a WTO complaint and a dispute becomes less likely with greater trade and power asymmetry. Similarly, the strong, potential defendant country resists to the demands from the weak, potential plaintiff country to lift disputable restrictions, but the weak plaintiff does not file a dispute because it fears retaliation as discussed above.

The prediction resulting from this logic differs from the Proposition above. The argumentation from before suggests that we should observe no disputes between a weak plaintiff and a strong defendant; many disputes between a strong plaintiff and a weak defendant; and some disputes between equally powerful and dependent plaintiffs and defendants.[7] The logic from the previous paragraph implies that we should observe no disputes between equally strong and dependent countries; and many disputes between asymmetric dyads in term of power and dependence. In this logic, it is not important whether the more powerful and less dependent country is the potential plaintiff or the potential defendant. This yields an undirected, dyadic hypothesis about the impact of relative power and trade dependence.

<u>Proposition 2b: The greater asymmetries in terms of economic power and trade dependence between two countries, the more likely it is that a trade dispute occurs.</u>

The third interpretation of the power hypothesis leads to a monadic argument. Possibly, strong and less dependent countries file disputes more often against other states, independent of the strength and dependence of their target. Economically more powerful countries experience smaller relative costs of litigation in the WTO. So they are more likely to use this "tool". On the other hand, economic power still plays an important role in the implementation of WTO verdicts (decentralized enforcement). That is, economically stronger countries will find it easier to enforce WTO verdices that are favorable to them and the benefits of filing a disputes are greater for stronger countries than for weaker countries.

Similarly, strong and less dependent countries tend to resist dispute settlement outside the WTO, and they do not fear the consequences of a complaint at the WTO. More powerful states are usually more important export destinations. They have a stronger incentive to exploit their power position to implement protectionist policies and are more likely to resist demands for trade concessions. Both conditions combined are likely to invite more challenges from trading partners to the extent those countries can expect to obtain more trade concessions through the WTO than through bilateral bargaining outside the WTO.

Finally, Kono (2006) argues that the typical median voter has a lower capital endowment than the national mean; so she tends to benefit more from trade with more capital-abundant countries. Kono finds evidence for the proposition that democracy (which raises median voter influence) contributes to more liberal trade with richer countries but more

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[7] This largely reflects the interpretation of the power hypothesis by Guzman and Simmons (Guzman and Simmons 2005: 572-574).

protection against poorer ones. Whether this motivates poorer countries to initiate more trade disputes, or whether this effect is overcompensated by the capacity or power effect is empirically unresolved. The findings of Reinhardt (1999) and Guzman and Simmons (2005) suggest that less developed countries are indeed more often the target than the plaintiff in WTO disputes.

This argumentation is does not reflect the relative power and dependence argument by Conybeare and Guzman and Simmons. But it reflects the implicit theoretical assumptions of empirical models in the existing literature, at least in parts. As an example, Reinhardt (1999) uses a relative variable for GDP (following the dyadic argument), but separate regressors for trade dependence, trade surplus and development status of the plaintiff and the defendant (following the monadic argument). His findings suggest that monadic arguments may in fact be more appropriate. Less developed countries (LDC) are less likely to initiate disputes and that they are more likely to be the targets, but difference in GDP (an indicator for economic power asymmetry) has no effect. Greater trade dependence of the plaintiff on the defendant and vice-versa have a positive effect on dispute initiation.

Proposition 2c: Countries that are more powerful and less dependent on bilateral trade (in absolute terms) are more likely to initiate and to become targets of a trade dispute.

2.3 Domestic Factors: Democracy

Research in international conflict generally agrees that democracies cooperate more and are less likely to fight each other. In a nutshell, the high degree of transparency and public control constrain democratic leaders and make democracies less war-prone, at least when they face other democratic countries.[8] In the context of trade dispute initiation, however, democracy is likely to work in the opposite way. That is, we should observe a positive effect of democracy on the probability of dispute initiation for reasons outlined below.

Dixon (1994), Raymond (1994), Busch (2000) and others have argued that democracies are motivated by the rule of law and principles of bounded competition. If we accept this assumption, we should expect that democracies pursue adjudication more often than non-democracies, after controlling for trade flows and trade dependence (which may be higher among democracies). Empirical tests of this proposition have thus far produced mixed results. Busch (2000) observes that democratic dyads in the GATT system (until 1994) were more likely to make concessions at the consultation stage, but were more likely escalate disputes to the panel stage, and were no more likely than non-democracies to make concessions at the panel stage. This finding supports audience-cost assumptions: democratic governments who seek to bolster their bargaining position in disputes by credibly commiting to certain positions find it hard to back down and make concessions. Busch (2000:427) states "that as highly democratic dyads escalate from consultations to a panel, the sizable audience costs that each sides generates in signaling resolve make it increasingly difficult for them to settle disputes by offering concessions."

Controlling for the effects of trade volume and trade dependence, using data for the population of WTO members (rather than WTO dispute dyads), and focusing on dyadic and monadic effects can offer a more comprehensive test of the democracy proposition. If we assume that democracy has a trade-promoting effect, this could increase the probability of

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[8] This very short summary, of course, is not doing not justice to the large bodies of literature and the many refinements of the argument. Since our focus is on trade conflicts, we cannot provide an extensive review of the international conflict literature.

trade dispute initiation by increasing bilateral trade volumes (see proposition 1 above); or it could also affect this probability by influencing trade dependence (see proposition 2). These possibilities imply that we need to control for trade volume and trade dependence when examining the effect of democracy.

Testing the democracy proposition is difficult as long as we focus only on the population of WTO disputes (rather than WTO member states). Indeed, the average democracy scores on a scale of -10 to +10 (see following section) are 3.72 both for the (potential) plaintiff and defendant in the population of directed WTO member state dyads (N=111'370). These scores are much higher (that is, the average country is much more democratic) in the subsample of country dyads that have in fact become involved in a WTO dispute (8.54 for the plaintiff, 9.24 for the defendant, N=495, 506). This suggests that democracy is important in determining whether a dispute ends up in the WTO in the first place. There are similar differences between the two populations when we look at trade volume and trade dependence. In other words, the best strategy for testing the democracy proposition is to test it on the population of WTO membership dyads.

Like in the case of economic power and trade dependence, democracy can be conceptualized in dyadic and monadic form. While the existing literature focuses largely on dyadic democracy effects we agree with Reinhardt (1999) that monadic effects are, theoretically, more plausible. He notes that democratic institutions are likely to favor producer over consumer interests, as suggested by collective action theory (Olson 1971; Stigler 1971). The pro-business bias, he argues, increases the likelihood that both import-competing and export-dependent producers will push their respective government towards initiating a trade dispute. Export dependent firms can benefit if the target country of trade action reduces market access barriers or reduces export subsidies (the latter make firms in the plaintiff country more competitive in third countries). Import-competing firms can benefit if the target country reduces export subsidies and import barriers that increase the competitiveness of exporters in the target country. Empirically, he finds a positive effect of democracy on GATT/WTO dispute initiation in 1948-1998. This effect is quite strong for monadic indicators of democracy of the plaintiff and defendant, but weak and negative for a dyadic indicator of democracy. Similarly, Davis (2006) argues that the most politicized trade problems get pushed into the WTO because the WTO offers a forum with binding commitments and enforcement mechanism. Initiating a dispute in the WTO signals to political influential domestic groups that their concerns are receiving priority. While these theoretical arguments focus on the plaintiff country, equivalent arguments can easily be formulated for the defendant country: democracies are more likely to resist demands by trading partners to remove trade-barriers because (protectionist) producer interests prevail over consumer interests; such resistance motivates trading partners to take the case to the WTO.

At a more general level, these arguments also pertain to interest group access and audience costs. Interest groups in democracies have more opportunities to lobby against the reduction of trade restrictions (in case of the defendant) or in favor of launching a dispute at the WTO (in case of the plaintiff) than interest groups in non-democracies. Moreover, interest groups in democracies have greater opportunities to instrumentalize the public in lobbying or campaigning against trade restrictions of another country or in favor of own trade restrictions. That is, they have a greater capacity to hurt government popularity and thus influence trade policy-choices.

Proposition 4: Democracies are more likely to initiate trade disputes and are more likely to become targets of dispute initiation.

2.4 Retaliation

Finally, it is possible that the WTO dispute settlement process is affected by retaliatory behavior. It is obvious that countries, when deciding on whether to initiate and/or escalate trade disputes, do pay attention to how their trading partners behave or behaved in other disputes. It is also obvious that countries targeted by a particular state may be tempted to initiate a dispute a dispute against that state. But such behavior is extremely difficult to identify empirically because no reliable evidence on government intentions or motivations is available in a format that would enable a large-N statistical study of our kind. Even qualitative case studies on individual trade disputes have been unable to provide systematic evidence on this phenomenon (e.g. Bernauer 2003).

Since our focus is primarily on the effects of economic power, dependence, and democracy, we follow those studies that have examined retaliation (e.g., Reinhardt 1999) and find some evidence of such an effect.

Proposition 5: Prior dispute initiation by country B against country A increases the probability that country A will initiate a dispute against country B.

3. Research Design

While most existing studies focus on the subset of country pairs that are (or were) actively involved in a trade dispute, we examine all potential conflict dyads.[9] We use directed dyads from 1995 to 2003. The dataset includes 8'515 pairs of WTO member countries.[10] Each dyad appears twice per year because the dependent variable not only measures the number of trade disputes in a dyad, but also which country is the plaintiff and which one is the defendant. For example, the ordered country pair Albania – Angola in 2000 is one observation; another observation is the ordered pair Angola – Albania in the same year. The former observation informs us how many times Albania filed a dispute against Angola in 2000; the later observation shows how often Angola initiated a dispute against Albania in the same year.[11] The total number of directed dyads in the dataset is 128'924.[12]

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[9] Selecting cases that are or were actively involved in a dispute is common not only in quantitative research (Busch 2000; Guzman and Simmons 2002, 2005). Conybeare (1985) for example analyzes qualitatively how the Anglo-Hanse, Franco-Italian and Hawley-Smoot trade conflicts evolved over a longer period of time. He is thus able to explain some variation in the intensity of conflicts. But as in the quantitative research referred to above, the motivation for the selection of these cases is the persistence or existence of a trade dispute in these dyads, and the variation examined does not include the possibility of no trade dispute.

[10] In 2003, the WTO had 130 member states. Hence there were 8'515 dyads in that year. Some countries joined the WTO when it was founded in 1995, others joined later, e.g. Albania in 2000. This means that the number of dyads is lower in earlier than in later years.

[11] This approach differs from Davis and Blodgett Bermeo (2007) who test a ,one-sided' argument about plaintiffs and ignore the potential defendants. Testing the common arguments about relative power and dependency and joint democracy requires a dataset that accounts for both defendant and plaintiff characteristics.

[12] If all countries that were WTO members in 2003 had been WTO members since 1995 the number of annual directed dyads from 1995 to 2003 would have been 153'270 (= 8'515 dyads * 9 years * 2).

Our dependent variable measures how many trade disputes a WTO member country initiated against another member country in a given year. This definition requires that we analyze annual country pairs and split disputes filed under the WTO Dispute Settlement Mechanism by more than one country into dyads. This approach is consistent with the existing literature (e.g., Busch 2000) and preferable because disputes initiated by several countries can be settled (or escalated) bilaterally. We coded this data based on information taken from the WTO's dispute settlement gateway.[13] A dispute initiation is coded as such if a formal request for consultations under the WTO dispute settlement system was made.

While the operationalization of some independent variables is straightforward, the different theoretical considerations about power, dependence and democracy yield different empirical specifications. Hypothesis 2a, for instance, suggests that power has to be measured in terms of a directed, relative variable, i.e. the power variable has to account for the power of the plaintiff relative to the dependent. Hypothesis 2b implies an undirected, relative power variable that only accounts for power asymmetries, but does not specify which actor was more powerful. Hypothesis 2c suggests that the power variable should not take into account relative power, but only absolute power of the actors. We now specify how we translate these different concepts into empirical measures.

Trade is defined as the sum of imports and exports between two countries in billion USD. The data is from Gleditsch (2002) and updated with data from the IMF Directions of Trade Statistics database.[14] **Trade dependence** of a country is defined as dependence of country A (plaintiff) on country B (defendant), or vice versa. We use the sum of exports and imports of country A to/from country B (and vice versa) divided by country A's (or B's) GDP. Directed relative trade dependence (**directed dependence**) is the difference between the trade dependence of countries A and B. The value of this variable is zero if both countries are equally dependent on trade with each other. Positive values indicate that the plaintiff (A) depends more on trade from the defendant (B) than vice versa. Negative values indicate that the defendant is more dependent on bilateral trade than the plaintiff. The undirected relative trade dependence (**undirected dependence**) of the two countries is defined as the absolute value of the directed relative trade dependence. The undirected variable captures whether the two countries are unequally dependent on bilateral trade, but it does not specify which of the two countries is more dependent.

The GDP data is taken from Gleditsch (2002) and updated with data from the Penn World Tables.[15] **GDP of A** is the plaintiff's and **GDP of B** is the defendant's GDP. Directed relative economic power (**directed relative power**) is the GDP of the plaintiff divided by the sum of the two countries' GDPs. The indicator takes the value 0.5 if both countries are equally powerful. Values closer to 0 show that the defendant is stronger than the plaintiff, values closer to 1 show that the plaintiff is economically more powerful. To measure the undirected relative economic power (**undirected relative power**), we subtract 0.5 from the directed power variable and take absolute values. Higher values then show more power asymmetry between the two countries, but the indicator does not show which country is more powerful.

Measuring retaliation is quite difficult because intentions that motivate government behavior cannot be quantified reliably. We use an admittedly crude concept based on a

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[13] http://www.wto.org/english/tratop_e/dispu_e/dispu_e.htm

[14] http://privatewww.essex.ac.uk/~ksg/exptradegdp.html;
http://www.imf.org/external/pubs/cat/longres.cfm?sk=154

[15] The GDP data in Gleditsch's dataset are from the same source. The online address is http://pwt.econ.upenn.edu/.

dummy variable that measures whether country A was the target of trade litigation by B before it initated a dispute. This variable (**retaliation**) takes the value one if the defendant country (B) initiated a WTO dispute against the plaintiff (A) during the previous two years, and zero otherwise. We use the combined Polity IV scores of countries A and B (**polity score of A, of B**) to measure democracy. The summary statistics of the explanatory variables are shown in Table 1.

Table 1: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Trade	120800	0.543	7.988	0	441.165
Dependence of A	116822	0.003	0.019	0	0.971
Dependence of B	116822	0.003	0.019	0	0.971
Directed Dependence	112930	0	0.027	-0.971	0.971
Undirected Dependence	112930	0.005	0.027	0	0.971
GDP of A	123408	0.324	1.257	0.000	10.205
GDP of B	123408	0.324	1.257	0.000	10.205
Directed Rel. Power	118092	0.5	0.364	0.000	0.999
Undirected Rel. Power	118092	0.332	0.150	0.000	0.499
Retaliation	128924	0.004	0.064	0	1
Polity Score of A	111370	3.723	6.142	-10	10
Polity Score of B	111370	3.723	6.142	-10	10

Our dependent variable is a count variable that indicates how many times one country filed a dispute against another country in a given year. For this reason count models that estimate the expected number of trade disputes between two countries in a given year can be used to test our hypotheses (King 1988; 1989b: 121-131). However, the specific structure of our data implies that the standard model for this kind of data, the simple Poisson regression model, may not be appropriate. The standard Poisson model is based on the assumption that the variance of the distribution equals its mean. In practice, the variance of a count variable is often larger than the mean of its distribution, i.e. the data is overdispersed. This is the case when the occurrence of a trade dispute increases the probability of another dispute in the same year (King 1989a, b).[16] When such overdispersion is present estimates of the standard Poisson model tend to be inefficient because the model produces standard errors that are biased downward. The standard Poisson model also fails to account for a possibly large number of zeros on the dependent variable (large number of observations for which no event occurred). In our case, a zero count means that no dispute was initiated in the respective dyad and year. A large share of "non-events" produces variance that exceeds the mean of the distribution – this violates the equidispersion assumption of the Poission distribution (King 1989a; Greene 1994).

As the frequency distribution of trade disputes in our dataset shows (Table 2), the share of zero counts is extremely high suggesting that overdispersion of zeros may be a problem. Most directed dyads (99.75%) did not experience the initation of a WTO trade dispute in 1995-2003. More than 4 dispute initiations per dyad and year are very rare. Those dyads with more than 4 dispute intiations usually include the EU or the United States or both. Besides the EU and USA, some other countries initiated an exceptionally high number of

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[16] Data can also be underdispersed if events within a specific time-period are negatively correlated. This is unlikely in our context.

disputes against the United States in 2002: Canada filed 7 disputes in that year, Japan 11, Mexico 5, New Zealand 7, and Norway 6.

One solution to the overdispersion problem is to use negative binomial models that account for unobserved heterogeneity among observations. We compared results from standard Poisson and negative binomial models for our data and found that the substantive conclusions for our key variables were largely the same. Nonetheless, a likelihood ratio test confirmed that the mean is smaller than the variance of the distribution. The null hypothesis of no overdispersion can be rejected at high levels of significance.[17] But although the negative binomial model tends to perform better in accounting for large numbers of zeros, the expected number of trade dispute initiations remains the same compared to the Poisson model. The negative binomial model thus predicts that the proportion of larger counts is higher, which may be appropriate if same-period events are positively correlated leading to extraordinarily high and low counts. This assumption may be problematic because, apart from the exceptional case of Japan in 2002, inspection of Table 2 suggests that the probability of a high number of dispute initiations in a given year is not particularly large compared to the probability of a lower number of dispute initiations.

Table 2: Frequency and probability distributions of trade dispute initiation

Dispute initiations	Frequency	Probability
0	128'602	99.75
1	230	0.18
2	54	0.04
3	15	0.01
4	11	0.01
5	5	0.00
6	2	0.00
7	2	0.00
8	2	0.00
11	1	0.00
Total	128'924	100

We propose to deal with the apparent overdispersion problem by addressing the assumption of Poisson and negative binomial regression models that every observation has a strictly positive probability that an event (dispute initiation) occurs. Although this probability can differ across dyads depending on their characteristics, the standard models assume that there is at least some probability of a trade dispute for all dyads. This is not only a problem statistically, but also unrealistic because it is hard to see how countries that hardly trade with each other would become involved in a dispute over trade restrictions. An appropriate model should therefore account for the possibility that a trade dispute is not possible, in our case primarily because countries do not trade. And it should account for the expected number of trade disputes, given that the probability of a dispute is not strictly zero.

We can model this situation by using zero-inflated (Greene 1994) or hurdle (King 1989a) models. These models split the sample into two groups. One group includes those dyads in which a dispute is not observed (hurdle model) or cannot be observed (zero-inflated

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[17] For the full model, the LR test statistics is 641, which means that we can clearly reject the hypothesis that there is no overdispersion.

models). The other group includes those country pairs that have a positive probability of a dispute (zero-inflated models) or actually experience at least one trade dispute (hurdle model). The hurdle model thus assumes that the event count is truncated at zero and an event always occurs when a certain threshold is crossed. For theoretical reasons, we opt for the zero-inflated model in this context because it does not require that a trade conflict necessarily occurs when such a dispute is feasible, i.e. when the threshold is crossed. In the zero-inflated model, some dyads do not have the possibility to clash over trade restrictions, primarily because they do not trade and hence can be classified into the "Always-0" group. Other dyads that trade more are subject to a non-zero probability of a dispute, but this does not mean that a trade dispute will necessarily occur. These are the dyads in the "Not Always-0" group.[18]

To illustrate the importance of trade for the transition of a dyad from the "Always-0" to the "Not Always-0" group, we first estimate the probability of observing at least one trade dispute by regressing a dummy variable for trade dispute initiation on the level of bilateral trade using a logit model.[19] The estimated probability of a trade dispute for the logit specification is given by

$$\Pr(Conflict) = \Lambda(-5.77 + 0.029 \cdot Trade)$$
$$(0.062) \quad (0.001)$$

where $\Lambda(\ )$ is the cdf of the logistic distribution. The numbers in brackets below the coefficients are standard errors. They show that the influence of trade on the probability of a dispute is statistically significant. The estimation is based on 82'332 dyads for which we have data on bilateral trade. We do not include "irrelevant" dyads, i.e., those dyads with zero trade, which reduces the large number of zero disputes by 38'468 observations. Estimating the model with all dyads for which we have data on bilateral trade (120'800), the results are almost identical. We thus use the reduced dataset for the subsequent analyses.

Figure 1 shows how the predicted probability of trade dispute initiation changes when trade increases from 0 to the maximum of 441 bn USD per year (trade between the EU and the USA in 2003) for both a probit and a logit model. When trade is zero or very close to zero, the probability of dispute initiation is essentially zero, too. When bilateral trade increases beyond 100 bn USD per year, the probability of at least one trade dispute increases quickly. Dyads with trade of 300 bn USD or more per year almost certainly experience the initiation of a WTO dispute. The probability of a dispute is over 90% for countries with a trade volume of more than 280 bn USD.

Although we expect that trade volume is one of the most important predictors of trade dispute initiation, it is not the only relevant variable. The existing literature suggests that economic power, trade dependence, and political system characteristics that affect the possibility of interest groups to lobby for or against protectionist measures also affect the probability of WTO disputes (see hypotheses above). Similarly, rivalries in the international economic system may contribute to the initiation of trade disputes. If, for instance, country A files a complaint at the WTO against country B this may increase the probability that the defendant retaliates by suing country A.

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[18] A comparison of hurdle and zero-inflated models by Zorn (1998) shows that, in practice, the results of the two models are often almost identical.

[19] The variable takes the value 1 if at least one WTO trade dispute was initiated in a given year and directed dyad, and 0 otherwise.
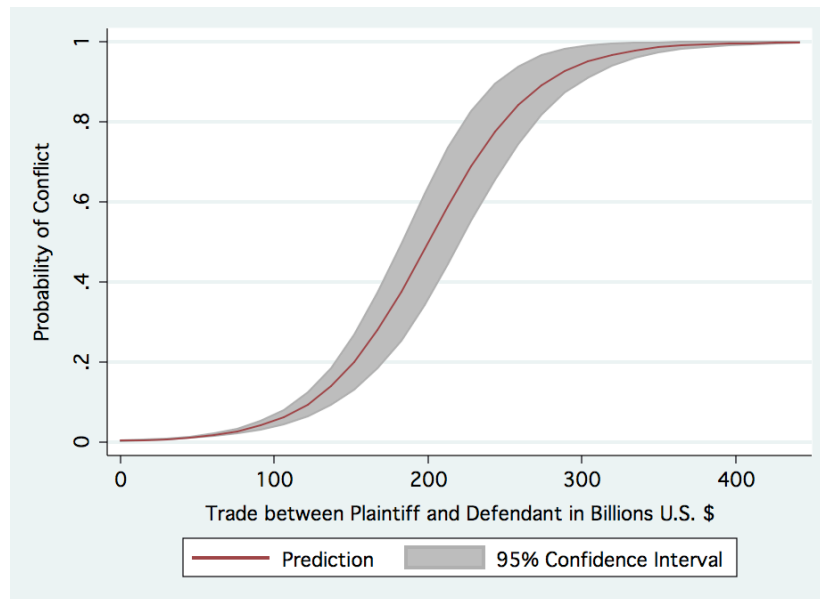
Figure 1: Predicted Probability of a Trade Dispute

We include the same variables in the so-called inflation and count equations. The inflation equation estimates the probability that a dyad belongs to the "Always-0" group (dyads for which the probability of a trade dispute is always zero). The count equation estimates how many dispute initiations are likely to occur, given that a dyad has made it into the "Not always-0" group. Including the same explanatory variables in both models helps us understand possible selection effects. For instance, it is possible that a trade dispute never occurs in highly asymmetric dyads, because the economically powerful country can easily punish the economically weak country. If power asymmetry decreases, the dyad may switch from the "Always-0" to the "Not always-0" group. But within the latter group, we may still observe less conflicts in dyads with greater power asymmetry because the weak country only files disputes against measures that have large effects on its economy. We expect the coefficients for the same variables to have opposite signs in the two equations in this case. A variable that decreases the chance that a dyad is selected into the group with zero probability of dispute initiation is likely to increase the expected number of trade disputes in that dyad.

4. Results

We test the hypotheses in three steps. First, we use a model with directed, relative variables, i.e. directed relative trade dependence and economic power. We then estimate a model that includes undirected relative dependence and economic power. Both specifications include a joint democracy variable that is equal to the lower of the two Polity scores of the plaintiff and the defendant country (Russett and Oneal 1997; Reinhardt 1999). Finally, we analyze the monadic arguments by estimating a model with separate variables for the plaintiff and the defendant for trade, economic power and democracy.

Each of the following three tables presents estimates for a zero-inflated count model. The results simultaneously take into account the probability of a dispute initiation and the expected number of dispute initiations, given that the probability of a dispute is positive. The inflation equation (we call it 'Always-0') estimates the probability of a dyad belonging to the 'Always-0' group. These are the dyads with zero probability of trade dispute initiation. The

count equation (we call it '# of disputes') estimates the number of trade dispute initiations for those dyads that have a positive probability of experiencing such an event.

The coefficient estimates are in the two columns on the left. To simplify the interpretation of the logit and count estimates, we also report the size of the estimated effect in the two columns on the right.[20] The upper cell in the right columns for each variable (denoted "%") reports the percentage change in the odds for the inflation equation and the percentage change in the expected number of disputes for the count equation if the variable increases by *one unit*. The lower cell in the right columns (denoted "%StdX") reports the percentage change in the odds and the expected number of disputes if the variable increases by *one standard deviation*.[21]

4.1 Dyadic Models

Table 3 presents the results for the directed variables. As the bivariate analysis in the previous section suggested, bilateral trade is a fundamental component of a fully specified dispute initiation model. Trade is particularly relevant for the possibility of a dispute. When trade increases by one standard deviation, the number of dyads in the Always-0 group relative to the number of dyads in the Not Always-0 group (i.e., the odds that a dyad is part of the 'Always-0' group) decreases by almost 100%. Hence, when trade increases, the probability of a trade dispute increases massively. Trade is less important for the number of disputes two countries initiate at the WTO. Although the coefficient is statistically significant in this specification, the expected number of disputes only increases by 5.4% when trade increases by one standard deviation.

The specification in Table 3 tests the dyadic arguments about relative power and capacity of plaintiff and defendant countries. The power hypothesis predicts that relatively stronger / less dependent countries should file disputes against relatively weaker / more dependent countries more often. The capacity hypothesis suggests that weaker countries should initiate a dispute against stronger countries more often. The results show that power and dependence in fact play a considerable role. If the relative trade dependence of the plaintiff increases, the probability that a dyad is in the Always-0 group decreases considerably. That is, contrary to the predictions of the power hypothesis, relatively more dependent countries tend to initiate disputes more often than relatively less dependent countries. Directed relative trade dependence is irrelevant when it comes to the actual number of conflicts.

The results for relative, directed economic power show that the more powerful the plaintiff relative to the dependent, the less likely it is that the dyad is in the Always-0 group and the lower the expected number of dispute initiations. The odds of a WTO dispute initiation increase by 35.5% when relative power of the plaintiff increases by one standard

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[20] We also think that due to the large number of zeros in our dataset, interpreting the coefficient estimates jointly with the estimated percentage effect is advisable. Keeping the substantive effect of a variable constant, larger numbers of observations produce smaller standard errors and therefore generate statistically more significant results. The large number of zeros may thus lead to relatively high levels of statistical significance even when the substantive effect of the variable is minor.

[21] The odds represent how many dyads are classified into the group with zero probability of a conflict (the Always-0 group) relative to how many dyads are in the group with a positive probability of a dispute (the Not Always-0 group).

deviation. This evidence supports the power hypothesis. However, greater relative power of the plaintiff also decreases the expected number of dispute initiations that we observe in a dyad / year. This evidence supports the capacity hypothesis and contradicts the power hypothesis. The diverging results across the two models are, from the viewpoint of our theory, inconsistent, suggesting that the dyadic model may not be appropriate.

Table 3: Dyadic model with directed variables

	Coefficient Estimates			Estimated Influence	
	Always-0	# of disputes		Always-0	# of disputes
Trade btw. A and B	-0.626***	0.005***	%	-46.5	0.5
	(0.228)	(0.001)	%StdX	-99.9	5.4
Directed Dependence	-27.663**	-0.826	%	-100.0	-56.2
	(11.268)	(0.776)	%StdX	-56.4	-2.5
Directed Rel. Power	-1.207**	-1.150***	%	-70.1	-68.3
	(0.476)	(0.436)	%StdX	-35.5	-34.2
Retaliation	-0.633	0.863***	%	-46.9	137.1
	(0.631)	(0.218)	%StdX	-5.5	8.0
Joint Democracy	-0.140**	0.091**	%	-13.0	9.5
	(0.062)	(0.038)	%StdX	-58.2	76.1
Constant	5.582***	-2.048***			
	(0.547)	(0.519)			
N (zeros / all)	63762 / 64073				
χ^2 (Prob > χ^2)	108.538 (0.0000)				
Vuong	8.64				
AIC / SBC	3183.55 / 3292.36				
Log Likelihood	-1579.78				

Notes: Robust standard errors cluster on dyad and are listed in brackets below coefficients; * p<0.10, ** p<0.05, *** p<0.01; %: percent change in expected count (conflict equation) / in odds (inflation equation) for unit increase in X; %StdX: percent change in expected count (conflict equation) / in odds (inflation equation) for standard deviation increase in X.

The effect of retaliation is substantial, and supports the hypothesis that countries file a complaint at the WTO in response to a complaint from their trading partners. This effect is strong across the two equations, but particularly large on the expected number of disputes. Prior dispute initiations by the partner country decrease the probability of being classified in the Always-0 group by 47% and increase the expected number of disputes by 137%.[22]

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[22] For the retaliation variable it makes more sense to inspect unit changes, rather than standard deviations, since that variable is a dummy variable (prior dispute initiations by the defendant = 1).

A striking result is the strong influence of joint democracy on dispute initiation. The more democratic the two countries, the more likely it is that a trade dispute is initiated and the larger the expected number of dispute initiations in this dyad. The magnitude of this effect is considerable, both for the probability of being classified into the Always-0 group and for the expected number of dispute initiations. In fact, comparing the results for the level of democracy to the other variables suggests that domestic politics (for which democracy is a proxy) plays a more important role than systemic factors (for which relative economic power and trade dependence are proxies).

To assess the importance of the bilateral trade variable for the dispute initiation model, we estimated the models in Table 3 without the trade variable. The results differ fundamentally, particularly in the inflation, but also in the count equation. In a model without the trade variable, the effect of directed relative dependence and economic power in the inflation equation is seriously *under*estimated.[23] The effect of retaliation and joint democracy are considerably *over*estimated without trade.[24] Ignoring the bilateral trade volume also affects the estimated effect in the count equation, particularly the effect of joint democracy.[25]

Table 4 shows the results for the undirected relative power and dependence variables. Again, we estimated the model without controlling for bilateral trade and the results differed substantively.[26] The effect of trade is largely the same as reported in Table 3. It is minor for the number of disputes, but major for the probability that no dispute initiation will occur. Similarly, the estimated influence of retaliation and joint democracy is consistent with our expectations and similar to the results of the models including directed variables (although the impact of a one-unit change in retaliation is considerably smaller in the count equation).

Undirected, relative dependence has a statistically significant influence in both equations. When the two countries are more asymmetrically dependent on trade, the probability of being part of the Always-0 group increases. Greater asymmetric trade dependence decreases the number of disputes that we observe. As for the directed variables specification, the differing effects across the two stages are puzzling. While the impact of dependence on the expected number of disputes is consistent with our theoretical expectations, the apparently strong effect on the classification into the Always-0 group is counterintuitive. Undirected relative power is only statistically significant in the inflation equation. The estimates suggest that when power asymmetries increase by one standard deviation, the odds of no trade dispute increase by 52%. This is consistent with the theoretical considerations in section 2.2.

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[23] Without the trade variable, a one standard deviation increase in the trade dependence and power variables leads to a -19% and -15.1% change, respectively, in the odds for the inflation equation as opposed to -56.4% and -35.5% with the trade variable.

[24] The estimated effect of a one deviation change in retaliation and joint democracy is -23.1% and -78.1% in the odds in the inflation equation without trade as opposed to -5.5% and -58.2% with trade.

[25] The effect of a one standard deviation change in the count equation is only 18.6% without trade, but 76.1% when trade is included.

[26] For the inflation equation, the estimated effect of a one standard deviation increase without controlling for trade is -99.9% for undirected trade dependence, 6.2% for undirected power, -21.8% for retaliation, and -24.4% for joint democracy. For the count equation, the estimated effect of a one standard deviation increase without controlling for trade is 1.4% for undirected dependence, -51.9% for undirected power, 10.9% for retaliation and 182.7% for joint democracy.

Overall, the model fit statistics are very similar across the two dyadic specifications, but suggest that we should slightly prefer the specification with directed variables over the one with undirected variables.

Table 4: Dyadic model with undirected variables

	Coefficient Estimates			Estimated Influence	
	Always-0	# of disputes		Always-0	# of disputes
Trade btw. A and B	-0.550***	0.008***	%	-42.3	0.8
	(0.141)	(0.002)	%StdX	-99.7	8.6
Undirected Dependence	-15.775**	-5.382***	%	-100.0	-99.5
	(7.389)	(1.288)	%StdX	-37.2	-14.7
Undirected Rel. Power	2.819*	2.018	%	1575.8	652.2
	(1.551)	(1.346)	%StdX	52.4	35.2
Retaliation	-0.765	0.462**	%	-53.5	58.8
	(0.670)	(0.211)	%StdX	-6.6	4.2
Joint Democracy	-0.151**	0.079**	%	-14.0	8.2
	(0.060)	(0.039)	%StdX	-61.0	63.5
Constant	4.536***	-2.736***			
	(0.808)	(0.689)			
N (zero / all)	63762 / 64073				
χ^2 (Prob > χ^2)	204.859 (0.0000)				
Vuong	8.48				
AIC / SBC	3191.25 / 3300.06				
Log Likelihood	-1583.63				

Notes: Robust standard errors cluster on dyad and are listed in brackets below coefficients; * p<0.10, ** p<0.05, *** p<0.01; %: percent change in expected count (conflict equation) / in odds (inflation equation) for unit increase in X; %StdX: percent change in expected count (conflict equation) / in odds (inflation equation) for standard deviation increase in X.

4.2 Monadic Models

Table 5 presents the results for the monadic model. Overall, this model outperforms the dyadic models in several respects. Not only the Akaike Information Criterion (AIC) favors the monadic model, but also the Schwartz Bayesian Criterion (SBC), which "punishes" models with more explanatory variables to a greater extent than the AIC. Another indication

that the monadic specification is more appropriate is that the estimated effects are theoretically more inconsistent across the equations.[27]

Table 5: Monadic model

	Coefficient Estimates			Estimated Influence	
	Always-0	# of disputes		Always-0	# of disputes
Trade btw. A and B	-0.091***	0.001	%	-8.7	0.1
	(0.023)	(0.001)	%StdX	-62.5	1.5
Dependence of A	-1.571	-2.808***	%	-79.2	-94.0
	(2.754)	(1.034)	%StdX	-3.4	-5.9
Dependence of B	20.247***	0.221	%	6.2e+10	24.7
	(4.998)	(1.254)	%StdX	55.6	0.5
GDP of A	-0.214***	0.062	%	-19.3	6.4
	(0.060)	(0.049)	%StdX	-28.5	10.1
GDP of B	-0.131**	0.213***	%	-12.3	23.8
	(0.053)	(0.046)	%StdX	-18.5	39.6
Retaliation	-1.363***	0.142	%	-74.4	15.2
	(0.369)	(0.186)	%StdX	-11.4	1.3
Polity score A	-0.129***	0.055**	%	-12.1	5.7
	(0.038)	(0.026)	%StdX	-54.4	40.1
Polity score B	-0.073*	0.092**	%	-7.0	9.6
	(0.043)	(0.040)	%StdX	-35.8	74.8
Constant	5.722***	-3.225***			
	(0.678)	(0.636)			
N (zeros / all)	63762 / 64073				
χ^2 (Prob > χ^2)	217.343 (0.0000)				
Vuong					
AIC / SBC	2995.17 / 3158.39				
Log Likelihood	-1479.59				

Notes: Robust standard errors cluster on dyad and are listed in brackets below coefficients; * p<0.10, ** p<0.05, *** p<0.01; %: percent change in expected count (conflict equation) / in odds (inflation equation) for unit increase in X; %StdX: percent change in expected count (conflict equation) / in odds (inflation equation) for standard deviation increase in X.

In the monadic specification, the trade volume between country A (plaintiff) and B (defendant) has the expected effect. As in the models before, it reduces the probability of being in the Always-0 group quite considerably (that is, it allows for dispute initiation). More

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[27] If the coefficients have the (theoretically implausible) same sign across the inflation and count equation in the monadic specification, the coefficient is statistically insignificant in at least one of the two equations.

trade also increases the number of disputes within the subset of potentially conflictive dyads, but this result is not statistically significant in this model. These results confirm our findings reported in Tables 3 and 4 that trade significantly influences whether a trade dispute is feasible, but it does not affect the number of dispute initiations that actually materialize.

Trade dependence of the (potential) plaintiff (A) has no statistically significant effect in the Always-0 equation. But it contributes considerably to lowering the number of disputes in the subset of countries with a positive probability of dispute initiation. That is, greater trade dependence does not necessarily deter potential plaintiffs from initiating a dispute. But it decreases the number of expected disputes. Although this suggests that trade dependence of potential plaintiffs has an impeding effect on trade conflict, the size of this effect is minor. A one standard deviation increase of dependence of A decreases the expected number of conflicts only by 5.9%. These results suggest that the WTO dispute settlement system is effective to some extent because trade dependent countries in fact use this procedure to challenge protectionist measures in partner countries.

Trade dependence of the defendant (B) on the plaintiff has a statistically significant and positive effect on being in the Always-0 group, but has no effect on the number of dispute initiations. This result suggests that countries that are more dependent on trade tend to back down more often and avoid a trade dispute when a partner country complains about a protectionist policy outside the WTO. This result also implies that less trade dependent countries tend to resist the demands from partner countries more often, thus forcing the discriminated country to initiate a dispute at the WTO. The effect of the defendant country's trade dependence on the probability that no trade dispute occurs is very strong. In contrast, trade dependence of the defendant plays no significant role once dyads have been selected into the positive probability group. Overall, this indicates that trade dependencies still play a role in the WTO Dispute Settlement Mechanism, although this effect is not huge.

If the plaintiff is economically more powerful this reduces the probability of being in the Always-0 group considerably, but has no significant effect on the number of disputes. This means that being economically more powerful creates a pre-disposition to initiate trade disputes, but it does not mean that more powerful countries in fact initiate more disputes. Economically more powerful defendants are less likely to find themselves in the Always-0 group, and they are in fact more often targeted. Similar to the trade dependence variables, the effect of economic power is thus more pronounced with respect to the potential defendant. The magnitude of this effect is considerable.

As before, the strong effect of democratic government on trade dispute initiation is striking. The coefficients for both the plaintiff's and defendant's democracy level are statistically significant in both the inflation and the count equations. Moreover, the estimated influence of these variables is substantial. Democratic countries are more likely to use the WTO dispute settlement system. Democratic plaintiffs are significantly less likely to be in the Always-0 group, and they tend to initiate a larger number of trade disputes. Democracies not only initiate more disputes, they are also targeted more often. This indicates that democratic governments tend to resist "out-of-court" settlements and force opponents to file a formal complaint at the WTO. These results suggest that greater interest group access and higher audience costs in democratic countries are major forces that lead to trade dispute initiations.

4.3 Discussion

How do our results compare to previous research, and what have we learned in general? First, the finding that trade is necessary for a trade conflict to occur may not be

particularly surprising. But if this is so, then it is even more surprising that bilateral trade has been neglected in almost all previous studies of trade disputes. This omission is serious when we take into account that the results for other determinants of trade dispute initiation differ considerably when we control for trade. This is the case for all three model specifications presented in this paper.

Second, the result that a higher bilateral trade volume does not lead to more trade dispute initiations is not obvious at all. Previous research suggests or is even based on the assumption that greater trade volume and/or diversity of a country leads to more trade disputes because the probability of encountering a disputable trade measure increases (Horn et al. 1999). Although the trade volume per se and trade diversity is not the same, both are highly correlated.[28] By implication, we should observe a rather strong relationship between the amount of trade and the number of trade disputes. But the impact of trade on the number of dispute initiations is very small and/or statistically insignificant across all model specifications. That is, we have demonstrated that trade is necessary for trade disputes to occur, but it does not affect rivalries by increasing the number of actual disputes. This result differs from Davis and Blodgett Bermeo's (2007) finding that ‚trade interests' (defined in that study as the number of times an industry exports to a bilateral trading partner more than 10 million USD worth) have a strong, positive effect on the number of initiated disputes.

Third, the difference between the dispute enabling impact of trade and its influence on the expected number of disputes is only visible in a model that explicitly distinguishes between these two effects. We re-estimated our specifications using a standard, single-equation count model and also find that, in this model, trade has a substantial impact on the expected number of disputes. The crucial distinction here is that if a variable contributes to the possibility of a conflict, this does not necessarily mean that a conflict will occur. Neither may it tell us accurately how many times a dispute will occur. A binary model that ignores information about the number of conflicts will not be able to separate these effects. And a model solely analyzing the number of conflicts may incorrectly suggest that a variable like trade increases the number of conflicts.

Fourth, our findings support the claim that economic power and trade dependence matter in the WTO dispute settlement process. In contrast to some theoretical arguments the evidence speaks largely in favor of absolute (monadic) rather than relative (dyadic) economic power and trade dependency. Clearly, economically more powerful defendants are involved in a higher number of trade disputes. The question now is whether this is the case because weak countries target them more often, as suggested by the capacity hypothesis. Or because more powerful countries systematically do not give in to the demands of other countries outside the WTO, independent of the strength of the plaintiff. Our results suggest that the latter is the case. We find inconsistent evidence for relative power in the dyadic, directed variables model (Table 3). Moreover, increasing power of the plaintiff increases the probability that a conflict may occur, but it has no effect on the number of conflicts (Table 5). Putting these results together, it is plausible to conclude that more powerful countries are more likely to resist demands for trade concessions by other countries. This effect is largely independent of the opponent's power. If the trading partner (whether it is powerful or weak) has a serious interest in forcing the partner country to remove a trade-restricting measure, it has to launch a dispute at the WTO. The results can be interpreted as evidence in favor of a monadic power hypothesis rather than of the dyadic capacity hypothesis. The same applies to trade dependence.

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[28] Horn et al. (1999: 8) estimate the relationship between the value of exports and export diversity. Their estimate implies that "a one percent increase in exports is on average associated with [a] 0.64 percent increase in the export diversity over products and markets."

Finally, domestic politics clearly is the most important factor for dispute initiation, arguably much more important than economic power and trade dependence. More democratic countries pursue more aggressive trade policies than less democratic ones. The most plausible interpretation of this very strong effect is that interest groups in democracies have more opportunities to lobby against the reduction of trade restrictions (in case of the defendant) or in favor of launching a dispute at the WTO (in case of the plaintiff) than interest groups in non-democracies. Moreover, interest groups in democracies have greater opportunities to instrumentalize the public in lobbying or campaigning against trade restrictions of another country or in favor of own trade restrictions. That is, they have a greater capacity to hurt government popularity and thus influence trade policy-choices. The strong impact of democracy on dispute initiation has important implications for the analysis of dispute escalation and dispute settlement. Almost all conflictive WTO dyads are democratic: the mean value of the Polity score (scale from -10 to 10) of plaintiff countries in the subsample of dyads that have experiences a WTO dispute initiation is 8.54 and the standard deviation is 3.04. The mean democracy score of defendant countries in that subsample is 9.24 and the standard deviation is 2.09). Explanatory models accounting for the role of democracy (or possibly other variables) in WTO dispute escalation and settlement (as opposed to dispute initiation) should take this potential selection effect and its impact on the estimation results into account.[29]

5. Conclusion

This paper has shed light on an important but largely ignored question relating to the WTO dispute settlement process, namely how to account for the probability that any given pair of countries becomes involved in a WTO dispute. The analysis of this question required a departure from the standard approach in WTO dispute settlement research, which examines only those disputes that have already entered into the WTO. Testing hypotheses on the determinants of dispute initiation on the population of WTO membership dyads poses some methodological challenges (notably, overdispersion and the large zero-share problem). We used zero-inflated count models to cope with these challenges and answer two questions: what factors increase the probability of trade dispute initiation to any value above zero? What factors determine the extent of trade dispute initiation (in terms of number of disputes initiated) in the sub-population of WTO membership dyads with a strictly positive probability of dispute initiation?

The results show that bilateral trade volume is necessary for trade dispute initiation, but does not have a substantive effect on the number of dispute initiations. The results also demonstrate that economic power and dependence matter in WTO dispute settlement. Monadic forms of these variables are better predictors than dyadic ones. The principal reason why economically more powerful and less trade-dependent countries are more likely to get involved in a trade dispute is that they are less likely to give in to demands for trade concessions outside the WTO. Domestic politics is very important in explaining dispute initiation, and, arguably, more important than economic power and trade dependence. More democratic countries clearly pursue more aggressive trade policies. Since the subgroup of country dyads that did experience a trade dispute initiation is highly democratic, studies based on the subsample fo conflictive WTO dyads cannot assess the importance of democracy for dispute initiation.

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[29] Starting from the full set of WTO dyads instead of the subset of conflictive dyads could be a potential alternative to the solutions for the problem of selection bias discussed by Busch and Reinhardt (Busch and Reinhardt 2002, section 2.2).

The WTO dispute settlement process is, of course, a lengthy process that begins within individual firms, interest groups, and governments and may extend all the way through the WTO system from consultations through formal adjudication to disputes over the implementation of WTO verdicts. Qualitative case studies on individual trade disputes offer important insights into entire life-times of disputes, and studies on forum choice from the perspective of individual countries are also very useful. However, to arrive at insights that are generalizable across the population of WTO disputes we will ultimately have to connnect models of dispute initiation (how disputes enter into the WTO) to models of dispute escalation and settlement within the WTO.

A next step in the analysis of dispute initiation and escalation should be to construct models of dispute initiation that take into account that potential plaintiffs, when deciding whether or not to initiate a dispute, assess the probability and costs and benefits of escalation down the line. Strategic probit models and statistical backwards induction are one possibility to take into account the forward-looking behavior of governments when they decide whether to initiate or to escalate a conflict. Another option for extending the research presented in this paper is to find more sophisticated ways of dealing with the issue of retaliation. The dummy variable we used is only an approximation of strategic interaction between countries. Future research could, for example, apply the multiple equation count model developed by King (1989b: 201-207; 1989a) to analyze rivalries, reciprocity and strategic interaction in the trade dispute initiation phase.

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