# Litigation in the World Trade Organization:

# Power of Gravity or Power of Discrimination?\*

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## ABSTRACT

The World Trade Organization (WTO) and associated global trade laws can be viewed as an incomplete contract. The WTO's dispute settlement mechanism is one of the key instruments that states use to fill gaps and resolve ambiguities in this contract. We study dispute initiations in all WTO member state dyads in 1995-2003 to explore whether and to what extent this process of legalization is affected by power, defined in terms of differences between states in economic size, trade dependence, and legal capacity. We find that power matters in WTO litigation, and that it affects usage of the WTO's dispute settlement system. However, its principal effect is a gravitational, and not a discriminatory one: larger economies and countries that trade more are more likely to get involved in trade disputes, either as complainants or defendants. While the power of gravity is rather strong, we find only weak and inconsistent evidence for discriminatory effects of power in the sense of disadvantages encountered by less powerful countries.

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# **1. Introduction**

The dispute-settlement mechanism of the World Trade Organization (WTO) and its predecessor, the General Agreement on Tariffs 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, this interest is also based on the view that the rule of law, which is characteristic of liberal democracies, should be extended beyond its cradle, the nation state, to solve international problems through legal means rather than power.

The theoretical literature views the WTO and associated global trade laws as an "incomplete contract" (e.g., Horn et al. 2006; Goldstein and Martin 2000; Rosendorff and Milner 2001; Rosendorff 2005). International negotiations and agreements following the establishment of the WTO in 1995 and, most important for this paper, activities of the WTO's dispute settlement mechanism, are regarded as efforts to fill gaps and resolve ambiguities in this incomplete contract. Research in political science and economics has in recent years started to investigate how this process of legalization is evolving. We study one of the key issues in this context, namely, whether there is a power bias in WTO litigation, and dispute initiation in particular. Our work is thus complementary to other research that examines whether and how WTO dispute settlement resolves ambiguities in specific areas of international trade law, e.g. provisions on anti-dumping measures (e.g., Bown 2005a, 2005b).

Several studies have investigated when and why countries initiate disputes in the WTO. While some studies offer encompassing explanations of dispute initiation (Allee 2004; Reinhardt 1999), much of the very recent work concentrates on the role of state power and legal capacity. Most authors seem to agree that power plays a minor role in accounting for countries' use of the WTO dispute settlement procedure (Guzman and Simmons 2005; Horn et al. 1999). Some authors also claim, however, that legal capacity is important for dispute initiation and that many poor countries do not have sufficient expertise and financial resources to prepare and follow through with a WTO case (Horn et al. 1999; Allee 2005; Davis and Blodgett Bermeo 2007; Bown 2005a; Busch et al. 2007). Recent work also suggests that if poorer countries and/or smaller economies decide to initiate a dispute, the stakes of the dispute must be high (Allee 2005); consequently they target rich countries and/or large economies, because – in view of greater legal capacity constraints – the expected returns from gaining better trade access to such economies are higher (Guzman and Simmons 2005).

We revisit these findings, focusing on the effects of both complainant and defendant power in relative (vis-à-vis specific other countries) and absolute terms. The analysis relies on a broad conceptualization of power that includes economic size, trade dependence, and legal capacity. The explanatory models also include trade volume, which, surprisingly, most previous studies do not. We use both cross-sectional (negative binomial models) and panel data analysis (zero-inflated count models) to examine all directed member state dyads in the WTO system in 1995-2003.

Based on this empirical approach we explore two types of power effects that have not been distinguished clearly enough in the existing literature: gravity and discrimination. The gravity effect implies that countries are drawn into trade disputes either as complainant or defendant primarily because their economies are large and/or and they trade a lot. The discrimination effect implies that less powerful countries encounter disadvantages in the WTO dispute settlement system in the sense that they initiate fewer disputes and/or become targets of dispute initiation because they are less powerful.

The principal conclusion from our analysis is that the gravity effect is more important than the discrimination effect. Models that include variables capturing absolute forms of power perform considerably better. And in those models, trade volume and GDP of the complainant *and* target country

have consistently positive effects on the probability of dispute initiation. In contrast, the effects of trade dependence and legal capacity are often statistically insignificant and substantively small. Power matters in WTO dispute settlements, but in ways that differ from the conventional view of the phenomenon. Larger economies and bigger traders appear to gravitate towards trade disputes, whereas less powerful countries do not appear to face serious disadvantages.

The main implication for further research on WTO dispute settlement is that explanations should start with a baseline model that is reminiscent of the gravity model in studies of international trade flows and also the very recent literature on interstate wars (Hegre 2008). This baseline model should include dyadic trade volume and the size of the two economies. The main policy implication is that we are unable to identify a serious bias in WTO dispute settlement that operates at the disadvantage of less powerful countries. The fact that larger economies and bigger traders gravitate towards dispute settlement in the WTO, thus subjecting themselves to third party adjudication, should be viewed as a positive achievement of the WTO. Additional support, particularly for poor countries, provided by NGOs, the WTO secretariat, other international organizations (e.g. UNCTAD), or individual governments can qualify as a no-regrets measure. Nevertheless, it would be helpful to investigate in greater detail whether smaller and/or poorer countries that experience costly trade restrictions avoid WTO dispute initiation primarily because of insufficient legal capacity and/or fear of reprisals by more powerful target countries.

The following section outlines the issue. Section 3 presents the theory and hypotheses. Section 4 deals with the empirical design of the study including the definition of variables and statistical techniques. Section 5 presents the results, and section 6 concludes.

## 2. The Issue

Even though the new WTO dispute settlement system, which became operational in 1995, has been heralded as an institutional innovation that puts right before might, critics maintain that some countries in this system are "less equal" than others. In particular, smaller and poorer countries are said to face disadvantages (e.g., Bown 2005a; Davis and Blodgett Bermeo 2007; Guzman and Simmons 2005; Horn et al. 1999). They allegedly face a higher risk of retaliation if they decide to initiate legal action against a more powerful country. And even if they obtain a favorable WTO verdict in any particular case, the WTO system puts implementation of verdicts into the hands of the complainant. If a small and/or poor complainant then faces a large and/or rich culprit, implementation of a verdict will be very difficult. Involvement in a WTO case also can be very costly because it requires specialized legal staff and disputes may last several years. If these claims hold true empirically we should observe more participation in WTO dispute settlement by larger and richer economies.

A first, descriptive look at the available data on WTO dispute initiations suggests that reality is more complicated that the above claim suggests. As shown in Table 1, 164 (44%) of the WTO dispute initiations in 1995-2007 have involved either the EU or the USA as the complaining country. 158 (43%) initiations have involved either the EU or the USA as the defendant country. 48 disputes have been directly between the EU and the USA. It is obvious, therefore, that the EU and USA are by far the heaviest users of the WTO's dispute settlement system, though the intensity of their involvement has somewhat decreased in recent years. Only one dispute was initiated by a least developed country. Other countries, including developing countries, have made consistent use of the system.

#### << Table 1 about here >>

The picture that emerges from this data is ambiguous. On the one hand, we observe that least developed countries are almost absent from the WTO dispute settlement system. On the other hand, developing countries as a whole are frequent users of the system. On average, they initiate slightly less

disputes than industrialized countries (the overall DC / IC ratio is 0.66, with no obvious temporal pattern). If one weighs the intensity of use of the dispute settlement system by shares in world trade, the participation of developing countries does not appear low. For example, in the 2000 – 2006 period, merchandise exports by industrialized countries were around 65-70% of the global total (64% in 2006, higher export growth rates of developing countries in recent years, 20% growth in 2006). This share corresponds, by and large, to developing countries' share of dispute initiations in the WTO. The share of least developed countries' merchandise exports in 2006 was 0.9%, which is slightly higher than their share in WTO dispute initiations (World Trade Report 2006).

Even though data of the aforementioned kind suggests that developing countries may not face systematic disadvantages in the WTO dispute settlement system, it is obvious that a more rigorous analysis that relies on more nuanced definitions of power and on inferential statistics is required. We start by assuming that country dyads that trade more with each other are more likely to get involved in a dispute. We then add several indicators for power to this baseline model to establish the extent to which relative or absolute power of the complainant and defendant have a discriminatory effect. In other words, we are interested in whether there are countries that, due to their trade volume with some other country, could have initiated a dispute against that country, but have not done so because of inferior power (small economic size, trade dependence on potential target country, low legal capacity).

# 3. Theory

The existing literature on international trade policy includes several studies that explain when and why trade disputes escalate and/or are resolved (e.g., Guzman and Simmons 2002; Busch 2000; Busch and Reinhardt 2003, 2006, 2001; Reinhardt 2001; Bown 2004a, 2004b). Most of these studies focus on trade disputes from the point in time when they have entered the WTO (or GATT) system. With very few exceptions, they do not examine the conditions under which countries file a dispute at the WTO in the first place before analyzing how this dispute then evolves within the WTO framework.<sup>1</sup> As a consequence, we still know quite little about how the driving forces differ along the way from the pre-WTO stage throughout the WTO process. Focusing on WTO disputes once they have entered the system also raises a methodological issue, in that such studies are based on non-randomly selected cases.<sup>2</sup> Ideally, a comprehensive assessment of dispute initiation and its determinants is based on all potential conflict dyads instead of those in which a complaint was filed at the WTO.

Moreover, research on WTO dispute initiation tends to focus on explanatory variables that capture the characteristics of either the complainant or the defendant country, but not both. Theoretical considerations and empirical specifications in current research center on the plaintiff and largely ignore the role and the characteristics of the potential defendant.<sup>3</sup> While the plaintiff ultimately decides whether or not to file a dispute, this decision, to a considerable degree, depends on the target country's willingness to comply with demands by the plaintiff.

<sup>1</sup> Other studies explain trade dispute forum choice (e.g. Davis 2006; Busch 2007). Most of them concentrate on very few countries, sometimes only one country, the United States.

<sup>2</sup> Busch and Reinhardt (2002) offer useful advice on how to deal with the problem of selection bias in this context. We submit that explicit modeling of the dispute initiation process will help us understand how the missing components influence subsequent escalation dynamics.

<sup>3</sup> See Davis and Blodgett Bermeo (2007). Guzman and Simmons (2005) emphasize the role of complainants and defendants, but their analysis is restricted to the subset of dyads that were in fact involved in a WTO dispute. Allee's (2004) empirical specification includes complainant compared to defendant GDP. But the analysis does not consider in greater detail different arguments about directed and undirected relative and absolute power and dependency that lead to different empirical specifications (see our argument below). Yet, the selection approach by Allee is very valuable because it sheds light on the interaction between defendants and plaintiffs outside the WTO.

The general structure of our explanatory model takes care of both of the aforementioned issues in that we concentrate on complainant and defendant country characteristics and include all directed WTO member country pairs in the analysis. The explanation follows a very simple and straightforward logic. The baseline model explains the potential for trade dispute initiations in terms of trade volume. Although several authors note that trade volume may affect the probability of disputes (Holmes et al. 2003; Reinhardt 1999, p.8 and other instances), the empirical specifications of previous studies, with very few exceptions (Horn et al. 1999; also Davis and Blodgett Bermeo 2007), do not include this variable. We then add the variables that measure the power of complainants and defendants, in absolute and dyadic (relative) terms, as well as a set of control variables.

## Trade

The effect of trade on the probability of trade disputes is fundamental. Trade plays the same important role in explaining trade disputes as traffic plays in explaining traffic accidents: more trade increases the probability that one country in a trading dyad implements some trade-restricting measure that is then challenged by the exporting country. Conversely, if two countries do not trade at all with each other, it is hard to see how they would get involved in a trade dispute.<sup>4</sup>

The volume of bilateral trade may not only affect whether a trade dispute is possible, it could 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 the probability of 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. Although trade diversity and trade volume are not identical, the two are highly

<sup>&</sup>lt;sup>4</sup> Cases in which two countries do not trade primarily because trade restrictions prevent the exchange of goods and services are exceptions. We do not examine this issue in greater detail because these cases are extremely rare.

correlated (Horn et al. 1999: 8). By implication, we should expect that more bilateral trade is associated with more trade disputes.

#### Power

The principal objective of this paper is to identify whether and in what ways power affects the WTO dispute settlement process. We use a broad conceptualization of power that identifies both the sources and the relational aspects of the phenomenon. In our context, the main sources of power emanate from the economic size of countries, their dependence on trade and their capacity to engage in legal action at the WTO. The relational aspect pertains to whether state behavior is influenced primarily by absolute sources of power or whether sources of power should be defined in relational terms (i.e., vis-à-vis specific other countries).

Interestingly, recent research on militarized interstate conflict is also beginning to pay more attention to the distinction of relative and absolute power (Hegre forthcoming). While previous research had focused primarily on the effect of power asymmetries (the preponderance vs. balance-of-power hypothesis) very recent research has found that larger and more powerful countries (in absolute terms) have better abilities and stronger incentives to fight wars. Hegre (forthcoming:1) concludes that "the empirical relationship between size and distance and conflict is stronger than any other identified in dyadic statistical studies of interstate conflict." In other words, size and distance are typically used in exlaining international trade flows, but can also be used to explain "gravitation" towards war.

Even though militarized conflicts are obviously very different in nature from trade conflicts, application of a modified version of the gravity model appears important. The most widespread application of the gravity model focuses on explaining trade volumes (e.g., Bergstrand 1985). These are influenced by countries' economic size and distance between them. We submit that distance can be omitted in our explanatory model because its effect on trade dispute initiation runs through trade flows. We find it hard to envision any direct influence of distance on the probability of trade dispute initiation.

In militarized conflicts, distance needs to be analyzed in combination with military power because there is a loss-of-strength gradient in the geographic projection of military power. The projection of power in contemporary trade relations appears to be primarily through trade relations. However, economic size appears important both in influencing trade flows and the probability of dispute initiation.

As noted by Conybeare in his analysis of French-Italian trade disputes in the 1880s and 1890s "...big powers can coerce small powers" (Conybeare 1985: 147). In the same vein, Guzman and Simmons (2005: 557) postulate that "politically weak countries will refrain from filing complaints against politically powerful states for fear of costly retaliation." Claims such as these are not explicit on whether power should be defined in absolute terms or in relative form, i.e. vis-à-vis specific other countries. That is, they do not tell us whether more powerful states are, per se, more litigatious, or whether they are more litigatious only vis-à-vis countries that, in strictly relative (dyadic) terms, are less powerful.

As to the effects of absolute power, we hypothesize that *more powerful countries are more likely to initiate disputes* because they have more resources to do so, and because they face a lower risk of retaliation by the target country (*Hypothesis H1a*). While this argument corresponds to the argument on the effects of size and power on militarized disputes, the latter literature does not offer much help with respect to the effect of the defendant's power. Even though it finds that the military capabilities and population size (both are indicators of power) of both countries in a dyad have a significant and positive effect on war initiation, it does not offer a theory for this observation because it uses nondirected dyads and does not distinguish war initiators and targets.

We submit that, in the WTO context, more powerful countries are not only more frequent initiators, but also more frequent targets of dispute initiations (Hypothesis H1b). This hypothesis rests on three arguments. First, more powerful countries are more likely to resist demands for trade-

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concessions outside the WTO. This may force their trade partners, no matter whether they are also powerful or not, to carry grievances into the WTO dispute settlement process. Second, the average country tends to trade more with large economies (the gravity effect). Trade restrictions by large economies hence impose larger costs on other countries and, conversely, the potential benefits of obtaining trade concessions from a large economy through a WTO case are larger. This makes more powerful countries more attractive targets (see also Guzman and Simmons 2005). The third argument is hard to pin down empirically, but is theoretically important: initiating trade disputes against small countries, and poor ones in particular, "looks bad" and may create reputational costs in the international system. The second and third argument overlap to a large degree: initiating disputes against small and poor economies in particular is unlikely to yield a large economic benefit and may get the initiator into reputational trouble.

The relative notion of power rests on the assumption that the costs incurred by the complainant country when initiating a trade dispute are also affected by the complainant's power relative to the defendant's power. A common assumption is that a more powerful defendant, relative to the complainant, can inflict greater costs on the complainant with less harm to its own economy. The (potential) complainant, in turn, faces costs of retaliation by the defendant when it considers whether or not to initiate a dispute against a more powerful country. Moreover, the implementation of WTO verdicts is largely in the hands of the country(ies) who won the legal case. More powerful complainants also have more power to enforce a verdict (if they win the legal case), while more powerful defendants are better able to resist the implementation of verdicts (if they are found guilty). This, in turn, reduces the net benefits of dispute initiation for the complainant. Consequently, *less powerful countries will refrain from initiating a dispute against a more powerful country* even if they have reasons to believe that they could win the legal case. Conversely, *more powerful countries initiate more disputes against less powerful countries (Hypothesis H2a)*.

The hypothesis that power differences in favor of the complainant make dispute initiation more likely implicitly rests on the assumption that states do not interact outside the WTO before they launch a dispute, or that any such interaction has no implications for the WTO process. Early settlement outside the WTO is essentially ruled out. But Conybeare's statement (see above) can be interpreted in a different manner if we consider that countries of different power negotiate bilaterally about barriers to trade before initiating a WTO dispute. Suppose that powerful states, plaintiffs and defendants, try to coerce less powerful states outside the WTO to behave according to their interests. This means that the more powerful, potential complainant country forces the weaker, potential defendant country to lift a disputed trade restriction without WTO proceedings. Similarly, the more powerful, potential defendant country resists demands by the weaker, potential plaintiff country to lift trade restrictions, but the weaker plaintiff does not initiate a formal WTO dispute because it fears reprisals. In this scenario, the probability of an "out-of-court" settlement increases with greater (undirected) power asymmetry between the potential complainant and defendant, and WTO dispute initiation becomes less likely.

In other words, taking into account interactions outside the WTO leads to an additional hypothesis that resembles the power preponderance hypothesis in research on armed interstate conflict. *Larger differences in power between potential complainants and defendants – in both directions – reduce the probability of trade dispute initiation (Hypothesis H2b)*. The logic of this hypothesis differs from the conventional power hypothesis discussed above. The latter holds that we should observe few disputes between a weaker complainant and a stronger defendant; many disputes between a stronger complainant and a weaker defendant; and some disputes between equally powerful complainants and defendants.<sup>5</sup> The logic of hypothesis H2b is that we should expect more disputes between equally powerful countries, and less disputes among countries that differ in power: if a

<sup>&</sup>lt;sup>5</sup> This argument is consistent with the interpretation of the power hypothesis by Guzman and Simmons (Guzman and Simmons 2005: 572-574).

potential complainant is much weaker than the potential defendant it will not initiate a dispute because it fears costly reprisal; if the potential complainant is more powerful than the defendant, it obtains more concessions from the defendant even without a formal dispute.

We noted above that we use a broad conceptualization of power, including economic size of a country, trade dependence, and legal capacity. With some potential exceptions, the power hypotheses discussed above apply to all three aspects of power. We discuss each of the potential exceptions in turn. The framing of the above hypothesis is oriented towards the economic size variable and requires no further discussion. However, when we replace economic size with trade dependence or legal capacity, some ambiguities may arise.

On the one hand, the less trade dependent country A is on country B, the less costly the initiation of a trade dispute will be for country A because it is less exposed to reprisals by the defendant. On the other hand, if trade dependence of country A on country B is low, the benefits from obtaining trade concessions from the defendant are likely to be low as well, unless low trade dependence has resulted from trade barriers that could be removed through a WTO dispute and would be followed by more exports from A to B. To the extent that low trade dependence of A on B reflects existing trade barriers of B, low trade dependence may increase the probability of dispute initiation. Since we will control for trade flows, the trade dependence variable is more likely to pick up power effects rather than benefits or costs of dispute initiation that emanate from trade flows. For this reason we expect trade dependence effects to be similar in direction as the effects of economic size.

The effect of a country's legal capacity might be ambiguous as well. The existing literature has discussed and analyzed quite extensively the mechanism that connects legal capacity and trade disputes (Davis and Blodgett Bermeo 2007; Allee 2005; Busch et al. 2007; Guzman and Simmons 2005). Most authors claim that poor countries often do not have the financial means and human resources to prepare and follow through with a WTO dispute. Filing a complaint is very costly in several respects. It

requires that countries monitor other countries' trade policies and import restrictions, collect evidence on policies and practices that violate international law and hire legal staff, sometimes for many years. There are a few caveats, however. First, previous experience with the WTO dispute settlement mechanism can equip poor countries with expertise necessary to engage in a WTO dispute and hence increases their legal capacity. Prior involvement in disputes thus lowers the entry costs and makes future dispute initiation more likely (Davis and Blodgett Bermeo 2007). Second, while a government may have a low legal capacity (usually because the country is poor), the particular industry or firms in the poor country that suffer from trade barriers and are pushing the case may have legal capacities to support the government, or they can hire foreign legal consultants or even get free advice from NGOs, governments or international organizations.

Third, it is difficult to measure legal capacity independent of the propensity of WTO dispute initiation. That is, there is an endogeneity problem that makes it difficult to tell whether countries with stronger legal capacities are more likely to initiate trade disputes, or whether governments that face a higher probability of trade disputes and have been involved in more such disputes have an increased legal capacity. Fourth, when we try to define legal capacity independently of WTO dispute probability, we have to resort to concepts such as national income. Income levels, in turn, are likely to correlate with trade volume, and the latter may also affect the probability of WTO dispute initiation. While the caveats concerning the effects of trade dependency are minor, we should have more reservations about the effects of legal capacity. In view of these caveats, we expect economic size to have the strongest effect on dispute initiation, followed by trade dependence and legal capacity.

# 4. Empirical Design

# 4.1 Approach

The empirical design follows directly from the theoretical argument. We start with a baseline model that explains the probability of a trade dispute in any directed dyad as a function of bilateral trade volume. We then introduce variables measuring relative power, as well as control variables, followed by models that include absolute indicators of power.

The original dataset includes all *directed* WTO member state dyads (pairs of countries) from 1995 to 2003.<sup>6</sup> Each dyad appears twice because the dependent variable measures not only the number of trade disputes in a dyad, but also which country is the complainant and which one is the defendant. For example, the observation for the ordered country pair Albania – Angola in 2000 informs us how many times Albania initiated a trade dispute against Angola in 2000. The observation for the ordered pair Angola – Albania shows how often Angola initiated a dispute against Albania in the same year.<sup>7</sup> Though we have data on all WTO dispute initiations through 2007, reliable data for the explanatory variables is not available beyond 2003. Following a common practice in the literature on international conflict, we drop "irrelevant dyads"; in our context, these are dyads that have zero bilateral trade in either direction.<sup>8</sup>

<sup>6</sup> In 2003, the WTO had 131 member states, implying that there were 8'515 dyads in that year. The number of dyads is smaller in earlier years because some countries joined the WTO only some time after its foundation, e.g. Albania in 2000.

<sup>7</sup> This approach differs from Davis and Blodgett Bermeo (2007) who test a ,one-sided' argument on complainant behavior and do not account for the characteristics of (potential) defendants.

<sup>8</sup> On irrelevant dyads in international conflict research, see, e.g., Maoz and Russett (1993), Russett and Oneal (1997), and Lemke and Reed (2001). Since trade conflicts are virtually impossible if countries do not trade with each other, non-trading dyads are considered irrelevant. We keep all dyads with a

We implement the empirical analysis in two parts. The first part relies on a cross-sectional analysis that examines the number of trade dispute initiations a directed dyad experiences in the 1995-2003 period.<sup>9</sup> We opt for the cross sectional approach because dispute initiations among WTO dyads are very low probability events – even after excluding "irrelevant" dyads. The cross-sectional analysis reduces to some extent the large number of no events in the dataset. It does so without omitting significant dynamics because there is rather little temporal variation in the key explanatory variables over the period of analysis. The second part analyzes dispute initiations across dyads and over time. As discussed below, we will address the rare-events problem in the panel dataset by using zero-inflated models that further distinguish between relevant and irrelevant dyads.

#### 4.2 Variables

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.<sup>10</sup> This approach follows a common practice in the existing literature (e.g., Busch 2000). The reason is that 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.<sup>11</sup> A

positive bilateral trade volume (in either direction). We cannot exclude the possibility that two countries have zero trade primarily because of trade restrictions. However, this possibility is, arguably, quite remote and we could not identify any dispute initiation among countries that have zero trade.

<sup>9</sup> The basic cross-section dataset includes  $2 \times 8'515 = 17'030$  observations, but estimations are based on a smaller dataset that does not include dyads with zero trade as mentioned above.

<sup>10</sup> In the WTO system disputes may be initiated by several countries, but there is always one country on the defendant side.

<sup>11</sup> <u>http://www.wto.org/english/tratop\_e/dispu\_e/dispu\_e.htm</u> (last visited on 15 May 2008)

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dispute initiation is coded as such if a formal request for consultations under the WTO dispute settlement system was made and the complainant and defendant country are listed as such by the WTO.

**Trade** is defined as the sum of imports and exports between two countries in billion USD.<sup>12</sup> The data is taken from Gleditsch (2002) and is updated with data from the IMF Directions of Trade Statistics database.<sup>13</sup>

As discussed in the theory section we use three types of concepts to assess the effect of power on dispute initiation: economic size of countries, trade dependence, and legal capacity. For each of the three concepts we measure power in absolute and relative terms. Economic size in absolute terms is measured by **GDP of A**, which captures the complainant's economic size, and **GDP of B**, which does the same for the defendant country. Directed relative economic size (**directed rel. econ. size**) is defined as the GDP of the complainant divided by the sum of the two countries' GDPs. This ratio takes the value 0.5 if both countries are equally powerful. Values closer to zero show that the defendant is more powerful than the complainant, values closer to 1 indicate that the complainant is more powerful. To compute a measure for **undirected rel. econ. size**, we subtract 0.5 from the directed variable and take the absolute value. The GDP data is taken from Gleditsch (2002) and is updated with data from the Penn World Tables.<sup>14</sup>

Trade dependence is defined as trade dependence of country A (complainant) on country B (defendant), and vice versa (**dependence of A**, **dependence of B**). This ratio is defined as 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 rel. dependence**) is the difference between the

<sup>&</sup>lt;sup>12</sup> We use the sum of exports and imports of country A.

<sup>&</sup>lt;sup>13</sup> <u>http://privatewww.essex.ac.uk/~ksg/exptradegdp.html;</u>

http://www.imf.org/external/pubs/cat/longres.cfm?sk=154

<sup>&</sup>lt;sup>14</sup> See above; <u>http://pwt.econ.upenn.edu/</u>.

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 complainant (A) depends more on trade from the defendant (B). Negative values indicate that the defendant is more dependent on bilateral trade than the complainant. The data is taken from Gleditsch (2002) and is updated with data from the IMF Directions of Trade Statistics database.<sup>15</sup>

We use two indicators for legal capacity: GDP per capita (**GDP/cap of A**, **GDP/cap of B**), and the number of delegates to the WTO in Geneva (delegation size of A, delegation size of B). The GDP data is taken from Gleditsch (2002) and is updated with data from the Penn World Tables.<sup>16</sup> The data for delegation size is taken from Horn et al. (1999).<sup>17</sup> We also use the two indicators in relational form. **Directed rel. GDP/cap** is defined as the GDP per capita of the complainant divided by the sum of the two countries' GDP per capita. **Directed rel. delegation size** is defined as the delegation size of the complainant divided by the sum of the two countries' delegation sizes. Again, these ratios take the value 0.5 if both countries have equal capacity. Values closer to zero show that the defendant has greater legal capacity than the plaintiff, values closer to 1 indicate the opposite. To construct the undirected measures, we substract 0.5 from the directed GDP/cap and delegation variables and take absolute values.

We add two control variables that are widely used in models of WTO trade disputes: democracy and retaliatory behavior. In line with most other work on the subject we assume that democracy has a positive effect on dispute initiation (see also Milner and Rosendorff 1997; Rosendorff and Milner 2001; Mansfield et al. 2000, 2003; Rosendorff 2005; Reinhardt 1999; Busch 2000; Huth and Allee

<sup>&</sup>lt;sup>15</sup> <u>See</u> above.

<sup>&</sup>lt;sup>16</sup> <u>See</u> above.

<sup>&</sup>lt;sup>17</sup> This data was compiled by Horn et al. based on the WTO telephone directory in October 2002. See also: <u>http://econ.worldbank.org/</u> (last visited on 15 May 2008).

2002, 2006; Davis 2006). We also assume that dispute initiation by any given country against another country increases the probability that, subsequently, the target country initiates a dispute against the previous initiator (e.g., Davis 2003, 2004). Hence we include the combined scores from the Polity IV project to measure **democracy of A and B** (Marshall et al. 2002). And we include a dummy variable to control for retaliation. This variable measures whether country A was the target of a dispute initiation by B before it initiated a dispute. The **retaliation** variable takes the value one if the defendant country (B) initiated a WTO dispute against the plaintiff (A) during the same or the previous year, and zero otherwise. This variable is only used in the analysis of panel data because identification of retaliatory behavior requires that the temporal dimension is taken into account. The summary statistics of the explanatory variables are shown in Table 2.

## << Table 2 about here >>

#### 4.3 Method

A few authors (e.g., Reinhardt 1999) have used binary models to distinguish between observations (country dyad and year) in which no dispute occurred and observations in which one or more disputes were initiated in the WTO. Davis and Blodgett Bermeo (2007) move beyond the binary approach and use count models. But they do not account for excess zeros present in the dataset. Our approach combines these two types of models.

We start by using negative binomial models to estimate the expected number of trade dispute initiations by one country against another country (King 1988; 1989b: 121-131). The data structure in this first step is cross-sectional. That is, we use 1995-2003 averages for the explanatory variables, and the cumulated number of disputes in a dyad in that time period. After excluding all dyads with zero bilateral trade we retain 12370 observations. After case-wise deletions in the analysis due to missing data the cross-sectional models are based on 9000 - 10000 observations. The risk of becoming involved in a WTO trade dispute is higher the longer both countries are WTO members. To account for

differences in exposure time, our models include the log of the duration (years) of the complainant's WTO membership. The coefficient for this variable is constrained to be 1 (Long 1997).

As shown in Table 3, WTO dispute initiations are rare events, especially in the dataset that is structured in terms of annual directed dyads.<sup>18</sup> To deal with the problem of excess zeros, i.e. the large number of non-events in the time-series cross-section dataset, in which the annual directed dyad is the unit of observation, we employ zero-inflated negative binomial models (Greene 1994). The first stage of zero-inflated models (the inflation equation) uses a binary specification to assess whether a dispute is possible (i.e. whether there is a positive probability of a dispute). The second stage (the count equation) accounts for variation in the number of initiated disputes among those dyads that have a positive probability of a dispute.

# << Table 3 about here >>

This approach has several advantages. The standard count models shown in table 4 directly extend the models in the existing literature (Davis and Blodgett Bermeo 2007). The zero-inflated models then split the dispute initiation process into two stages for statistical and theoretical reasons. It is unrealistic that all dyads have a strictly positive probability of a trade dispute, as the standard models assume. Countries that trade very little (but more than nothing) are very unlikely to become involved in a dispute over trade restrictions. Since it is not obvious ex ante at what trade level a dyad becomes relevant, the two-step procedure separates observations with zero probability of dispute initiation from those with a positive probability of conflict.<sup>19</sup>

<sup>&</sup>lt;sup>18</sup> In the cross-sectional dataset, the maximum number of disputes in a dyad from 1995 to 2003 increases to 30 (USA – EU).

<sup>&</sup>lt;sup>19</sup> Relevant, in this context, means that a dyad has a positive probability of a trade conflict. For theoretical reasons, we opt for the zero-inflated model instead of the related hurdle model (King 1989a). The latter assumes that an event always occurs when a specific threshold is crossed. This

## **5. Results**

Figure 1 shows the results of a bivariate logit analysis of the relationship between bilateral trade and the probability of dispute initiation. It confirms that including bilateral trade flows in models of dispute initiation is crucial. While the probability of a dispute between dyads with a trade volume up to around 100 bn USD per year is very small, this probability then rises fast, and disputes in dyads trading more than 300 bn USD per year are virtually guaranteed.

### << Figure 1 about here >>

We start the full analysis with the cross-sectional models and then re-examine the findings based on zero-inflated count models. All models include trade and the squared value of the trade variable. This specification reflects the idea that the expected number of trade disputes increases less with rising bilateral trade. Statistical tests suggest that this specification is more appropriate than one without the squared term.

Tables 4.1 and 4.2 show the cross-sectional results. Models 1 and 2 include the directed relational power variables, which are included in hypothesis H2a. Models 3 and 4 include the undirected relational power variables, which are included in hypothesis H2b. Models 1 and 3 include GDP/cap, the first indicator for legal capacity; models 2 and 4 include delegation size instead of GDP/cap as a measure of legal capacity.

condition is not met in our empirical area. In the zero-inflated model, some dyads have a zero probability of becoming involved in a trade dispute, e.g. because they trade only very little, and hence can be classified into the "Always-zero" group. Dyads that trade more may be 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-zero" group. In practice, the estimates produced by the two models are often very similar (Zorn 1998).

As expected, bilateral trade volume has a statistically significant, positive effect in all four models. Together with the negative effect of the squared trade volume, the results imply that the expected number of trade disputes increases with more trade; and that the impact of an additional unit of trade on expected disputes increases less when the trade volume is high than when it is low.

Unlike relative economic size, relative trade dependence has a statistically significant effect, and this effect cuts against hypothesis H2a: the more trade dependent country A is relative to country B, the more likely it is that country A will initiate a trade dispute. The effect of directed relative GDP/cap on dispute initiation is negative, which also cuts against hypothesis H2a: if country A is richer than country B it is less likely to initiate a dispute against country B. By implication, if country A is poorer than country B, it is more likely to initiate a dispute against country B. The effect of relative delegation size points in the same direction, but is statistically insignificant.

The findings concerning effects of directed relative income and delegation size offer some indirect support for the argument by Guzman and Simmons (2005) that poorer countries, if at all they decide to initate a dispute, select richer countries as targets. However, the results for directed relative economic size are not compatible with this interpretation: less powerful countries (in terms of economic size) do not appear to select bigger markets as targets of WTO disputes. In summary, hypothesis H2a, which postulates that more powerful countries tend to initiate disputes against less powerful countries, can be rejected.

Hypothesis H2b, which postulates that we should see less dispute initiations in dyads marked by larger power differences, receives some support. Out of the six coefficients indicating whether there is a power preponderance effect, five have the expected negative sign, though only two of these coefficients are statistically significant at conventional levels: greater differences in trade dependence and greater differences in legal capacity (measured by delegation size) are associated with less dispute initiations. In other words, we observe that power matters. It is plausible, however, that this power

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effect does not indicate discrimination of weaker countries. Rather, it appears that the directed relative power effect, which cuts against hypothesis H2a, is also driving the effects of the undirected relative power variables, particularly in the case of trade dependence.

Democracy has a positive effect on dispute initiation in all four models. Democracies are more likely to be involved in trade disputes. The subset of dyads with trade conflicts is highly democratic. The estimated dispersion parameter,  $\hat{\alpha}$ , indicates that the conditional variance of the distribution of trade disputes exceeds the conditional mean by far.<sup>20</sup> The large value of this parameter suggests that there is a large degree of variation in the number of disputes across dyads that remains unexplained by models 1 through 4.

## << Table 4.1 about here >>

Compared to models 1 through 4, models 5 and 6 in Table 4.2 relating to hypotheses H1a and H1b perform better. The former hypothesis postulates that more powerful countries (in absolute terms) initiate more disputes. The latter claims that more powerful countries are more often targets of dispute initiation. The Bayesian Information Criterion (BIC) is considerably smaller for models 5 and 6 than for the previous models, indicating that these models fit the data much better.<sup>21</sup> The estimated parameter for overdispersion,  $\hat{\alpha}$ , drops from more than 8.3 for models 1 to 4 to less than 3.3 for models 5 and 6. This suggests that there is a much larger degree of unobserved heterogeneity across WTO dyads leading to differences in expected disputes in models 1 to 4. Large parts of this unobserved heterogeneity disappear in models that include absolute definitions of power.

<sup>&</sup>lt;sup>20</sup> The likelihood ratio test statistic suggests that the probability of falsely rejecting the null hypothesis of no overdispersion is practically zero.

<sup>&</sup>lt;sup>21</sup> This is the case although the BIC punishes the greater number of variables in models 5 and 6 fairly strongly and more than alternative measures of fit like the Akaike Criterion.

The trade effect in models 5 and 6 is statistically significant, but weaker than in models 1 to 4. This suggests that a considerable part of the estimated effect of trade volume in models 1 to 4 is due to variables capturing power in absolute terms.

The effect of trade dependence of country A vis-à-vis country B is negative, but statistical significance is rather low. This may indicate that complainants that are dependent on trade with the potential target country carefully choose the disputes they initiate. If an issue is very important for a country, it outweighs possible costs of dispute initiation emanating from high trade dependence. It also implies, however, that trade dependence of A has a weak, but slightly reducing effect on dispute initiation. In contrast, trade dependence of the defendant has a highly significant, negative effect. The more dependent country B is on trade with country A, the less likely it is to become the target of a trade dispute initiation by country A. In other words, while the former effect offers some, albeit weak support for hypothesis H1a, the latter finding strongly supports hypothesis H1b.

Economic size of both the complainant and defendant country has a highly significant and positive effect on dispute initiation. This finding supports both hypotheses H1a and H1b. That is, large economies are both more likely to initiate disputes and to become targets of dispute initiation. As to legal capacity, we find no substantive indication that poorer countries are less likely to initiate trade disputes. The second indicator for legal capacity, WTO delegation size, however, has a positive effect on dispute initiation, both for country A and B. That is, countries with larger WTO delegations are more likely to be involved in trade disputes as complainants or defendants. We will return to this result below, arguing that the causal effect might operate in the reverse direction: countries that are regularly involved in trade disputes have a larger delegation to deal with these disputes.

## << Table 4.2 about here >>

Figure 2 illustrates the substantive effects of economic size by relating the GDP of countries A and B to the probability of dispute initiation. It shows how the probability of at least one trade dispute

changes when the economic size of a country increases. The probability of experiencing trade dispute increases by about 1 percentage point when the economic size of A increases from the minimum to the maximum. Similarly, the probability of becoming the target of a dispute initiation increases by around 2 percent when the economic size of the defendant increases from the minimum to the maximum.

#### << Figure 2 about here >>

The substantive effect of economic size and also the other indicators for power (trade dependence, GDP/cap, delegation size) is rather small. This small effect is in part due to the fact that trade dispute initiations are very rare events (see Table 3 above). Marginal effects are also small because the mean of most variables is very low. If we fix the values of other variables at higher levels, the impact of the indicators for power on dispute initiation increases considerably, reducing the probability of no trade conflict even significantly more than 10% for certain specifications. But at the same time uncertainty about these effects (indicated by the confidence intervals) grows massively because there are only few dyads in these regions of the explanatory variables.

The marginal effect of income (GDP/capita) is essentially zero. Both per capita income of the complainant and the defendant have no substantive effect. Hypotheses H1a and H1b must be rejected when we use income as an indicator of legal capacity. In contrast, Figure 3 indicates that the effect of the second indicator for legal capacity (delegation size) is significantly larger than the effect of income per capita. Its magnitude is comparable to the size of the effect of economic size. When the delegation size of the complainant or the defendant increases from the minimum to the maximum, the probability of at least one trade dispute increases by 1.7% - 2%.

## << Figure 3 about here >>

These results raise some questions about the relationship between GDP/cap and delegation size. It is likely that, to a considerable extent, the size of WTO delegations reflects the extent to which a country has used the WTO dispute settlement procedure or expects to become involved in a dispute. That is, countries that are involved in trade disputes tend to expand their Geneva-based delegations. Conversely, countries less implicated in trade disputes have smaller WTO delegations, even if they could (in terms of their income level) maintain a larger delegation. This interpretation is consistent with Davis and Bermeo Blodgett (2007) who argue that countries initiate disputes more often when they have been participants in earlier disputes. In other words, our results suggest that legal capacity, measured either in terms of income or delegation size, has a small effect and does not prevent smaller and/or poorer countries from using the WTO's dispute settlement system.

We conclude by re-examining the results from the cross-sectional negative binomial models based on results from zero-inflated count models using panel data. Table 5 shows the results for a model that includes absolute indicators for power. Model 7 corresponds to model 6 in Table 4 since this model has, overall, the best model properties. The results shown in Table 5 confirm the earlier findings. The further decrease of the parameter  $\hat{\alpha}$  indicates that much of the overdispersion in the standard models in table 4 is due to the large number of zeros in the dataset. Accounting for excess zeros significantly reduces overdispersion (although not completely).<sup>22</sup> The signs of all coefficients point in the direction that we expected based on theoretical considerations.<sup>23</sup>

<< Table 5 about here >>

<sup>&</sup>lt;sup>22</sup> The likelihood ratio test still leads to the rejection of the null hypothesis of no overdispersion. The value of the Vuong statistic is 6.37 indicating that we should favor the zero-inflated over the standard model for the panel dataset.

<sup>&</sup>lt;sup>23</sup> The only exceptions are the coefficients for GDP of A in the inflation equation and delegation size of B in the count equation. But both coefficients are not statistically significant and suggest that the substantive effect is negligible. Note that the signs of the coefficients for the same variable should point into opposite directions across equations.

The zero-inflated count model offers additional information that cannot be obtained from the negative binomial models. The effect of trade volume is particularly large in the inflation equation, that is, the equation that estimates the probability that a country *never* gets involved in a trade dispute. Trade is, therefore, a precondition for disputes. The models also show that when we distinguish between the dispute-enabling and dispute-promoting effects of trade, the estimated dispute-promoting effect is considerably smaller than suggested by the negative binomial models. That is, more trade increases the probability of disputes, but more trade has only a weak effect in terms of increasing the actual number of disputes.

As expected, economic size of plaintiffs and defendants does not have dispute-enabling effects, but is a dispute-promoting factor. These variables show no substantive impact in the inflation equation, but influence the expected number of disputes. This result is consistent with the results from models 5 and 6 and supports hypotheses H1a and H1b. The same applies to the estimated influence of the retaliation variable. Whether or not a defendant country has previously filed a complaint against a potential plaintiff does not matter for the probability that a dyad never experiences a dispute. If, however, one country has initiated a dispute against another country, the expected number of disputes that the latter country initiates against the former country increases significantly.

Finally, delegation size has the expected effect and supports the view that it is primarily dispute-enabling, but not dispute-promoting. Potential target countries with larger delegations are less likely to be in the always-zero group, but delegation size does not affect the number of disputes. This finding is consistent with hypothesis H1b. The effect of delegation size of the potential plaintiff is statistically insignificant in both equations, which may be surprising at first glance, at least for the inflation equation. Yet, this finding cuts against discrimination claims: it appears that countries with small delegations do neither initiate nor become targets of disputes. At worst, countries with a small legal capacity may have backed down outside the WTO and therefore did not experience disputes.

However, an entirely different interpretation of the statistical result is based on the premise that, whereas the GDP/cap variable is clearly exogenous to dispute settlement, delegation size is not. In fact, delegation size is likely to reflect the risk of becoming involved into a trade dispute. Countries that have not been involved in disputes in the past and do not anticipate disputes in the forseeable future have small delegations. For those countries that have a positive probability of a trade dispute, delegation size does not matter. Though we remain unable to establish conclusively whether delegation size (the only indicator for legal capacity that has any significant effect on dispute initiation) is a cause or a consequence of dispute initiation, our findings suggest that the latter may be the case.

Table 6 summarizes the observed effects of absolute (hypotheses H1a and H1b) and relative (hypotheses H2a and H2b) indicators of power on the probability of dispute initiation. It indicates whether and to what extent each of the hypotheses is supported by empirical evidence.

<< Table 6 about here >>

# 6. Conclusion

The principal conclusion we draw from the analysis is that the gravity effect is considerably stronger than the discrimination effect. The models that include absolute indicators of power (models 5 and 6 in Table 4.2) perform considerably better. And in those models, trade volume and economic size of the complainant *and* target country have consistently positive effects on the probability of dispute initiation. In contrast, the effects of trade dependence and legal capacity are less consistent and weaker. In other words, if the discrimination effect had been stronger than the gravity effect, the statistical models should have produced much stronger support for hypotheses H2a and H2b; and we should have been stronger particularly in comparison to the effects of trade, and hypothesis H1b should have received

less support. All this is clearly not the case. Power does matter in the WTO dispute settlement system. But it appears to matter primarily in the sense that larger economies and country pairs that trade more "gravitate" towards trade disputes.

The causal mechanisms that inform our hypotheses on the effects of power on WTO dispute initiation involve considerations about bargaining outside the WTO that we cannot illuminate in our empirical analysis. Further empirical research should explore in greater detail interactions outside the WTO. A useful extension of our work could be to distinguish between conflicts that where settled outside the WTO and those cases that were carried into the WTO. Such research should also test propositions about the impact of court characteristics on incentives for "out-of-court" settlement (Gilligan et al. 2007). Moreover, WTO dispute settlement tends to be 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. Further research could construct models of dispute initiation that explicitly take into account that potential complainants, when deciding on 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 on whether to initiate or to escalate a conflict (Signorino 1999; Bas et al. Forthcoming). The issue of retaliation could also be dealt with in this context. The dummy variable used in most empirical work (including ours) is only a simple approximation of strategic behavior. Future research could, for example, analyze rivalries, reciprocity and strategic interaction in the dispute initiation phase using count models that consider interdependencies across observations (King 1989b: 201-207; 1989a).

The conventional wisdom, which holds that absence of evidence does not mean evidence of absence, applies to our research as well. Even after taking into account gravity effects, smaller and/or

poorer countries may still face disadvantages in WTO dispute settlement that our analysis fails to capture. While additional support for such countries by NGOs, the WTO secretariat, other international organizations (e.g. UNCTAD), or individual governments can certainly qualify as a no-regrets measure, it would still be useful to gather more systematic empirical evidence. Qualitative case studies on a larger scale would be required to this end. They would have to investigate whether smaller and/or poorer countries that experience costly trade restrictions by some other country(ies) avoid WTO dispute initiations primarily because of insufficient legal capacity and/or fear of reprisals by more powerful target countries.

Countries	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
EU	2	7	16	16	6	8	1	4	3	5	3	5	0	76
USA	6	17	17	10	10	8	1	4	3	4	1	3	4	88
Canada	5	3	1	4	2	1	3	4	1	2	0	1	2	29
Japan	1	3	1	1	2	1	0	2	0	1	0	0	0	12
Korea	0	0	2	0	1	3	0	1	3	2	0	1	0	13
other ICs	0	2	5	2	3	1	0	4	1	0	1	1	1	21
Total ICs	14	32	42	33	24	22	5	19	11	14	5	11	7	239
Brazil	1	0	4	1	0	7	4	5	0	0	0	0	1	23
Chile	1	0	1	0	0	1	3	2	1	0	1	0	0	10
India	1	4	0	3	1	2	2	2	0	1	0	1	0	17
Mexico	2	3	0	0	3	1	1	0	3	0	2	1	1	17
Other DCs	9	12	3	4	6	9	9	9	11	3	4	7	4	90
Other LDC	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Total DC	14	19	8	8	10	20	19	18	15	5	7	9	6	158
DC/IC	1.00	0.59	0.19	0.24	0.42	0.91	3.80	0.95	1.36	0.36	1.40	0.82	0.86	0.66

Table 1: Dispute Initiations in the WTO System

Note: IC=industrialized country; DC=developing country; LDC=least developed country. Some disputes involve more than one complainant, hence the number of dispute initiators (397) is larger than the number of disputes (369). Source: <u>www.wto.org</u> and Leitner and Lester (2008).

Ta	able	2:	<b>Summary</b>	Statistics
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Variable	Oha	Maan	Std Day	Min	Mov
Vallable	OUS	Mean	Std. Dev.		Iviax
Trade	60560	0.995	11.128	0.000	441.165
GDP of A	60560	0.506	1.580	0.001	10.205
GDP of B	60560	0.507	1.580	0.001	10.205
Directed rel. econ. size	60560	0.500	0.366	0.000	1.000
Undirected rel. econ. size	60560	0.334	0.150	0.000	0.500
Dependence of A	60560	0.003	0.022	0.000	0.901
Dependence of B	60560	0.003	0.022	0.000	0.901
Directed rel. dependence	60560	0.000	0.030	-0.900	0.900
Undirected rel. dependence	60560	0.006	0.030	0.000	0.900
GDP/cap of A	60560	0.009	0.009	0.000	0.036
GDP/cap of B	60560	0.009	0.009	0.000	0.036
Directed rel. GDP/cap	60560	0.501	0.286	0.010	0.990
Undirected rel. GDP/cap	60560	0.249	0.139	0.000	0.490
Delegation size of A	60560	5.962	4.522	0	23.000
Delegation size of B	60560	5.970	4.522	0	23.000
Directed rel. del. size	60556	0.500	0.222	0	1.000
Undirected rel. del. size	60556	0.180	0.129	0	0.500
Democracy of A	60560	4.605	5.870	-10.000	10.000
Democracy of B	60560	4.604	5.856	-10.000	10.000

Note: The table shows the summary statistics for the directed annual dyads, i.e. for the time-series cross-section dataset. We compute these values using the observations underlying the estimation results in Table 5.

Dispute		
initiations	Frequency	Probability
0	82'090	99.71
1	190	0.23
2	34	0.04
3	8	0.01
4	6	0.01
5	1	0.00
6	1	0.00
8	2	0.00
Total	82'332	100

Table 3: Frequency and probability distributions of trade dispute initiation

Note: The table only includes observations for dyads with a positive bilateral trade volume.

Figure 1: Effect of trade volume on dispute initiation



	Model (1)	Model (2)	Model (3)	Model (4)
Trade	0.157***	0.156***	0.183***	0.177***
	(0.021)	(0.021)	(0.028)	(0.028)
Trade (squared)	-0.0004***	-0.0004***	-0.0005***	-0.0004***
	(0.000)	(0.000)	(0.000)	(0.000)
Directed rel. dependence	4.491***	3.900***		
	(1.341)	(1.301)		
Undirected rel. dependence			-7.647**	-6.257
			(3.611)	(3.860)
Directed rel. econ. size	0.351	0.385		
	(0.270)	(0.352)		
Undirected rel. econ. size			-0.252	0.324
			(0.747)	(0.769)
Directed rel. GDP/cap	-0.988**			
	(0.387)			
Undirected rel. GDP/cap			-0.977	
			(0.820)	
Directed rel. deleg. size		-0.838		
		(0.547)		
Undirected rel. deleg. size				-2.386**
				(0.982)
Democracy of A	0.310***	0.275***	0.254***	0.259***
	(0.045)	(0.038)	(0.034)	(0.035)
Democracy of B	0.181***	0.201***	0.206***	0.208***
	(0.031)	(0.033)	(0.035)	(0.034)
Constant	-9.574***	-9.513***	-9.291***	-9.352***
	(0.488)	(0.503)	(0.534)	(0.510)
â	8.70	8.78	8.59	8.39
N	9928	9109	9928	9109
$\chi^2$	210.47	204.18	242.90	202.94
$\Pr < \chi^2$	0.000	0.000	0.000	0.000
BIC	1456.33	1455.33	1455.10	1447.77
Log Likelihood	-686.75	-686.64	-686.14	-682.86

Table 4.1: Cross-sectional models (negative binomial model) including relative power variables

Robust standard errors cluster on dyads and are listed in brackets below coefficients \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

	Model (5)	Model (6)
Trade	0.062***	0 046***
Truce	(0.014)	(0.010)
Trade (squared)	-0.0001***	-0.0001***
	(0.000)	(0.000)
Dependence of A	-6.970*	-6.615*
1	(4.043)	(3.660)
Dependence of B	-8.644***	-8.342***
-	(3.163)	(2.862)
GDP of A	0.272***	0.167***
	(0.041)	(0.045)
GDP of B	0.323***	0.218***
	(0.046)	(0.046)
GDP/cap of A	-3.825	
	(12.346)	
GDP/cap of B	-4.713	
	(12.136)	
Delegation size of A		0.083***
		(0.017)
Delegation size of B		0.078***
-		(0.017)
Democracy of A	0.251***	0.216***
	(0.038)	(0.031)
Democracy of B	0.178***	0.158***
	(0.032)	(0.030)
Constant	-9.730***	-10.410***
	(0.428)	(0.406)
â	3.22	2.84
Ν	9928	9111
$\chi^2$	497.49	532.08
$\Pr < \chi^2$	0.000	0.000
BIC	1400.47	1369.74
Log Likelihood	-645.01	-630.17

Table 4.2: Cross-sectional models (negative binomial model) including absolute power variables

Robust standard errors cluster on dyads and are listed in brackets below the coefficients. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01





Note: The two graphs are based on model 5; bilateral trade and democracy variables are set to 10; the other explanatory variables are kept at their means. Democracy and trade are not held at their means because there are hardly any non-democracies that are involved in trade disputes, and countries with little trade usually do not get involved in trade disputes. Holding democracy at the mean, i.e. a Polity IV score of around 4, implicates that the probability of a trade dispute is essentially zero and the effect of all other variables is extremely small.



Figure 3: Marginal Effect of WTO Delegation Size

Note: The two graphs are based on model 6; bilateral trade and democracy variables are set to 10; the other variables are kept at their means; the scale of the y-axis is the same as for Figures 2.

	Model 7			
	Inflation equation	Count equation		
Trade	-0.587***	0.010**		
	(0.216)	(0.005)		
Trade (squared)	0.001***	-0.000		
	(0.000)	(0.000)		
Dependence of A	3.406	-2.950**		
	(8.889)	(1.418)		
Dependence of B	77.143***	-2.448		
	(24.053)	(1.635)		
GDP of A	-0.005	0.118**		
	(0.100)	(0.047)		
GDP of B	0.071	0.133**		
	(0.114)	(0.061)		
Delegation size of A	-0.071	0.008		
	(0.046)	(0.031)		
Delegation size of B	-0.128**	-0.029		
	(0.055)	(0.027)		
Democracy of A	-0.127*	0.085**		
	(0.075)	(0.042)		
Democracy of B	-0.135*	0.050		
	(0.072)	(0.046)		
Retaliation	-0.897	0.792***		
	(1.187)	(0.210)		
Constant	6.623***	-3.989***		
	(1.089)	(0.918)		
$\hat{lpha}$	0.9	952		
N (all / nonzero)	60320	) / 240		
$\chi^2$	85.87			
$\Pr < \chi^2$	0.000			
BIC	247	2.56		
Log Likelihood	-109	98.64		

 Table 5: Panel data model (zero-inflated negative binomial model) including absolute power variables

The inflation equation estimates the probability that a dyads never becomes involved in a trade dispute (belongs to the 'Always-zero' group). The count equation estimates the expected number of trade disputes, weighted by the probability that a dyad belongs to the 'Not Always-zero' group. Robust standard errors cluster on dyads and are listed in brackets below the coefficients; \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

# **Table 6: Summary of Empirical Results**

	Economic size effect	Trade dependence effect	Legal capacity effect
H1a	Strong support	Some, albeit weak support	GDP/cap: no support
			Delegation size: some,
			albeit weak support, but
			direction of causality
			problematic
H1b	Strong support	Some support	GDP/cap: no support
			Delegation size: some
			support, but direction of
			causality problematic
H2a	No support	No support	GDP/cap: no support
			Delegation size: no support
H2b	No support	Some, albeit weak support	GDP/cap: no support
			Delegation size: some
			support, but direction of
			causality problematic

H1a: More powerful countries are more likely to initiate disputes.

H1b: More powerful countries are more likely to become targets of dispute initiation.

H2a: More powerful countries are more likely to select less powerful countries as targets of dispute initiation. Less powerful countries are less likely to select more powerful countries as targets of dispute initiation.

H2b: Country pairs characterized by larger power differences are less likely to experience dispute initiations.

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