

# Free Trade Agreements and Trade Disputes

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## Abstract

This paper investigates the effects of the formation of free trade agreements (FTAs) on trade disputes. We construct a unique and comprehensive dataset on inter-country trade disputes from 1995 to 2007. The dataset covers 110 countries and 1130 trade disputes. We find that the incidences of trade disputes between two countries are positively associated with economic size, economic growth, and trade shares, thereby lending partial support to the “capacity hypothesis” in the dispute literature. More importantly, we obtain that FTAs between two countries reduces the occurrences of trade disputes between them. We also find that FTAs relying on the WTO dispute settlement mechanism further reduce trade disputes between their members compared to FTAs without provisions on trade dispute settlement. By contrast, the dispute-reducing effect is mitigated in FTAs which have their own dispute settlement mechanisms. The main results are robust to the control for possible measurement error and endogeneity problem.

*Keywords:* Trade disputes; Trade conflicts; Dispute settlement; WTO; FTA

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# Free Trade Agreements and Trade Disputes

## 1. Introduction

Trade disputes or trade conflicts occur frequently between trading partners. Based on the data that we have collected, 1130 trade disputes involving 110 countries occurred from 1995 to 2007. Trade conflicts occur even between “friendly” countries that have free trade agreements (FTAs).<sup>1</sup> For example, 83 trade disputes occurred between Canada and the United States from 1995 to 2007.<sup>2</sup> Undoubtedly, trade disputes matter both economically and politically. Even a small piece of trade dispute could cause enormous political damages. For instance, the well-known banana war between the European Union and Latin American countries had caused much hidden damage.<sup>3</sup>

In fact, the WTO’s Dispute Settlement Body (DSB) has been receiving disputes from member countries since the inception of the body in 1995. By the end of 2010, the DSB has received more than 400 disputes, which dwarfs the total of all disputes under the whole period of the General Agreement on Tariffs and Trade (GATT) (1947–1994). The recent two decades have seen increasing number of FTAs established and like the WTO which has DSB for member countries to solve trade disputes, most of the FTAs embed dispute settlement provisions. It is important to understand what factors affect the frequency of trade disputes and how the formation of FTA affects the occurrence of trade conflicts between member countries. These two issues have not been systematically investigated previously. In this paper, we construct a unique and comprehensive dataset on trade disputes to address these concerns.

There are empirical studies that explore the determinants of trade dispute initiations. However, all those studies are based on *WTO disputes* (including GATT disputes), that is, disputes registered with the WTO Secretariat (and the GATT for GATT disputes).<sup>4</sup> Among all possible trade disputes, which we call *primary trade disputes* (or just trade disputes for simplicity when there is no confusion), the WTO disputes are “not just the tip, but the tip of the tip of the iceberg” (Horn and Mavroidis, 2006). Based on our calculation, WTO disputes from 1995 to 2007 account for only 30% of the total trade disputes. No inference about the determinants of trade dispute initiations can be drawn based on conclusions obtained from those existing studies.<sup>5</sup> One of the objectives of this paper is to fill this gap in the literature by addressing those issues based on *primary* trade disputes. We construct the first

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<sup>1</sup> We use the term “FTA” broadly in this paper. FTA also includes both free trade agreements and customs unions.

<sup>2</sup> The number is obtained based on the dataset we use in the present study.

<sup>3</sup> The initial complaint was brought by four Latin American countries and the US in July 1991. They complained that EU’s tariff-quota system on banana import is preferential to its former colonies in Africa and discriminates against Latin American exporters. The past 20 years have seen enough political drama on the banana war although the total export value of bananas was not even close to 4 billion for Latin American countries until 2008. The banana case is the most legally complicated and politically contentious in the history of GATT/WTO, and had taken so long that many people who worked on this case retired long before its final closure. When the EU and 11 Latin American countries signed the agreement, which put the banana issue to a rest on Nov 8, 2012, the WTO Director-General Pascal Lamy could not help but hailed that “this is a truly historic moment” (Details from WTO 2009 Press Release Press/591).

<sup>4</sup> See the survey by Horn and Mavroidis (2006).

<sup>5</sup> Horn and Mavroidis (2006) conclude, at the end of their survey, that the generalization problem is the most serious drawback of the literature.

dataset of all possible trade disputes by keyword search in Factiva, one of the largest global digital business archives in the world. Factiva provides access to news articles that appear in over 36,000 newspapers, trade presses, magazines, newswires, television and audio transcripts, and web and social media in 200 countries. We do not deny that there might be inevitable media bias, especially in non-democratic countries or countries which have censorship. However, trade disputes at government level are big news for any country and so there is a fair chance that some sort of news would be reported in at least one party of the disputing countries. Based on some criteria (discussed in detail later), we obtain 1130 disputes from 1995 to 2007 that involves 110 countries.

Several important results emerge from our research. First, size matters. When looking at primary trade disputes, we find that a “larger” country (larger GDP, larger GDP per capita, larger export share or larger import share) gets involved in more trade disputes, both as plaintiff and as defendant.<sup>6</sup> Second, friendship (or relationship in general) matters. Based on primary trade disputes, we find that FTAs reduce trade disputes among their member countries. Lastly, dispute settlement mechanism matters. The effect of FTA on all trade disputes varies with the type of dispute settlement mechanism associated with the FTA. We find that FTAs requiring members to bring disputes to the WTO for settlement decrease trade disputes the most compared to the FTAs with no specific dispute settlement provisions. By contrast, the dispute-reducing effect of FTA is mitigated in FTAs that use their own dispute settlement forum and those that allow members to choose either their own forum or the WTO’s DSB. Our findings are robust to various measures of trade dispute frequency, different estimation approaches, and possible reverse causality.

This paper makes several important contributions to the literature. First, this study is the first to provide a systematic empirical analysis on the determinants of all possible trade disputes. Empirical literature on the determinants of participation of countries in trade disputes and conflicts is available, but most studies are exclusively based on GATT/WTO disputes. Horn et al. (2005) is the first to study the participation issue in the WTO dispute settlement. The authors find that the number of the trade dispute initiations can be explained fairly well by the volume of trade and the diversity of trade partners. Bown (2005) substantially refines the study of Horn et al. (2005) and identifies potential (but not real) dispute target country. He shows that retaliatory and legal power also matter. Horn and Mavroidis (2006) provide a good survey of this literature before 2006. The two main hypotheses examined empirically are “capacity hypothesis” and “power hypothesis,” in which the former finds stronger support than the latter. The export value, development level, and democratic system of a country can determine the distribution of the number of WTO disputes across countries. Grinols and Perrelli (2006) indirectly examine the role of dispute settlement mechanism by using the 1975–2000 US dispute data to conduct an event history analysis and show that the WTO increases the incident of US trade disputes and shortens their lifespan.<sup>7</sup> They find that the increase in the incidents of trade disputes is not just caused by the increase of trade flows or the increase in membership of the WTO,

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<sup>6</sup> The results hold when the number of disputes is measured in terms of per dollar trade.

<sup>7</sup> Grinols and Perrelli (2006) also use US trade disputes from the USTR Section 301 in addition to the GATT/WTO disputes.

and thus, their results imply that the improved dispute settlement mechanism of the WTO is also responsible.

Bown (2004a) classifies existing empirical studies on trade disputes into two groups, in which one focuses on the initiation of trade disputes (in particular, the number and frequency) and the other on outcome of trade disputes. Most of the studies belong to the first group, as this paper does.<sup>8</sup> Bown (2004b) also points out the potential bias of conclusions based on WTO disputes. Our paper examines primary trade disputes instead of only WTO disputes. In addition, this paper covers more countries than any existing paper.

Second, our paper is among the first to unveil additional benefits of FTAs. The literature on FTA focuses on incentives of forming FTA on the one hand and implications of FTA formation for trade flows and investment on the other hand.<sup>9</sup> As a supplement, we examine the impact of FTA on trade disputes. Two papers are closely related to our paper in this regard. Based on WTO trade disputes from 1995 to 2000, Bown (2005) reports that countries tend to participate less in disputes against other members of the same preferential trade agreement to which they belong. He suggests that the result may be due to that trade disputes would worsen the relations of PTA member countries or that the PTAs have their own dispute settlement mechanisms. Similarly, Prusa and Teh (2010) examine the effects of PTAs on a special type of trade disputes, namely, dumping and anti-dumping (AD), and show that PTAs decrease the AD filings against PTA member countries but increase those against non-PTA members. They find that their result is due to the built-in AD clauses in PTAs, rather than the concern of their relationship or goodwill.

Our study is different from these two in an important way. We show that the dispute-reducing result of FTA also exists in primary trade disputes and not only in WTO trade disputes as they suggested. More importantly, we carefully examine this causal effect by using an instrumental-variable (IV) approach because relationship between countries could affect the incentive to form an FTA. Considering that some FTAs have their own dispute settlement clause, whereas others do not, we can also show that the built-in dispute settlement mechanism is not the sole reason behind the dispute-reducing result of FTA, thereby leaving a partial explanation to the goodwill of FTA members.

Third, our paper empirically explores the differential roles of dispute settlement mechanism imbedded in FTA. According to the classification by Horn and Mavroidis (2006), empirical research on WTO trade disputes fall under two main themes, which are determinants of participation/initiation in disputes and impact of GATT/WTO dispute settlement mechanism.<sup>10</sup> The main result of our paper is related to the former theme, but we also examine how FTAs with different dispute settlement mechanisms affect participation in disputes.

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<sup>8</sup> Bown (2004a, 2004b) are two studies on outcomes of disputes. Bown (2004a) shows that developing countries as plaintiffs in dispute resolution are more successful under the WTO than under the GATT.

<sup>9</sup> Examples of empirical studies on the formation of FTAs include Baier and Bergstrand (2004), Egger and Larch (2008), and Chen and Joshi (2010). Examples about the impact of FTA on trade and FDI include Baier and Bergstrand (2007, 2009), MacDermott (2007), Baltagi et al. (2008), and Medvedev (2012).

<sup>10</sup> The impact of dispute settlement mechanism includes the effects on participation in disputes (Bown, 2005) and on the economic outcome of disputes (Bown, 2004b).

Blonigen and Bown (2003) find evidence that in the US, the WTO dispute settlement mechanism reduces positive decisions made by the AD authority using US AD data from 1980 to 1998. Grinols and Perrelli (2006) look at how improved dispute settlement under the WTO affects the initiation of trade disputes by the US from 1975 to 2000 by using the cases initiated under US Section 301 system and under the GATT/WTO. Their results show that besides trade share, the WTO increases the initiation of trade disputes, but shortens their lifespan.

Another difference of our paper from the existing literature is our examination of the effects of dispute settlement mechanism associated with FTAs. We find that compared to the benchmark case in which FTAs do not have any dispute settlement provision, FTAs requiring their members to resolve disputes through the WTO further decreases the disputes among their members. By contrast, FTAs with their own dispute settlement forum or have duplicate settlement forums partially offset the dispute-reducing effect of FTA formation. Our results are different from Prusa and Teh (2010), who find that PTAs with AD rules reduce intra-PTA AD filings, but PTAs without AD rules *increase* (statistically insignificant though) intra-PTS AD filings.

The rest of the paper is organized as follows. Section 2 presents the empirical model and motivation. Section 3 describes our data. Section 4 contains the main empirical analysis. Section 5 discusses the endogeneity problem by using IVs and the propensity score matching (PSM) method. Section 6 examines the effects of dispute settlement mechanism associated with different types of FTAs, and Section 7 provides the conclusion.

## 2. Empirical Model

Existing studies have produced various results on the determinants of the participation of countries in WTO trade disputes. Horn et al. (2005) report that the number of trade dispute initiations can be explained fairly well by the volume of trade and the diversity of trade partners. However, Bown (2005) shows that measures of the retaliatory or legal capacity of a country also matter. To investigate how FTA relationship affects the frequency or occurrence of primary trade disputes, we propose the following reduced-form empirical model:

$$E(DISPUTE_{ijt} | FTA, X, t) = \exp(\alpha_0 + \alpha_1 FTA_{ijt} + \lambda X + \varepsilon_{ijt}), \quad (1)$$

where  $DISPUTE_{ijt}$  is the number of primary trade disputes initiated by country  $i$  against country  $j$  in year  $t$ ;  $FTA_{ijt}$  is the FTA dummy variable which is equal to 1 if countries  $i$  and  $j$  belong to the same FTA in year  $t$  and zero otherwise;  $\mathbf{X}$  is a vector of explanatory variables in addition to FTA; and  $\varepsilon_{ijt}$  is the error term.

Besides the FTA dummy, we have classified our explanatory variables  $\mathbf{X}$  into three groups: macroeconomic variables ( $X_1$ ), trade variables ( $X_2$ ), and other control variables ( $X_3$ ). The decision of whether to initiate a piece of trade dispute is the trade-off between the potential benefit

from litigation, the probability of winning and the litigation costs, political economy costs and capacity to absorb costs. We discuss all explanatory variables and their possible effects on trade dispute initiation below.<sup>11</sup>

### **FTA relationship: $FTA_{ijt}$**

Formation of FTA could influence the initiation of trade disputes in many ways. On the one hand, the increased trade volume following the signature of FTA may result in more disputes. Trade liberalization under FTA is very comprehensive and inevitably covers some sensitive industries, which often induces more lobbying activities in those industries, demanding for various forms of trade protection. As a result, more trade disputes will occur. On the other hand, formation of FTA may provide a more flexible and/or efficient way to handle trade tensions, so that spat on trade does not necessarily develop into formal trade disputes. Moreover, countries may choose to complain less against their FTA partner countries simply to symbolize their “friendly” relationship. In fact, there are as many stimulating factors as restraining forces in FTA which might affect the initiation of trade disputes. Therefore, the net effect is ultimately an empirical question. While we do not have a prior, Bown (2005) hypothesizes that a country is less likely to initiate a formal dispute against FTA partner countries in the WTO because it would worsen relations or because the FTA agreement contains its own dispute settlement provisions.

### **Macroeconomic variables: vector $X_1$**

The macroeconomic variables of the complaining country directly relates to its capacity to initiate trade disputes. Larger countries have more resources to use in activities related to trade disputes and to cover the costs of dispute settlement compared to smaller countries. We employ two proxies of complaining country’s litigation capacity. One is  $GDP_{it}$ , i.e. the gross domestic production of country  $i$  in year  $t$ , measuring the overall capacity of a country to absorb any dispute related costs. The other is  $GDPPC_{it}$ , i.e. the GDP per capita of country  $i$  in year  $t$ , measuring the income level of the complaining country and its average capacity to absorb dispute costs. We expect that larger countries in terms of GDP or GDP per capita would initiate more trade disputes.

The macroeconomic variables of the defendant country also matter. If country  $j$  has a higher level of GDP and/or GDP per capita, it has greater capacity to absorb the costs of being litigated, it has more resources to fight against disputes, but its large market may also attract more “attacks” because other countries could benefit more if they win the dispute. Accordingly, we include both  $GDP_{jt}$  and  $GDPPC_{jt}$  in our regression model.

The inclusion of GDP and GDP per capita also helps control for the economic development level

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<sup>11</sup> Various combinations of these variables are used by different authors, for example, by Prusa and Teh (2010) in studying the impact of PTAs on anti-dumping, Bown (2004c) in studying the initiation of trade dispute, Bown (2005) in studying the participation issue of WTO’s DSB, and Grinols and Perrelli (2006) in studying the incident and lifespan of US trade disputes.

of each country. Countries with different income levels may have different trade patterns or trade products. Occurrence of trade disputes may be associated more with some products of trade than the others. Both Horn et al. (2005) and Bown (2005) treat GDP as an important determinant of WTO trade disputes.

The growth rate of GDP can also be related to trade dispute. A more rapidly growing country is more likely to be targeted in trade disputes due to its expanding export penetrating into other countries' markets. In return, it may also initiate more complaints on the importing countries' protection. Thus, we have both  $GDPGR_{it}$  and  $GDPGR_{jt}$  in our regression. Knetter and Prusa (2003) have found that GDP growth rate have significant negative impact on anti-dumping filings, i.e., a fall in GDP growth results in an increase in AD filings.

### **Trade variables: vector $X_2$**

Bilateral trade value:  $EXPORT_{ijt}$  and  $IMPORT_{ijt}$  are the value of country  $i$ 's export to and import from country  $j$  in year  $t$ , respectively. It is obviously that a pair of countries would not have any trade dispute if they do not have any trade between themselves. It is then expected that higher value of bilateral trade leads to more trade disputes. In fact, trade values have been found to be crucial determinants of trade disputes by Horn et al. (2005). Grinols and Perrelli (2006) also show that the rise of US trade dispute initiation can be partially attributed to increasing trade volume.

Trade shares:  $EXSHARE_{jit}$  refers to the share of country  $i$ 's export to country  $j$  in country  $i$ 's total export in year  $t$ ;  $EXSHARE_{ijt}$  is the share of country  $j$ 's export to country  $i$  in country  $j$ 's total export in year  $t$ . These two variables represent the relative importance of the bilateral trade relationship between countries  $i$  and  $j$ .  $EXSHARE_{jit}$  measures the market diversification of country  $i$ 's export. The potential benefit is larger for the plaintiff if it has higher export concentration in the targeting country (higher  $EXSHARE_{jit}$ ).  $EXSHARE_{ijt}$  is a proxy for the capacity of the plaintiff to retaliate credibly if the defendant country fails to abide by the rules mentioned in the dispute, which positively affects the probability of realizing benefits from initiating a dispute. Thus, the expected coefficients on the two trade share variables are positive. Bown (2005) finds positive coefficients of these two shares on the participation of trade disputes in WTO. Grinols and Perrelli (2006) have shown that opponent's trade share has positive effect on US's initiation of trade disputes in both the WTO and its Section 301 cases.

### **Other control variables: vector $X_3$**

Exchange rates:  $REER_{it}$  and  $REER_{jt}$  are the real effective exchange rates of countries  $i$  and  $j$  in year  $t$ , respectively. When country  $i$ 's currency is weak ( $REER_{it}$  is large), import is low and export is strong, which makes country  $i$  less likely to initiate trade complaints against country  $j$ . Thus, the sign of  $REER_{it}$  is expected to be negative; conversely, the sign of  $REER_{jt}$  is positive. Knetter and Prusa

(2003) find that a real appreciation of a country's currency leads to more AD filings from the country.

Trade barrier:  $MFN_{it}$  and  $MFN_{jt}$  refer to the simple average value of the most-favored-nation (MFN) tariff rates of countries  $i$  and  $j$  in year  $t$ , respectively. Normally, country  $i$  complains against country  $j$  when the latter deviates from its committed openness level (e.g., MFN). Country  $j$  is more likely to deviate if its committed tariff level is lower, and thus, country  $i$  is more likely to complain against country  $j$ . That is, the expected estimate of  $MFN_{jt}$  is negative. In contrast, if country  $i$ 's committed tariff level is high, it may represent the fact that the country is a very protectionist and so may initiate more disputes. The implication is that the expected estimate of  $MFN_{it}$  is positive.

WTO membership:  $WTO_{it}$  and  $WTO_{jt}$  are the dummy variables that indicate the WTO membership of countries  $i$  and  $j$  in year  $t$ , respectively. WTO member countries are supposed to comply better with the trading rules, and thus, have fewer trade disputes compared to non-members. However, the dispute settlement mechanism of the WTO seems to encourage member countries to bring trade disputes to the WTO. Thus, the effect of WTO membership on trade disputes is ambiguous. We follow Grinols and Perrelli (2006) to include the WTO membership of both countries.

Country pair time-invariant variables:  $BORDER_{ij}$  is a dummy variable that is equal to unity if country  $i$  and country  $j$  share a land border, and zero otherwise.  $COMLANG_{ij}$  is a dummy variable that is equal to unity if country  $i$  and country  $j$  have a common official language.  $COLONY_{ij}$  is a dummy variable that is equal to unity if country  $i$  and country  $j$  ever had a colonial relationship.  $DIST_{ij}$  refers to the distance between country  $i$  and country  $j$ . These common gravity-type variables might influence trade disputes for cultural and geographical reasons. However, we are not aware of any theory on how these variables might affect trade disputes. We would let data inform us.

### 3. Data

Our sample period spans from 1995, the year of WTO establishment, to 2007.

The data for the independent variables are easily obtained. Each country-pair's FTA status ( $FTA_{ijt}$ ) is available in the WTO Regional Trade Agreement Database. The data for the main economic variables, including GDP, GDP per capita, GDP growth rates, total import, total export, tariff rates, and exchange rates, are available from World Development Indicator (WDI) of the World Bank. Bilateral trade data can be extracted from the United Nations (UN) COMTRADE Database, and information with regard to bilateral border, distance, language, and colonial relationship can be obtained from the CEPII Gravity Dataset.

We now focus on the dependent variable, i.e., the primary trade disputes ( $DISPUTE_{ijt}$ ). In general, there are three sets of trade disputes. The first set is the WTO trade disputes. The WTO keeps full record of each dispute requiring consultation at DSB. Most of studies on trade disputes use the WTO dataset (Horn et al., 2005; Bown, 2004a, 2004b, 2004c; and Bown, 2005). The second set is the regional trade disputes. Countries belonging to the same region, group or agreement may choose to bring their disputes to the regional forums for resolution. For instance, the dispute settlement panel of the NAFTA (North American Free Trade Agreement), one of the most important trade bloc in the



world, had received and ruled on 372 cases of trade disputes within the three signatory countries, US, Canada and Mexico by August 28, 2014. The detailed data is available from NAFTA Secretariat website. The third set is what we call the primary trade disputes. This set includes all reported trade disputes covered by the Factiva's news resource, and in theory, it should include disputes in the first two sets as its subsets.

Unfortunately, unlike the first two sets of trade disputes, data for the third set is not directly available. As a contribution to the literature, we search, collect and construct the first dataset of primary trade disputes. Our first-hand materials are *news reports*. The source is the Factiva Database, one of the largest global digital business archives in the world.

There are several merits associated with the Factiva Database. First, the Factiva Database has a wide coverage in terms of both countries and news sources. It provides access to news articles that appear in over 36,000 newspapers, trade presses, magazines, newswires, television and audio transcripts, and web and social media in 200 countries. Second, the Factiva Database includes both global news and local news reported by big news agencies including Associated Press and Reuters. These large news agencies have offices in most countries so that news reports are relatively uniform in terms of subject and unbiased geographically. Third, although the Factiva Database is based on English articles, major news agencies from non-English speaking countries often provides English version of their news articles in Factiva. Examples are Jiji Press of Japan and Xinhua News Agency of China. This helps reduce the language bias. To sum up, the widely covered database of Factiva allows us to search for almost all of the trade disputes in the world.

News reports are surely biased one way or another. The question is whether and how the bias affects the representation of our dataset and therefore the issues studied in the present paper. In the case where the biases are likely to affect the results of our analysis, we would try every way to tackle the problem. Most news reports and critics are biased, if they are, in ideology. We believe ideology is unlikely to affect our study as we rely on the number of trade disputes rather than the outcome or the content of the disputes.

News reports and critics may also be biased in other aspects. For example, the Factiva sources may be disproportionately covering more high-income and larger countries than less developed and smaller countries. News agencies in developed countries are more independent from the governments and because of that they could be more likely to pick up and report trade disputes than their counterparts in some countries where state-owned news agencies dominate. This bias may result in more disputes associated with developed countries on either side, as a plaintiff or a defendant, than those associated with developing countries.

Factiva may have better coverage of subnational news publications in developed countries than in developing countries. In many developed countries, Factiva include both national and subnational local news publications. In contrast, in less developed countries, Factiva covers primarily national and some local news publications. Such a variation of coverage across country is a serious concern for some studies using media data, but it is not a big concern in our study because our key variable, the

number of trade dispute, is from country-level or international level news. Unlike news on firms or industries, national level news are likely to be picked up by all types of news publications, at least in one of the countries to that a dispute is related.

Given the concern of media overrepresentation bias (for whatever reason) in developed countries, we will conduct two subsample tests on developed countries and developing countries, respectively. The results indicate that the potential media bias does not cause a problem in our present study.

## **Methodology and Data Description**

In constructing our database, we adopt a simple search mechanism. We first search the key word “*trade disputes*” in the Factiva Database for the period of 1995/01/01 to 2007/12/31. We exclude reports/articles under the subject “sports/recreation” and “trend/analysis” since “trade disputes” mentioned in those subjects are not real trade disputes. With this criterion, we obtain 23,149 reports/articles in total. We then screen the text of each article, in particular the text around the keyword to determine whether the dispute mentioned in the article is really a trade dispute. To this end, we follow the WTO definition on trade dispute closely. Specifically, a case is counted as a trade dispute if it involves one country’s government explicitly expressing that another country is violating an agreement on trade or its commitment made in the WTO or some regional trade agreements.<sup>12</sup> Once a case satisfies the above definition, we record it as one dispute and extract some relevant information such as to the country of the plaintiff and that of the defendant. When information is available, we also record the issue of each dispute (e.g., tariff, subsidy and dumping) and the settlement or proposed settlement approach.

There are several remarks about our data search process.

First, we take a very simple approach to identify and record disputes. For example, we record a US dispute against Japan on telecommunication market access when we find one article reporting something like “the US government is complaining that the telecommunication market in Japan is discriminate against US companies...”. However, some cases are connected. For example, in our collected articles from Factiva, we find one article in 1998 reporting “the US government complained that Canada was subsidizing its dairy industry...” , and another article in 1999 reporting “Canada denounce the countervailing duty that US imposed on dairy import from Canada is unfair...”. These two disputes are connected to the same case in which the US first initiated a complaint, then took action, and finally Canada complained. We do not attempt to link them together. What we do is to record this as two independent disputes: a US dispute against Canada in 1998 and a Canadian dispute against US in 1999. This approach could in some sense result in overestimate of the frequency of trade disputes, but on the other hand it serves the exact purpose of representing the number of complaints initiated by a country against another for whatever reason. Moreover, our approach is intrinsically consistent with the WTO practice, where countries could request the WTO consultation on the same subject when the ruling on a previous case is not carried out or when there are new

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<sup>12</sup> WTO website, [http://www.wto.org/english/tratop\\_e/dispu\\_e/dispu\\_e.htm](http://www.wto.org/english/tratop_e/dispu_e/dispu_e.htm), extracted on Aug 27, 2012.

features of the case. The banana dispute against the EU is a case at point, where DS16, DS27, and DS 158 are three separate cases on EU's banana import regime filed in the WTO.

Second, we restrict the search to the period of 1995/01/01 to 2007/12/31. We deliberately choose 1995/01/01 as our starting date because it was the day when the GATT was transformed to the WTO. The establishment of the dispute settlement mechanism in the WTO might fundamentally change member countries' trade disputes. Since the global financial crisis started in the year of 2008 and the subsequent "great trade collapse" might affect countries' behavior on trade disputes initiation, we choose 2007/12/31 as the end date. We believe that a thirteen-year period is a reasonably lengthy panel in our empirical studies.

Third, we have done some searching using some synonyms of "trade disputes" before finally deciding to adopt "trade disputes" as the keyword. We have tried "trade dispute", "trade conflict", "trade conflicts", "trade war" and "trade wars", but these searches produce fewer outcomes than "trade disputes". For example, "trade conflict" yields only 1,600 pieces of news articles as opposed to 23,149 pieces of outcomes under "trade disputes". It is very likely that outcomes under "trade disputes" include most, if not all, of those under other keywords.

Table 1 shows typical information of a subsample of trade disputes in our database. They are some representative cases initiated by the US against various countries in 1995. Some interesting facts can be observed. First, the US launched trade disputes against all types of countries, including WTO members, non-WTO members, and FTA partners. Second, the US brought complaints to various forums for settlement. In 1995, China was not yet a WTO member and had no regional trade agreement with the US. The US had no choice but to settle the IPR dispute with China via bilateral consultation. For WTO member countries, sometimes the US chose the WTO forum to solve their disputes, such as the beef quarantine regulation case with South Korea and the banana case with EU, and sometimes the US invoked the Section 301 clause to handle the disputes, such as the film industry subsidy case with EU. For FTA partner countries, sometimes the US relied on FTA dispute settlement panel to handle disputes; examples include the US complaint on Canadian wheat export subsidy which was brought to the NAFTA dispute settlement panel. This table is an illustration that the WTO disputes are only part of the primary trade disputes, and there are alternative places for dispute settlement other than the WTO's DSB.

[Table 1 inserted here]

Sometimes the same dispute appears in the news more than once in a particular year, in which case we count it as just one dispute to avoid duplication. In fact, some prominent trade disputes appear thousands of times in our collected articles. Examples include the bananas dispute between EU and Latin American countries and the hormone beef dispute between the US and EU. In contrast, if a case appears in multiple years, we treat it as many disputes, with one year counted as one dispute. The justification is that such a case could be very different from the others and we can view it as being initiated repeatedly. However, the main results of the paper are robust to the different definitions of "a"

dispute.<sup>13</sup> Based on the above criteria, we obtain 1130 cases of disputes during the period between 1995 and 2007, covering 110 countries. Among those cases, 369 disputes were reported to the WTO during the same period.

It is observed that in some cases, there are multiple plaintiffs or defendants involved in the same dispute. Since our study is conducted at bilateral country-pair level, we convert those multiple-country disputes to a number of bilateral country-pair disputes. For instance, we have a dispute, in which “EU, US and Canada complained Japan’s unequal tax for import spirits”. We convert this case into many bilateral disputes initiated by the US, Canada, and individual EU countries against Japan. Note that we treat EU as individual countries, so the EU-Japan case results in several cases that each EU member country brought against Japan. The reason of treating EU as individual countries in spite of the uniform trade policy of EU member countries is that we can take care of trade disputes within EU members and those initiated by or against one individual country. Finally, we obtain 6228 bilateral trade disputes at country-pair level.

The distribution of the 6228 bilateral disputes across countries is presented in Table 2. As we can see, the US is the biggest plaintiff, comprising nearly a quarter of all bilateral disputes, followed by Canada and the EU countries. China and Brazil are the only two developing countries initiated more than one hundred disputes during our sample period. The US is not only the biggest plaintiff, initiating more than one thousand disputes, but also the largest target, receiving over one thousand complaints. The other big targets are South Korea, China, India, Russia, Japan and the EU countries. The different numbers of disputes between EU member countries reflect both within-EU disputes and their different accession time.

[Table 2 inserted here]

Our dependent variable  $DISPUTE_{ijt}$  is a count number at country-pair-year level. The value of  $DISPUTE_{ijt}$  is obtained by simply adding the number of trade disputes that country  $i$  initiates against country  $j$  in year  $t$ .<sup>14</sup> We find that the highest value of  $DISPUTE_{ijt}$  is 14: the US had 14 trade disputes against Japan in 1999. As a comparison, based on the WTO dataset, we find that the largest number of disputes reported to the WTO by a single country in any given year against a single country is 6: EU had six trade disputes against the US in 2000.

#### 4. Empirical Analysis

In this section, we first present the baseline results from the empirical analysis and then check the robustness of the results. Identification issues will be examined in the next section.

Given that our dependent variable is the count of trade disputes, using OLS regression is

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<sup>13</sup> We use an alternative approach that only counts the first time that a dispute appears during consecutive years in the news. By using this approach, we have 973 of primary trade disputes from 1995 to 2007, still much bigger than the number of WTO disputes.

<sup>14</sup> Horn and Mavroidis (2006) point out many potential problems in counting a country’s participation in trade disputes, although most studies use simple accounting similar to our study. However, the accounting problem is less serious in our study than those that try to address the *participation* problem because we focus on the *number* or *frequency* of trade disputes.

inappropriate. Poisson distribution requires the mean and the variance of the dependent variable be equal, but our count data exhibit an over-dispersion property, i.e., the variance of dependent variable exceeds the mean to a large extent. Therefore, we use the panel negative binomial model with random effects in our baseline regression.<sup>15</sup> All independent variables, except economic growth rate and the dummy variables, take the log values.

#### 4.1. Results from the Baseline Models

Tables 3 present the baseline regression results for primary trade disputes. The estimates reported in the tables are “incidence rate ratios” (IRR) associated with the underlying parameter estimates, that is, these numbers are the exponential of the estimated coefficients. In count outcome models, IRR is more informative than the estimated coefficient itself. IRR represents the ratio of the counts predicted by the model when the variable of interest is one unit above its mean value and all other variables are at their respective means. The impact of an independent variable on the corresponding dependent variable is positive (negative) if its IRR is greater (less) than unity. For example, the IRR of an explanatory variable that is equal to 1.3 (respectively, 0.7) means that a one-unit increase in the explanatory variable would *increase* (respectively, *decrease*) the dependent variable by 30% when all other independent variables are at their respective means.

[Table 3 inserted here]

Table 3 shows that the key result is robust to the use of various combinations of control variables. The formation of an FTA has statistically significant and negative effect on the number of trade disputes between any pair of its member countries. That is, a country launches less trade complaints against another country if they both belong to the same FTA. In particular, the last column of Table 3, which includes all control variables, indicates that FTA reduces trade conflicts among member countries by 72.3%.<sup>16</sup>

Most of the other explanatory variables, excluding the control dummies, have the same qualitative effects on primary trade disputes as those found for WTO disputes in the literature. Our results suggest that the number of primary trade disputes increase with the size of the economies (GDP) of the complaining and the defending countries. A larger country tends to launch more disputes and also receives more complaints. Bown (2005) and Guzman and Simmons (2005) also find a positive relationship between the GDP of the plaintiffs and their participation in WTO trade disputes because a larger country is likely to have more resources to use for disputes and dispute settlement than smaller countries. Guzman and Simmons (2005) show that a country will focus its complaints (through WTO) towards larger countries to obtain larger benefits (i.e. the “capacity hypothesis”)

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<sup>15</sup> We apply panel negative binomial model with fixed effect for robustness check. Our main results remain but the fixed effect model loses efficiency due to the smaller sample size. We also use Poisson model and log transformation of the dependent variables in OLS models, and the results are robust.

<sup>16</sup> Horn and Mavroidis (2006), at the end of their survey, raise the question of why a certain group of countries has launched few complaints (relative to some benchmark). One plausible reason for this observation is that these countries belong to the same FTA.

owing to capacity constraint. Our finding also supports the “capacity hypothesis.”

The economic development level has statistically significant impact on primary trade disputes. Our results show that a more developed country (higher GDP per capita) tends to launch more trade disputes against other countries, and a more developed country receives more complaints from other countries. This result is robust with or without the control of GDP and bilateral trade, as we exclude GDP control in columns (4) and (6) and bilateral trade control in column (2). This finding is partly consistent with the argument that poorer countries tend to launch fewer trade disputes, but receive more complaints than they “should be” getting (Horn and Mavroidis, 2006). The mirror side of this result is that poorer countries initiate fewer trade disputes, and they receive fewer complaints.

Our regression results show that economic growth affects trade dispute initiations. A faster growing economy tends to launch more trade disputes against other countries, but also receives more complaints from other countries. However, the magnitudes of these effects are not very large. Bown (2004b) also includes GDP growth in his trade dispute analysis, and finds that the GDP growth rate of the defendant country has a positive effect on the successful outcome of a trade dispute, as measured by the growth of import by the defendant country from the plaintiff country. Our results relate the GDP growth rates of both defendant and plaintiff countries to the initiation of trade disputes.<sup>17</sup>

The impact of bilateral trade value on trade disputes contradicts our intuitive expectation. The result depends on whether or not GDP is included in the regression. On the one hand, when GDP is not included as in columns (4) and (6), the estimated IRRs of  $IMPORT_{ijt}$  are larger than unity, which indicates that primary trade disputes are positively associated with the complaining country’s import from the defendant. However, with the inclusion of GDP in the regression in columns (3), (5), and (7), the IRRs of  $IMPORT_{ijt}$  become less than unity. On the other hand,  $EXPORT_{ijt}$  is negatively associated with primary trade dispute in all specifications in Table 3. These results are not in line with those in the literature of WTO disputes. Both Bown (2005) and Horn et al. (2005) report larger trade results in more trade complaints. Horn et al. (2005) speculate that fixed costs of litigation exist, and thus, larger traders are more likely to launch trade disputes.

Bilateral trade shares significantly affect trade disputes. It is easily seen from Table 3 that the estimated IRRs of  $EXSHARE_{ijt}$  are larger than unity. That is, when country  $i$ ’s export to country  $j$  takes a larger share of country  $i$ ’s exports, country  $i$  launches more trade disputes against country  $j$ . This observation is consistent with the view that a country uses its constrained resources more against its main export markets because the potential benefit from initiating disputes is larger. This finding is consistent with Bown (2005), who reports that export concentration is positively related with WTO dispute participation. Also, Table 3 shows that a country tends to launch more primary disputes against another country if the latter’s export concentration to the former is higher ( $EXSHARE_{ijt}$ ). This behavior reflects the view that a country is likely to take advantage of the others if the latter are too dependent on its market for export. Bown (2004b) has the same observation with regard to the effect

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<sup>17</sup> Knetter and Prusa (2003) include the GDP growth rate of the filing country in the regression of anti-dumping filing, and their results indicate a negative impact.

of the defendant's export share on the successful outcome of GATT/WTO trade disputes.

Exchange rate matters. A country with weaker currency (higher  $REER_j$ ) receives more complaints. This finding is consistent with the view that countries may use weak currency to gain advantage in international trade, and thus, will receive more complaints from their trading partners. In contrast, the plaintiff's exchange rate ( $REER_i$ ) is negatively related to primary trade disputes, although not statistically significant when all control variables are included.

Trade barriers matter as well. A country with higher most-favor-nation (MFN) tariff tends to initiate more primary trade disputes. Higher MFN tariff of the complaining country simply reflects stronger protective stance on trade. Hence, a country with higher MFN tariff is more inclined to launch trade disputes. On the other hand, countries with higher MFN tariffs are less likely to deviate from their committed tariff levels and so are expected to receive fewer complaints. However, they are also expected to receive more complaints purely because they are more protectionist to begin with. Our empirical finding shows that the impact of the defendant MFN tariff on primary trade dispute is less significant or even insignificant.

The control dummy variables exhibit mixed effects as indicated by column (7) of Table 3. Countries tend to have fewer primary trade disputes against each other if they have a common official language. WTO member countries tend to launch more trade disputes against other countries (member or non-member) and also receive more trade complaints.<sup>18</sup> However, we have neither a theory nor clear arguments to explain these observations.

We have explored a large set of determinants of primary trade disputes in our regressions. Some findings are consistent with the results found in existing studies of WTO disputes, some are different, and some are new. Further investigation is necessary to find the explanations.

## 4.2. Some Robustness Checks

The central message from the baseline analyses is that FTAs have a statistically significant and negative effect on the initiation of primary trade disputes. Although this key result is expected and intuitive, reasonable concerns about their validity and robustness arise. We address some of those concerns below.

■ It takes time for countries to respond to changes in economic conditions in general, and changes in those explanatory variables in our models in particular. For example, establishment of FTAs may not be able to exert their influence on trade disputes immediately. Following the common approach in the literature, we use a one-period lag for all time-variant explanatory variables in model (1). We examine how the last period's explanatory variables affect this period's trade disputes, and report the negative binomial estimation results in Table 4. As shown by Table 4, the impact of FTAs on primary trade disputes is negative and statistically significant. The impact is stronger than that from the baseline model in Table 3. The qualitative aspects and significance of the estimates of other

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<sup>18</sup> Multi-collinearity between WTO membership and bilateral trade may not be a serious problem in negative binomial models. Some studies (e.g., Rose, 2004) show that the WTO membership does not have significant effect on trade flows, but others (e.g., Baier and Bergstrand, 2007) report the opposite.

explanatory variables remain the same. We also perform regressions based on longer period lags (two and three year lags) and find that the impact of FTAs is similar.

[Table 4 inserted here]

■ In many cases, our dependent variable takes the value zero, as a country normally does not have trade dispute with many countries in many years. Thus, the issue of excessive zeros in our data raises concerns. In theory, if the count of trade disputes is zero for a pair of countries in a particular year, it literally means that there is no trade dispute between them that year. However, in practice, we assign zero to a pair of countries for a particular year if we cannot find any media report on trade dispute between them in the corresponding year. Hence, we cannot really differentiate the true zeros (no trade dispute between two countries) from the excessive zeros (no media report on trade dispute between two countries). Econometric theory suggests that excessive zeros are generated by a separate process from count values, and the former can be modeled independently. Zero-inflated Poisson model (ZIP) can be used to deal with the potential problem of excessive zeros. A ZIP model embeds two parts, namely, Poisson count and logit, for predicting excessive zeros. We report the ZIP regression results for primary trade disputes in Table 5. We use a dummy, OECD, as the inflated variable, which indicates whether the complaining country belongs to the OECD. This is based on the belief that the participation behavior of developing countries in trade disputes is quite different from that of the developed countries. As in the baseline model, FTA has a negative and statistically significant effect on trade disputes. Other explanatory variables also have similar effects as in the baseline model. Therefore, we are comfortable to conclude that the problem of excessive zeros is unlikely to be present in our analysis.

[Table 5 inserted here]

■ Our dependent variable, *DISPUTE*, is a count number in the baseline model. We now redefine it as a binary variable. Let  $D\_DISPUTE_{ijt}$  be one if there exists any trade dispute between countries  $i$  and  $j$  in year  $t$ , and zero otherwise. Using this new dependent variable allows us to examine the impact of FTAs on the *occurrence* of trade disputes rather than the FTA impact on the *frequency* of trade disputes.

There are at least two reasons for reviewing our main results using this method. First, this binary variable enables us to minimize measurement error in the process of counting the number of disputes. Knowing whether trade dispute occurs for any given country pair in a given year is more accurate than counting how many trade disputes occur, due to possible incompleteness and carelessness. Second, the binary variable method allows us to avoid the finite sample bias when the number of events being analyzed is small or unbalanced, as demonstrated by King and Zeng (2001). Our dataset is not small, but it is unbalanced. The full sample includes less than 2 percent of cases where country pairs have some disputes (i.e. the value of *DISPUTE* is equal to or greater than one).

With the definition of  $D\_DISPUTE$ , we use the rare-events correction for the logistic regression.



Table 6 presents the regression results. The main result is that FTAs reduce the occurrence of trade disputes between FTA member countries. The usual panel logistic regressions produce similar qualitative and quantitative results, which we do not report here to save space.

[Table 6 inserted here]

■ Due to the potential media bias of Factiva database mentioned above, we divide our sample into developed and developing countries by the income level of the complaining country. The left panel of Table 7 represents regression results on developed plaintiffs and the right panel represents those on developing plaintiffs, respectively. The baseline result on FTA remains robust. FTA relationship is associated with less trade disputes between member countries and this effect does not vary with the development level of the complaining party. The magnitude of FTA effect on trade disputes initiation is similar across two panels though other control variables generate less significant results in the developing country subsample.

[Table 7 inserted here]

■ Our dependent variables are directional, but the key explanatory variable, *FTA*, is not. Therefore, it is desirable to check whether the main results remain unchanged qualitatively when we redefine the dependent variables as unidirectional. Accordingly, we pool the primary trade disputes of country *i* against country *j* ( $DISPUTE_{ijt}$ ) and those of country *j* against country *i* ( $DISPUTE_{jit}$ ) together as primary trade disputes *between* countries *i* and *j*, denoted as  $DISPUTE_{(i+j)t}$ , i.e. let  $DISPUTE_{(i+j)t} = DISPUTE_{ijt} + DISPUTE_{jit}$ . We run the regression on the new dependent variable. Note that we need to drop two control variables, country *i*'s export and import value to and from country *j*, i.e.,  $EXPORT_{ijt}$  and  $IMPORT_{ijt}$ , since they are directional variables, and we replace them with one unidirectional variable,  $TRADE_{ijt}$ , which refers to the total bilateral trade between country *i* and country *j*.

When including all other control variables, we obtain the estimate of the *FTA* parameter as 0.3391, which is statistically significant at 1% level. It is comparable to the counterparts obtained from the baseline model, which is 0.2775. To save space, we do not report the estimates of other explanatory and control variables. The message from this exercise is that the main results from the baseline models are robust. FTAs discourage member countries to initiate trade disputes against other member countries in the same FTA.

## 5. Identification

Our baseline regression model assumes that the error term is not correlated with the dependent variable. However, if *FTA* is not an exogenous variable, the estimated results could be biased or wrong. One may suspect that FTAs and trade disputes might be correlated as the trade relationship between two countries may affect the formation of FTAs and the occurrence of trade disputes simultaneously. Both FTAs and trade disputes can be regarded broadly as intertwined trade policy.

There is evidence that some FTAs have an explicit purpose of addressing trade disputes between member countries.<sup>19</sup> Thus, trade disputes might influence the formation of FTAs. Even for FTAs that have no explicit aim to address trade disputes, we can hardly exclude such a possibility. This phenomenon, if it exists, is the reverse causality problem or endogeneity problem of the explanatory variable in our model. This serious econometric problem limits the previous regressions from identifying the causal effect of FTAs on trade disputes.

Following the literature, we adopt two approaches, which are propensity score matching (PSM) and instrumental variable (IV) estimation, to address the endogeneity problem. The PSM method is appropriate when there is a concern about group differences in measured covariates, whereas the IV method is more suitable when there is a concern about the differences in unmeasured covariates. Generally, IV should work better than PSM in the present issue. Empirical studies on the effect of FTAs have suffered from the lack of a suitable instrument (Baier and Bergstrand, 2007). We are able to find plausible instrument(s) due to the recent development in the literature. We use both IV and PSM methods for robustness.

### 5.1. Instrumental Variable Estimation

The choice of IV in this section is largely motivated by the work of Chen and Joshi (2010), who examine the third-country effect on the formation of FTAs. Chen and Joshi (2010) show theoretically and empirically that the decision to enter into an FTA depends not only on the economic characteristics of the participating countries, but also on their existing FTA relationship with third countries. When they decide whether to form an FTA, countries weigh the gains in export profit and consumer surplus against the loss in home profit and tariff revenue. They identify two effects of the third-country FTA relationship. The first effect is a *loss sharing effect*, which applies to countries with pre-existing FTAs. The second effect is a *concession erosion effect*, which applies to countries whose potential FTA partner has a pre-existing FTA.

Suppose there are three countries, A, B, and C. Countries A and B are about to form an FTA. On the one hand, if A already has a pre-existing FTA (with C), the decrease in its home profit resulting from the AB-FTA is smaller as the profit loss is diluted to its existing FTA partner (C). Hence, country A has higher incentive to form an FTA with B than if it does not have a pre-existing FTA with C. This relationship indicates a loss sharing effect. On the other hand, with A having a pre-existing FTA, the export profit gain of B resulting from the AB-FTA is smaller than if A does not have a pre-existing FTA. Hence, B's incentive to form an FTA is lower. This relationship shows the concession erosion effect.

Chen and Joshi (2010) also compare the incentives of forming an FTA in the “one-FTA” case (in which only one country in the pair has FTA with third countries) and the “two-FTA” case (in which

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<sup>19</sup> In the negotiation of Canada-US FTA (CUSFTA), the Canadian side insisted that a dispute settlement provision is indispensable and the key issue of CUSFTA (*The Financial Times*, Oct 6, 1987). In 1988, Mike Mansfield, then US Ambassador to Japan, expressed his personal support in forming an FTA with Japan, in the hope to provide comprehensive solutions to the fierce trade disputes between the two countries (*The New York Times*, Aug 12, 1988).

both countries in the pair have FTA with third countries) to the benchmark case (in which neither country has a pre-existing FTA). The study shows that the concession erosion effect is offset by the loss sharing effect in the two-FTA case. Therefore, both countries have unambiguously stronger incentives to form an FTA, whereas the relative magnitude of the two effects depends on other country pair characteristics in the one-FTA case. Their analysis shows that accounting for the third-country effects can increase the number of successfully predicted FTAs by 31 percent.

The main result of Chen and Joshi (2010) is that pre-existence of a third-country FTA has some explanatory power on the formation of an FTA between two countries. Furthermore, trade conflict between two countries is unlikely to be affected directly by their third-country FTA relationships. Thus, we use the third-country FTA status as an instrumental variable for FTA between these two countries.

Following Chen and Joshi (2010), we construct two dummy variables to reflect various situations of the third country status between any pair of countries, corresponding to the “one-FTA” case and “two-FTA” case in their paper. The first dummy is  $D1$ , which is equal to unity if a third country has an FTA relationship with one and only one country in the pair, and equal to zero otherwise. The second dummy is  $D2$ , which is equal to unity if a third country has an FTA relationship with both countries in the pair, and equal to zero otherwise.  $D1$  and  $D2$  could be both equal to unity for some country pairs. For example, considering China and Mexico as a pair, Mexico has an FTA with the US, while China does not, and thus,  $D1$  is equal to unity. Meanwhile, both China and Mexico have FTAs with South Korea, and thus,  $D2$  is also equal to unity. We also introduce a third instrument,  $D3$ , which is equal to the number of common third countries that have FTAs with both countries of the pair.

We employ the “two-step generalized method of moments instrumental variable” (GMM-IV) estimation because the model is non-linear in nature. Table 8 presents the regression results. The estimated coefficients (rather than IRRs as in the previous tables) are reported. The second-stage results, reported in the upper part, confirm that FTA formation reduces the incidence of primary trade disputes. The corresponding first-stage results are reported at the bottom. The sign and magnitude of coefficients on  $D1$  and  $D2$  are comparable with the empirical results of Chen and Joshi (2010). The coefficients on  $D3$  is also positive and statistically significant, which indicates that country pairs with more common third-country FTA partners have stronger incentives to form or to join an FTA, which provides support for the domino theory of FTA formation (Baldwin, 1995).<sup>20</sup>

[Table 8 inserted here]

## 5.2. Propensity Score Matching

Country pairs with FTAs and those without FTAs may have underlying differences, in which

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<sup>20</sup> It is legitimate to worry the effect of trade dispute between country A and B on the formation of bilateral FTA between the two countries. However, if country A and B are FTA members of a large FTA that involves more than two countries, such as EU and NAFTA, then this effect may be less important. That is, the reverse causality problem will be less serious if we run the regression using a subsample that includes only multi-country FTAs, i.e., excluding all bilateral FTAs. We find that the estimation results based on such a subsample are similar to those based on the whole sample: The formation of FTA has significantly negative impact on the frequency of primary trade disputes.

case a simple regression of the occurrence of trade disputes on the *FTA* dummy variable, along with other control variables, is likely to generate biased estimators. We employ the commonly used propensity score matching (PSM) technique to deal with this potential problem. The idea of PSM is to imitate a randomized experiment with a treated group and a control group where both groups are substantively similar. The treatment group consists of all country pairs with FTAs. The control group consists of country pairs without FTAs, but each one shares similar characteristics with a country pair in the treatment group. To construct the control group, we first create the propensity score, which in this study is the probability of having an FTA. We achieve this aim by running a probit regression using the FTA dummy of any country pair as the dependent variable and all explanatory and control variables from the baseline models as independent variables. Based on the estimated model, we then calculate the propensity score of every country pair in the entire population. Lastly, we do the matching.

All observations that have an FTA dummy equal to zero in all years constitute the “to-be-selected” pool. Other observations not in the pool must have an FTA in some years, which form our treatment group. For each country pair in the treatment group, we choose the year when the two countries establish an FTA, and calculate the pair’s propensity score in that year. We then use three different matching methods to conduct the matching. The first method is nearest-neighbor matching. For each treated country pair, we pick a country pair from the “to-be-selected” pool, which has the propensity score closest to that of the treated pair in that year and put it in the control group. Nearest-neighbor matching is the most intuitive method, but it normally results in extremely large estimation variance and a significant reduction of observations in the control group. Alternatively, the second method is radius matching, in which case we first set a radius and then all observations from the “to-be-selected” pool with propensity scores within the radius will be included in the control group. A third method is kernel matching, which assigns each country pair in the treatment group with a weighted sum of country pairs from the “to-be-selected” pool with a similar propensity score. The weight diminishes with the distance between the propensity score of the “to-be-matched” country pair and that of the treated one.

[Table 9 inserted here]

Columns 1 to 3 in Table 9 show the negative binomial regression results for *DISPUTE* using the nearest-neighbor matching, radius matching and kernel matching, respectively. For ease of comparison, we include the results from the baseline models without using any matching technique in the last column. Clearly, the results are very robust. *FTA* has negative and statistically significant effects on trade disputes.

## **6. Differential Effects of FTA: The Role of Dispute Settlement Mechanism**

The Uruguay Round set up the DSB to administer the Dispute Settlement Understanding (DSU), whose mission is to resolve trade disputes brought to the WTO by its members. Despite the

comprehensive structure of the DSU, many FTAs have their own provisions on trade dispute settlements. Part of the reason is that not every country of FTA is a WTO member. Another reason is that countries may want to have a more flexible or less costly way than the DSU to settle disputes within a small group of countries.

We treat all FTAs the same in the earlier analysis. In this section, we investigate how FTAs with different dispute settlement provisions affect initiations of trade disputes differently. Almost all FTAs include a dispute settlement clause of some sort (Porges, 2011), but there is a great variation regarding the dispute settlement mechanism among FTAs, especially those FTAs signed more than 20 years ago (Morgan, 2008).

We classify FTAs in four types. First, some FTAs have their own dispute settlement mechanisms and their provisions specify that members should resolve their disputes by using the dispute settlement mechanism of their FTA. We use a dummy variable  $OWNRULE=1$  for a country pair that has such a mechanism. Second, some FTAs have their own dispute settlement mechanisms, but their provisions specify that members can resolve their disputes using either the dispute settlement mechanism of their FTA or that of the WTO.<sup>21</sup> We use a dummy variable  $BIRULE=1$  for a country pair that has such a mechanism and specification. Third, some FTAs do not have their own dispute settlement mechanisms and their provisions explicitly specify that members should resolve their disputes using the WTO dispute settlement mechanism. We use a dummy variable  $WTORULE=1$  for a country pair having an FTA of this sort. Fourth, some FTAs do not have any specific provision on how to resolve their disputes.<sup>22</sup> The four types are mutually exclusive. There are 154 FTAs in our sample of the previous sections. Based on our data collection, we can only find information on the dispute settlement provision for 141 FTAs due to availability of documents. Among the 141 FTAs, 59 FTAs use their own dispute settlement forum ( $OWNRULE=1$ ), 31 FTAs provide the option to use their own or the WTO dispute settlement mechanism ( $BIRULE=1$ ), 8 FTAs rely on WTO dispute settlement ( $WTORULE=1$ ), and 43 FTAs have no specific provisions on the forum for dispute settlement.

We include three dummy variables, i.e.,  $OWNRULE$ ,  $BIRULE$ , and  $WTORULE$ , to replace the  $FTA$  dummy in the baseline model (1), and run the negative binomial regression on primary trade disputes using the subsample consisting of all country-pairs with FTAs. The benchmark, which is obtained when all three dummy variables are equal to zero, is the fourth type of FTA discussed above.

Table 10 reports the regression results. The dummy variable  $WTORULE$  has an IRR less than unity and is statistically significant in most columns. This finding indicates that countries with FTAs

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<sup>21</sup> EU has been a firm supporter of WTO's DSU. EU started to include their own mechanisms in all its trade agreements that concluded after 2000, and thus, the countries concerned can resolve their differences more rapidly and effectively. While the EU-Mexico (2000) authorizes a Joint Council to deal with trade related disputes, the EU-Chile (2003) adds that preference should be given to WTO rules if a violation is equivalent in substance to a WTO obligation (Article 189. 4c). The contrary is indicated in the NAFTA Article 2005(4) on the choice of forum provision. The NAFTA provision states that certain disputes that pertain to matters arising under both the WTO Agreement and the standards-related provisions of the NAFTA, and concern human, animal, or plant life, or health or the environment, and raise factual issues concerning the environment or conservation shall be heard at the responding party's option and solely under the NAFTA's dispute settlement procedures.

<sup>22</sup> Generally, we do not know much why some FTAs have their own dispute settlement mechanisms, but others do not. Guzman (2002) provides one explanation, which is the cost of credibility.

that explicitly specify the use of the WTO dispute settlement forum have less trade disputes than those with the benchmark-case FTAs. On the contrary, both *OWNRULE* and *BIRULE* have IRRs greater than unity, and the estimates are (mostly) statistically significant. That is, countries that rely on their own FTA dispute settlement mechanism or allow members of the FTA to choose either their own forum or the WTO forum to settle trade disputes have more trade disputes than countries with the benchmark-case FTAs.

[Table 10 inserted here]

The findings show that although FTAs reduce the trade disputes of member countries among themselves, FTAs with different provisions of dispute settlement mechanisms have significantly different effects on reducing trade disputes. Generally, FTAs explicitly specifying WTO as the only forum for dispute settlement reduce trade disputes between members the most. FTAs with their own dispute settlement platforms (requiring the members to use their own platforms or allowing them to choose between their own or the WTO platforms) have less effect on reducing the trade disputes between members. However, these results are not inconsistent with the previous finding that FTAs reduce trade disputes in general.<sup>23</sup> This finding is both important and interesting, but further investigation is needed to find the underlying explanations.<sup>24</sup>

## 7. Conclusion

Trade disputes occur frequently and have detrimental effects on trade flows. This paper investigates the impact of FTA formation on the initiation of (primary) trade disputes. We find that economic size, economic growth, and trade shares all have positive effects on trade disputes, i.e., leading to more trade disputes. More importantly, countries belonging to the same FTA tend to have fewer trade conflicts among themselves. We also find that FTAs with different provisions on dispute settlements have different degrees of dispute-reducing effects. Some of our findings are consistent with the literature based on WTO trade disputes, but no study has been made on primary trade disputes.

Our empirical analysis is based on our unique dataset. Although we have endeavored to avoid measurement error in the data collection process and to mitigate the potential endogeneity problem in the regression, our study has limitations. First, the conceptual problem with regard to the definition of the unit of account pointed out by Horn and Mavroidis (2006) hovers on this paper as it does on the whole literature. Second, we do not have information on the duration of each dispute, and thus, we cannot examine the lifespan of primary trade disputes, as Grinols and Perrelli (2006) do for WTO

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<sup>23</sup> We ran a number of regressions using different subsamples. In the subsample consisting of country pairs with the fourth type of FTAs and country pairs without FTA, we find that the formation of FTAs reduce the trade dispute initiation. We also find dispute-reducing effects of FTA in both the subsample consisting of country pairs with *OWNRULE* FTAs and country pairs with no FTA, and the subsample consisting of country pairs with *BIRULE* FTAs and those without FTA.

<sup>24</sup> This observation may be related to the arguments of Busch (2007) and Porges (2011) that the overlapping of dispute settlement forums often affords opportunities for a complaining country to choose the most advantageous forum to litigate (or simply called “forum shopping”).

disputes. We do not have information on the economic damage caused by each dispute, either. To search for data on the duration and economic damage of trade disputes is more challenging and left for future work.

Our unique dataset of primary trade disputes is useful for investigating the pattern of trade disputes in more detail. At least two directions of future research could be taken. One is to exploit the differential effects of FTAs on trade disputes in different industries. The other is to explore the selection of dispute settlement forums. We are interested in knowing what disputes are brought to the WTO's DSB, what disputes are brought to their FTA forum, and what factors determine the "forum shopping" behavior.

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**Table 1: Subsample of Trade Disputes by US in 1995**

Plaintiff	Defendant	Issue	Settlement Forum
US	EU	audiovisual entertainment, film industry subsidy	Section 301
US	EU	banana import rules	WTO
US	China	IPR protection	Bilateral consultation
US	Canada	wheat, export subsidy	NAFTA panel
US	Korea	beef and meat, quarantine regulations	WTO

**Table 2: Distribution of Bilateral Trade Disputes**

Plaintiffs	Numbers	Percent	Defendants	Number	Percent
United States	1412	22.67	United States	1007	16.17
Canada	290	4.66	South Korea	663	10.65
United Kingdom	208	3.34	China	449	7.21
France	205	3.29	India	311	4.99
Austria	203	3.26	Russia	279	4.48
Belgium	203	3.26	Poland	197	3.16
Denmark	203	3.26	Japan	177	2.84
Finland	203	3.26	United Kingdom	143	2.3
Germany	203	3.26	France	141	2.26
Greece	203	3.26	Belgium	139	2.23
Ireland	203	3.26	Germany	138	2.22
Italy	203	3.26	Finland	137	2.2
Luxembourg	203	3.26	Netherlands	137	2.2
Netherlands	203	3.26	Spain	137	2.2
Portugal	203	3.26	Austria	136	2.18
Spain	203	3.26	Denmark	136	2.18
Sweden	203	3.26	Greece	136	2.18
China	175	2.81	Ireland	136	2.18
Brazil	107	1.72	Italy	136	2.18
Australia	71	1.14	Luxembourg	136	2.18
South Korea	62	1	Portugal	136	2.18
Chile	53	0.85	Sweden	136	2.18
India	53	0.85	Ukraine	127	2.04
Japan	51	0.82	Canada	125	2.01
Poland	39	0.63	Brazil	110	1.77
Russia	39	0.63	Argentina	101	1.62
Mexico	38	0.61	Vietnam	88	1.41
Argentina	35	0.56	Chile	82	1.32
Hungary	30	0.48	Indonesia	56	0.9
Uruguay	29	0.47	Czech Republic	41	0.66
Norway	26	0.42	Taiwan	32	0.51
Estonia	24	0.39	Mexico	30	0.48
Lithuania	24	0.39	Australia	29	0.47

New Zealand	23	0.37	Malaysia	21	0.34
Czech Republic	22	0.35	Philippines	20	0.32
Latvia	22	0.35	South Africa	20	0.32
Cyprus	21	0.34	Latvia	16	0.26
Malta	21	0.34	Norway	16	0.26
Slovakia	21	0.34	Israel	15	0.24
Slovenia	21	0.34	Morocco	15	0.24
Indonesia	20	0.32	Hungary	14	0.22
Egypt	19	0.31	Lithuania	12	0.19
Ukraine	18	0.29	Cyprus	11	0.18
Sudan	16	0.26	Estonia	11	0.18
Algeria	15	0.24	Malta	11	0.18
Bahrain	15	0.24	Slovakia	11	0.18
Comoros	15	0.24	Slovenia	11	0.18
Djibouti	15	0.24	Egypt	6	0.1
Iraq	15	0.24	Thailand	6	0.1
Jordan	15	0.24	Colombia	4	0.06
Kuwait	15	0.24	Honduras	4	0.06
Lebanon	15	0.24	Romania	4	0.06
Libya	15	0.24	Venezuela	4	0.06
Mauritania	15	0.24	Kenya	3	0.05
Morocco	15	0.24	Nepal	3	0.05
Palestinian Territory	15	0.24	New Zealand	3	0.05
Oman	15	0.24	Antigua and Barbuda	2	0.03
Qatar	15	0.24	Ecuador	2	0.03
Saudi Arabia	15	0.24	Pakistan	2	0.03
Somalia	15	0.24	Singapore	2	0.03
Syrian Arab Republic	15	0.24	Afghanistan	1	0.02
Tunisia	15	0.24	Bangladesh	1	0.02
United Arab Emirates	15	0.24	Barbados	1	0.02
Yemen	15	0.24	Benin	1	0.02
Philippines	8	0.13	Costa Rica	1	0.02
Thailand	6	0.1	Iraq	1	0.02
Pakistan	5	0.08	Kyrgyzstan	1	0.02
Vietnam	5	0.08	Lao	1	0.02
Kenya	4	0.06	Mali	1	0.02
Malaysia	4	0.06	Myanmar	1	0.02
Colombia	3	0.05	Nicaragua	1	0.02
Singapore	3	0.05	Saudi Arabia	1	0.02
South Africa	3	0.05	Sudan	1	0.02
Switzerland	3	0.05	Uganda	1	0.02
Taiwan	3	0.05	Uzbekistan	1	0.02
Venezuela	3	0.05			
Zimbabwe	3	0.05	<b>Sum</b>	<b>6,228</b>	<b>100</b>
Bangladesh	2	0.03			
Belarus	2	0.03			
Hong Kong, China	2	0.03			
Kazakhstan	2	0.03			
Namibia	2	0.03			
Romania	2	0.03			

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Turkey	2	0.03
Zambia	2	0.03
Angola	1	0.02
Antigua and Barbuda	1	0.02
Bolivia	1	0.02
Botswana	1	0.02
Bulgaria	1	0.02
Costa Rica	1	0.02
Ecuador	1	0.02
Fiji	1	0.02
Guatemala	1	0.02
Honduras	1	0.02
Lesotho	1	0.02
Madagascar	1	0.02
Malawi	1	0.02
Mauritius	1	0.02
Mozambique	1	0.02
New Caledonia	1	0.02
Nicaragua	1	0.02
Papua New Guinea	1	0.02
Paraguay	1	0.02
Peru	1	0.02
Saint Vincent and the Grenadines	1	0.02
Solomon Islands	1	0.02
Swaziland	1	0.02
Tanzania	1	0.02
Vanuatu	1	0.02
<b>Sum</b>	<b>6,228</b>	<b>100</b>

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Source: Our dataset.

**Table 3: Effects of FTA on Trade Disputes: Baseline Model**

DISPUTE	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FTA <sub>ijt</sub>	0.6273*** (0.0649)	0.6656*** (0.0648)	0.3460*** (0.0410)	0.2186*** (0.0241)	0.3082*** (0.0478)	0.1617*** (0.0232)	0.2775*** (0.0454)
GDP <sub>it</sub>		1.5970*** (0.0250)	2.2282*** (0.1217)		3.0247*** (0.2550)		3.1515*** (0.2871)
GDP <sub>jt</sub>		1.9298*** (0.0332)	2.0309*** (0.1078)		2.3521*** (0.2000)		2.4784*** (0.2305)
GDPPC <sub>it</sub>		1.2774*** (0.0310)	1.7459*** (0.0631)	1.6094*** (0.0545)	2.0750*** (0.1447)	2.1194*** (0.1411)	2.0354*** (0.1504)
GDPPC <sub>jt</sub>		1.0728*** (0.0243)	1.1296*** (0.0347)	1.1536*** (0.0323)	1.1885*** (0.0683)	1.3391*** (0.0715)	1.0765 (0.0672)
GDPGR <sub>it</sub>		1.0148** (0.0061)	1.0560*** (0.0090)	1.0256*** (0.0087)	1.1398*** (0.0159)	1.1163*** (0.0162)	1.1470*** (0.0161)
GDPGR <sub>jt</sub>		1.0223*** (0.0056)	1.0358*** (0.0053)	1.0186*** (0.0061)	1.0905*** (0.0118)	1.0561*** (0.0120)	1.0921*** (0.0124)
EXPORT <sub>ijt</sub>			0.4961*** (0.0295)	0.9251** (0.0280)	0.3870*** (0.0361)	0.9151* (0.0475)	0.3632*** (0.0348)
IMPORT <sub>ijt</sub>			0.7719*** (0.0438)	1.3388*** (0.0376)	0.5262*** (0.0518)	1.0699 (0.0521)	0.4980*** (0.0502)
EXSHARE <sub>ijt</sub>			2.4006*** (0.1500)	1.3677*** (0.0461)	3.5619*** (0.3536)	1.5928*** (0.0896)	3.9272*** (0.4007)
EXSHARE <sub>ijt</sub>			1.5947*** (0.0926)	1.0529* (0.0326)	2.1054*** (0.2078)	1.3077*** (0.0676)	2.2969*** (0.2312)
REER <sub>it</sub>					0.7400 (0.2286)	0.3586*** (0.1134)	0.7903 (0.2468)
REER <sub>jt</sub>					1.4748 (0.4373)	1.1904 (0.3596)	1.9298** (0.5801)
MFN <sub>it</sub>					1.7029*** (0.2142)	1.9138*** (0.2270)	1.6999*** (0.2212)
MFN <sub>jt</sub>					0.8135** (0.0729)	1.1038 (0.1005)	0.8719 (0.0836)
BORDER							0.5902 (0.1950)
COMLANG							0.5061*** (0.0915)
COLONY							0.9756 (0.2576)
DIST							0.9724 (0.0906)
WTO <sub>it</sub>							1.4956* (0.3444)
WTO <sub>jt</sub>							2.8328*** (0.4381)
Observations	474,874	470,672	176,953	176,953	36,832	36,832	36,710
Country-pairs	38,612	37,822	21,504	21,504	6,053	6,053	6,001
Log likelihood	-14382.88	-12639.60	-10795.48	-4963.74	-4929.03	-11020.31	-5114.30

Notes: (i) The dependent variable *DISPUTE* refers to the number of trade disputes initiated by country *i* against country *j* in year *t*. (ii) Regression is negative binomial estimation with random effects for each country pair. (iii) Coefficients are reported as incidence-rate ratios and standard error in parentheses. (iv) \*\*\*, \*\*, and \* represent statistical significance at 1%, 5%, and 10%, respectively.

**Table 4: Effects of FTA on Trade Disputes: Lagged Period**

DISPUTE	(1)	(2)	(3)	(4)
L.FTA <sub>ijt</sub>	0.6235*** (0.0697)	0.2659*** (0.0346)	0.1651*** (0.0266)	0.1337*** (0.0229)
L.GDP <sub>it</sub>	1.7456*** (0.0328)	2.1887*** (0.1310)	2.6892*** (0.2332)	3.3640*** (0.3387)
L.GDP <sub>jt</sub>	1.9893*** (0.0399)	1.8369*** (0.1034)	1.6277*** (0.1310)	2.0504*** (0.1934)
L.GDPPC <sub>it</sub>	1.3912*** (0.0396)	1.8011*** (0.0704)	2.2594*** (0.1518)	2.1289*** (0.1561)
L.GDPPC <sub>jt</sub>	0.9398** (0.0243)	1.0029 (0.0323)	1.0949* (0.0601)	0.9493 (0.0590)
L.GDPGR <sub>it</sub>	1.0391*** (0.0059)	1.0950*** (0.0102)	1.1576*** (0.0178)	1.1740*** (0.0180)
L.GDPGR <sub>jt</sub>	1.0194*** (0.0061)	1.0276*** (0.0059)	1.0795*** (0.0116)	1.0906*** (0.0128)
L.EXPORT <sub>ijt</sub>		0.5411*** (0.0355)	0.4414*** (0.0431)	0.3505*** (0.0370)
L.IMPORT <sub>ijt</sub>		0.8141*** (0.0500)	0.7768*** (0.0740)	0.6215*** (0.0645)
L.EXSHARE <sub>ijt</sub>		2.3854*** (0.1662)	3.2306*** (0.3401)	4.2325*** (0.4835)
L.EXSHARE <sub>ijt</sub>		1.4483*** (0.0920)	1.4112*** (0.1375)	1.8087*** (0.1919)
L.REER <sub>it</sub>			0.3321*** (0.1099)	0.5091** (0.1698)
L.REER <sub>jt</sub>			0.9069 (0.2787)	1.2964 (0.3973)
L.MFN <sub>it</sub>			1.8612*** (0.2420)	1.8798*** (0.2682)
L.MFN <sub>jt</sub>			1.0161 (0.0946)	1.1664 (0.1349)
BORDER				0.4918** (0.1581)
COMLANG				0.4214*** (0.0781)
COLONY				1.0638 (0.2906)
DIST				0.8418* (0.0777)
L.WTO <sub>it</sub>				2.7040*** (0.6188)
L.WTO <sub>jt</sub>				5.3334*** (0.8955)
Observations	432,850	160,571	32,464	32,385
Country-pairs	37,814	21,042	5,871	5,824
Log likelihood	-10362.72	-9542.35	-4631.51	-4553.60

Notes: (i) The dependent variable *DISPUTE* refers to the number of trade disputes initiated by country *i* against country *j* in year *t*. (ii) Regression is negative binomial estimation with random effects for each country pair, and all time-variant explanatory variables are taken one year lag. (iii) Coefficients are reported as incidence-rate ratios and standard error in parentheses. (iv) \*\*\*, \*\*, and \* represent statistical significance at 1%, 5%, and 10%, respectively.

**Table 5: Effects of FTA on Trade Disputes: Zero Inflated Poisson Regression**

DISPUTE	(1)	(2)	(3)	(4)
FTA <sub>ijt</sub>	0.5518*** (0.0639)	0.3612*** (0.0432)	0.2821*** (0.0412)	0.0992*** (0.0192)
GDP <sub>it</sub>	1.4058*** (0.0220)	1.4344*** (0.0520)	1.7794*** (0.1026)	2.0139*** (0.1223)
GDP <sub>jt</sub>	1.7386*** (0.0284)	1.2870*** (0.0497)	1.5210*** (0.0890)	1.7059*** (0.1071)
GDPPC <sub>it</sub>	1.3662*** (0.0305)	1.5312*** (0.0464)	1.7765*** (0.0990)	1.8528*** (0.1094)
GDPPC <sub>jt</sub>	1.0304 (0.0236)	1.0212 (0.0257)	1.2551*** (0.0509)	1.2896*** (0.0549)
GDPGR <sub>it</sub>	1.0535*** (0.0076)	1.0899*** (0.0125)	1.1368*** (0.0190)	1.1587*** (0.0190)
GDPGR <sub>jt</sub>	1.0406*** (0.0050)	1.0358*** (0.0060)	1.1065*** (0.0141)	1.1268*** (0.0143)
EXPORT <sub>ijt</sub>		0.7568*** (0.0350)	0.6718*** (0.0448)	0.5998*** (0.0404)
IMPORT <sub>ijt</sub>		1.3413*** (0.0527)	0.9988 (0.0697)	0.9385 (0.0669)
EXSHARE <sub>ijt</sub>		1.3575*** (0.0648)	1.5195*** (0.1044)	1.6013*** (0.1122)
EXSHARE <sub>ijt</sub>		0.8556*** (0.0350)	1.0756 (0.0741)	1.1164 (0.0788)
REER <sub>it</sub>			0.6279 (0.2185)	0.4150*** (0.1411)
REER <sub>jt</sub>			0.1202*** (0.0386)	0.1204*** (0.0380)
MFN <sub>it</sub>			1.3525*** (0.1503)	1.2806** (0.1539)
MFN <sub>jt</sub>			0.9945 (0.0587)	0.9990 (0.0573)
BORDER				2.3542*** (0.5180)
COMLANG				0.6231*** (0.0586)
COLONY				0.8296** (0.0685)
DIST				0.6052*** (0.0406)
WTO <sub>it</sub>				0.8290 (0.1649)
WTO <sub>jt</sub>				1.4059** (0.2242)
Observations	470,672	176,953	36,832	36,710
Log likelihood	-16016.24	-14000.08	-6472.21	-6331.52

Notes: (i) The dependent variable *DISPUTE* refers to the number of trade disputes initiated by country *i* against country *j* in year *t*. (ii) In the zero inflated Poisson estimation, it is inflated by whether the complaining country belongs to OECD or not. (iii) Coefficients are reported as incidence-rate ratios and robust standard error in parentheses. (iv) \*\*\*, \*\*, and \* represent statistical significance at 1%, 5%, and 10%, respectively.

**Table 6: Effects of FTA on Trade Disputes: Rare Event Logistic Regression**

D_DISPUTE	(1)	(2)	(3)	(4)
FTA <sub>ijt</sub>	0.4327*** (0.0640)	0.2788*** (0.0429)	0.2003*** (0.0418)	0.1733*** (0.0379)
GDP <sub>it</sub>	1.7633*** (0.0366)	1.6730*** (0.0966)	2.0397*** (0.1970)	2.1337*** (0.2258)
GDP <sub>jt</sub>	2.1192*** (0.0463)	1.6502*** (0.0917)	1.8113*** (0.1797)	1.8936*** (0.2018)
GDPPC <sub>it</sub>	1.3575*** (0.0441)	1.4598*** (0.0583)	1.9673*** (0.1318)	1.9601*** (0.1312)
GDPPC <sub>jt</sub>	0.9777 (0.0348)	0.9254** (0.0357)	1.0195 (0.0738)	0.9895 (0.0743)
GDPGR <sub>it</sub>	1.0154*** (0.0052)	1.0257*** (0.0090)	1.1589*** (0.0203)	1.1617*** (0.0208)
GDPGR <sub>jt</sub>	1.0329*** (0.0043)	1.0330*** (0.0056)	1.0745*** (0.0105)	1.0798*** (0.0120)
EXPORT <sub>ijt</sub>		0.8347*** (0.0526)	0.6785*** (0.0701)	0.6594*** (0.0702)
IMPORT <sub>ijt</sub>		1.2728*** (0.0841)	1.0571 (0.1276)	1.0364 (0.1282)
EXSHARE <sub>jit</sub>		1.2525*** (0.0808)	1.5827*** (0.1714)	1.5878*** (0.1733)
EXSHARE <sub>ijt</sub>		0.9454 (0.0625)	1.1074 (0.1315)	1.1038 (0.1334)
REER <sub>it</sub>			0.1060*** (0.0428)	0.1106*** (0.0451)
REER <sub>jt</sub>			0.3392*** (0.1361)	0.3863** (0.1532)
MFN <sub>it</sub>			1.5399*** (0.1595)	1.4898*** (0.1665)
MFN <sub>jt</sub>			1.0185 (0.0711)	1.0077 (0.0772)
BORDER				1.2436 (0.4348)
COMLANG				0.8413 (0.1757)
COLONY				1.4506 (0.3378)
DIST				0.8940 (0.0851)
WTO <sub>it</sub>				0.9904 (0.1959)
WTO <sub>jt</sub>				1.3640 (0.3206)
Observations	470,672	176,953	36,832	36,710

Notes: (i) The dependent variable *D\_DISPUTE* refers to the dummy variable that equals one if country *i* initiates any trade disputes against country *j* in year *t*, and zero otherwise. (ii) Coefficients are reported in exponential form and robust standard error clustered at country pair level in parentheses. (iii) \*\*\*, \*\*, and \* represent statistical significance at 1%, 5%, and 10%, respectively.



**Table 7: Effects of FTA on Trade Disputes: Developed vs. Developing Countries**

DISPUTE	Developed Plaintiffs				Developing Plaintiffs			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FTA <sub>ijt</sub>	0.4916*** (0.0570)	0.3124*** (0.0430)	0.3223*** (0.0543)	0.3111*** (0.0558)	1.8706*** (0.3186)	0.6798* (0.1499)	0.3812** (0.1543)	0.2621*** (0.1101)
GDP <sub>it</sub>	1.6343*** (0.0334)	2.6767*** (0.1758)	4.0491*** (0.3816)	4.1867*** (0.4231)	1.7837*** (0.0524)	2.0567*** (0.1971)	0.9336 (0.2672)	1.3128 (0.4116)
GDP <sub>jt</sub>	2.0871*** (0.0458)	2.1817*** (0.1399)	2.6424*** (0.2609)	2.8164*** (0.3011)	1.6398*** (0.0464)	1.2672** (0.1263)	1.0834 (0.2417)	1.4570 (0.3688)
GDPPC <sub>it</sub>	0.8835** (0.0532)	1.4667*** (0.1173)	1.3542*** (0.1561)	1.2792* (0.1750)	0.8377*** (0.0485)	0.8224** (0.0643)	0.8829 (0.1867)	0.7373 (0.1691)
GDPPC <sub>jt</sub>	1.0064 (0.0274)	1.0594 (0.0379)	1.1778*** (0.0746)	1.0427 (0.0720)	1.4092*** (0.0642)	1.5168*** (0.1034)	1.3787* (0.2362)	1.3158 (0.2438)
GDPGR <sub>it</sub>	1.0460*** (0.0072)	1.1030*** (0.0117)	1.1569*** (0.0187)	1.1680*** (0.0189)	0.9671*** (0.0088)	0.9432*** (0.0119)	0.9803 (0.0319)	0.9808 (0.0326)
GDPGR <sub>jt</sub>	1.0254*** (0.0062)	1.0383*** (0.0058)	1.1010*** (0.0127)	1.1006*** (0.0132)	1.0007 (0.0140)	1.0122 (0.0158)	0.9988 (0.0370)	1.0149 (0.0375)
EXPORT <sub>ijt</sub>		0.3893*** (0.0289)	0.3035*** (0.0326)	0.2943*** (0.0334)		0.7254*** (0.0747)	1.5985 (0.4976)	1.3606 (0.4476)
IMPORT <sub>ijt</sub>		0.8107*** (0.0542)	0.5331*** (0.0597)	0.5037*** (0.0574)		0.9933 (0.1172)	0.8658 (0.2322)	0.7627 (0.2134)
EXSHARE <sub>ijt</sub>		3.0625*** (0.2431)	4.4041*** (0.5112)	4.7395*** (0.5725)		1.6657*** (0.1745)	0.9309 (0.2919)	0.9414 (0.3152)
EXSHARE <sub>jit</sub>		1.4210*** (0.0968)	1.8516*** (0.2045)	1.9975*** (0.2235)		1.4991*** (0.1759)	2.0407*** (0.5444)	2.1414*** (0.6028)
REER <sub>it</sub>			1.0612 (0.3566)	1.1247 (0.3830)			0.9114 (0.7684)	1.5596 (1.3167)
REER <sub>jt</sub>			1.8547** (0.5777)	2.2835*** (0.7165)			0.4121 (0.4382)	0.7856 (0.8574)
MFN <sub>it</sub>			1.8445*** (0.2879)	1.7601*** (0.2772)			2.1881** (0.7021)	2.3136** (0.7771)
MFN <sub>jt</sub>			0.7398*** (0.0775)	0.8244* (0.0878)			1.0445 (0.2086)	0.9857 (0.2123)
BORDER				0.4050** (0.1427)				1.1613 (0.6685)
COMLANG				0.6340** (0.1288)				0.5281 (0.2434)
COLONY				1.0356 (0.3122)				1.2193 (1.0125)
DIST				0.9891 (0.1006)				0.4735*** (0.1268)
WTO <sub>it</sub>				1.5721 (0.6890)				1.8282* (0.5839)
WTO <sub>jt</sub>				2.9712*** (0.4687)				1.8404 (1.3860)
Observations	152,959	83,274	22,928	22,851	317,713	93,679	13,904	13,859
Country-pairs	12,410	8,453	3,181	3,152	25,412	13,051	2,872	2,849
Log likelihood	-9269.85	-8454.30	-4399.35	-4366.38	-3195.17	-2138.03	-459.50	-452.04

Notes: (i) The dependent variable *DISPUTE* refers to the number of trade disputes initiated by country *i* against country *j* in year *t*. The left panel is subsample of developed country as plaintiff and the right panel is subsample of developing country as plaintiff. (ii) Regression is negative binomial estimation with random effects for each country pair. (iii) Coefficients are reported as incidence-rate ratios and standard error in parentheses. (iv) \*\*\*, \*\*, and \* represent statistical significance at 1%, 5%, and 10%, respectively.

**Table 8: Effects of FTA on Trade Disputes: GMM-IV**

DISPUTE	(1)	(2)	(3)	(4)
FTA <sub>ijt</sub>	-0.1736*** (0.0143)	-0.1648*** (0.0146)	-0.1900*** (0.0217)	-0.2499*** (0.0431)
GDP <sub>it</sub>		-0.0346*** (0.0037)	-0.0324** (0.0142)	-0.4932*** (0.0916)
GDP <sub>jt</sub>		0.0159*** (0.0029)	0.1018*** (0.0103)	0.4064*** (0.0733)
GDPPC <sub>it</sub>		0.0326*** (0.0039)	0.0861*** (0.0109)	0.3403*** (0.0775)
GDPPC <sub>jt</sub>		-0.0064 (0.0039)	0.0132 (0.0109)	0.0162 (0.0800)
GDPGR <sub>it</sub>		0.0001*** (0.0000)	0.0011*** (0.0002)	0.0080*** (0.0009)
GDPGR <sub>jt</sub>		0.0002*** (0.0000)	0.0009*** (0.0001)	0.0071*** (0.0009)
EXPORT <sub>ijt</sub>			-0.0313*** (0.0043)	-0.0309* (0.0174)
IMPORT <sub>ijt</sub>			-0.0370*** (0.0034)	-0.1492*** (0.0181)
EXSHARE <sub>ijt</sub>			0.0319*** (0.0043)	0.0365** (0.0174)
EXSHARE <sub>ijt</sub>			0.0375*** (0.0033)	0.1485*** (0.0179)
REER <sub>it</sub>				0.0857** (0.0338)
REER <sub>jt</sub>				0.0857** (0.0384)
MFN <sub>it</sub>				-0.0015 (0.0097)
MFN <sub>jt</sub>				-0.0221*** (0.0079)
WTO <sub>it</sub>				0.1090*** (0.0173)
WTO <sub>jt</sub>				0.3588*** (0.0385)
Observations	366,760	364,434	156,157	33,664
Country-pairs	28,730	28,728	16,921	4,839
Corresponding first stage regressions				
D1	-0.0177*** (0.0011)	-0.0136*** (0.0011)	-0.0307*** (0.0028)	-0.0835*** (0.0128)
D2	0.1268*** (0.0017)	0.1287*** (0.0017)	0.0877*** (0.0020)	0.1261*** (0.0043)
D3	0.0035*** (0.0001)	0.0039*** (0.0001)	0.0082*** (0.0002)	0.0146*** (0.0004)
F statistic	2440.073	2331.028	1233.755	705.127
J statistic	106.943	112.84	68.886	10.463
(p-value)	0.0000	0.0000	0.0000	0.0053

Notes: (i) The dependent variable *DISPUTE* refers to the number of trade disputes initiated by country *i* against country *j* in year *t*. (ii) Two step GMM panel IV regression is employed. FTA is instrumented according to the relationships with third country; *D1*, *D2*, and *D3*, and time invariant variables are dropped with fixed effect. (iii) Coefficients are reported and robust standard error clustered at country pair level in parentheses in both stages. (iv) Kleibergen-Paaprk Wald F statistic for weak identification and Hansen's J statistic for the over identification are reported. (v) \*\*\*, \*\*, and \* represent statistical significance at 1%, 5%, and 10%, respectively.

**Table 9: Effects of FTA on Trade Disputes: Propensity Score Matching**

DISPUTE	(1)	(2)	(3)	(4)
FTA <sub>ijt</sub>	0.5765*** (0.1160)	0.2767*** (0.0778)	0.2799*** (0.0456)	0.2775*** (0.0454)
GDP <sub>it</sub>	3.8078*** (0.8643)	3.0553*** (0.2947)	3.1612*** (0.2883)	3.1515*** (0.2871)
GDP <sub>jt</sub>	6.0262*** (1.4442)	2.2450*** (0.2184)	2.4902*** (0.2321)	2.4784*** (0.2305)
GDPPC <sub>it</sub>	0.9700 (0.2529)	2.2988*** (0.1762)	2.0406*** (0.1507)	2.0354*** (0.1504)
GDPPC <sub>jt</sub>	0.9189 (0.1765)	1.2238*** (0.0784)	1.0809 (0.0675)	1.0765 (0.0672)
GDPGR <sub>it</sub>	1.0860*** (0.0264)	1.1445*** (0.0169)	1.1467*** (0.0161)	1.1470*** (0.0161)
GDPGR <sub>jt</sub>	1.0918*** (0.0279)	1.0959*** (0.0123)	1.0924*** (0.0124)	1.0921*** (0.0124)
EXPORT <sub>ijt</sub>	0.2604*** (0.0620)	0.3821*** (0.0383)	0.3630*** (0.0348)	0.3632*** (0.0348)
IMPORT <sub>ijt</sub>	0.1264*** (0.0316)	0.5967*** (0.0628)	0.4977*** (0.0502)	0.4980*** (0.0502)
EXSHARE <sub>ijt</sub>	6.5903*** (1.7639)	3.6440*** (0.3910)	3.9252*** (0.4005)	3.9272*** (0.4007)
EXSHARE <sub>ijt</sub>	10.3585*** (2.8388)	1.9434*** (0.2033)	2.2969*** (0.2313)	2.2969*** (0.2312)
REER <sub>it</sub>	2.8558* (1.5512)	0.6951 (0.2343)	0.7819 (0.2444)	0.7903 (0.2468)
REER <sub>jt</sub>	1.9740 (0.9924)	3.0989*** (1.0116)	1.9402** (0.5832)	1.9298** (0.5801)
MFN <sub>it</sub>	1.3288 (0.3635)	1.8772*** (0.2611)	1.7045*** (0.2220)	1.6999*** (0.2212)
MFN <sub>jt</sub>	0.7559 (0.2093)	1.0278 (0.1046)	0.8754 (0.0840)	0.8719 (0.0836)
BORDER	0.3258* (0.2029)	1.1368 (0.5980)	0.5723* (0.1908)	0.5902 (0.1950)
COMLANG	1.3810 (0.5814)	0.5849*** (0.1113)	0.5017*** (0.0908)	0.5061*** (0.0915)
COLONY	0.6492 (0.5046)	0.7414 (0.2045)	0.9738 (0.2577)	0.9756 (0.2576)
DIST	2.7682*** (0.7349)	0.8878 (0.0976)	0.9472 (0.0885)	0.9724 (0.0906)
WTO <sub>it</sub>	6.9002** (5.3592)	1.3334 (0.3142)	1.5040* (0.3464)	1.4956* (0.3444)
WTO <sub>jt</sub>	10.3215*** (5.7095)	2.5558*** (0.4092)	2.8357*** (0.4387)	2.8328*** (0.4381)
Observations	10,259	30,436	36,488	36,710
Country-pairs	1,002	5,480	5,983	6,001
Log likelihood	-1583.57	-4216.31	-4914.78	-5114.30

Notes: (i) The dependent variable *DISPUTE* refers to the number of trade disputes initiated by country *i* against country *j* in year *t*. (ii) Regression is negative binomial estimation with random effects for each country pair. (iii) Coefficients are reported as incidence-rate ratios and standard error in parentheses; (iv) \*\*\*, \*\*, and \* represent statistical significance at 1%, 5%, and 10%, respectively.

**Table 10: Effects of Different FTAs on Primary Trade Disputes**

DISPUTE	(1)	(2)	(3)	(4)	(5)
BIRULE	11.5309*** (3.8247)	1.2791 (0.4200)	1.0640 (0.4467)	2.0162 (0.9008)	8.8851*** (6.8097)
OWNRULE	1.7856*** (0.3770)	1.6077** (0.3241)	3.5920*** (0.9931)	2.7096*** (0.8016)	11.8007*** (7.8280)
WTORULE	0.7097 (0.3187)	0.1813*** (0.0778)	0.3035** (0.1425)	0.2084*** (0.1021)	0.9612 (0.7324)
GDP <sub>it</sub>		1.4032*** (0.0685)	2.1344*** (0.3482)	2.4024*** (0.4011)	4.9170*** (1.3969)
GDP <sub>it</sub>		1.7314*** (0.0928)	4.1435*** (0.7043)	4.6936*** (0.8208)	13.0836*** (3.9541)
GDPPC <sub>it</sub>		0.8607** (0.0568)	1.2180** (0.1223)	1.1238 (0.1173)	1.0080 (0.2194)
GDPPC <sub>it</sub>		0.8368** (0.0589)	1.0927 (0.1141)	1.0297 (0.1103)	0.5123*** (0.1077)
GDPGR <sub>it</sub>		0.9829 (0.0160)	0.9724 (0.0178)	0.9747 (0.0182)	1.1674*** (0.0442)
GDPGR <sub>it</sub>		0.9547*** (0.0156)	0.9756 (0.0185)	0.9770 (0.0187)	1.0779** (0.0340)
EXPORT <sub>ijt</sub>			0.5159*** (0.0926)	0.4810*** (0.0871)	0.2484*** (0.0796)
IMPORT <sub>ijt</sub>			0.3021*** (0.0556)	0.2800*** (0.0518)	0.1039*** (0.0349)
EXSHARE <sub>ijt</sub>			2.2165*** (0.4149)	2.3012*** (0.4382)	4.6319*** (1.5510)
EXSHARE <sub>ijt</sub>			4.1666*** (0.8160)	4.3498*** (0.8575)	11.1186*** (3.7327)
BORDER				0.5525* (0.1717)	0.4331* (0.2161)
COMLANG				0.4785*** (0.1287)	0.5800 (0.2694)
COLONY				0.7547 (0.3157)	1.4904 (1.0812)
DIST				0.5861*** (0.0859)	0.4420*** (0.1046)
REER <sub>it</sub>					5.2718** (4.4221)
REER <sub>it</sub>					0.2865* (0.1947)
MFN <sub>it</sub>					1.8424** (0.5726)
MFN <sub>it</sub>					0.5119** (0.1355)
WTO <sub>it</sub>					4.0961 (4.5105)
WTO <sub>it</sub>					2.5391 (2.5632)
Observations	35,034	34,814	23,985	23,847	9,618
Country-pairs	2,746	2,740	2,291	2,259	1,016
Log likelihood	-1996.14	-1878.81	-1499.53	-1486.43	-799.562

Notes: (i) Regression is negative binomial estimation with random effects; (ii) Coefficients are reported as IRR and standard error in parentheses; (iii) \*\*\*, \*\*, and \* represent statistical significance at 1%, 5%, and 10%, respectively