The Sustainability of the WTO Dispute Settlement System: Does it work for Developing Countries?

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Abstract

Our study provides an econometric analysis of whether developing countries are disadvantaged by the WTO dispute settlement procedure. Despite the many successes of the Dispute Settlement Board (DSB), there is a need to better understand the overall effectiveness of the dispute mechanism. Using bilateral data for about 160 countries from 1995 to 2017, this paper describes the influencing factors for developing countries' participation in the dispute settlement process. By conducting a rare events logistic regression analysis, the results from this study show that the key factors that determine the ability for a developing country to initiate a dispute against another country include the export intensity, retaliation capability, economic power, and economic threat from potential defendant countries. This means that not all developing countries can participate in trade dispute settlement mechanisms, so the WTO dispute settlement system has relative legitimacy. In addition, we further compare and analyze the influence of these four dimensions over different time periods and in different target countries through seemingly unrelated estimations.

Keywords: WTO; dispute settlement system; developing country

JEL Codes: F02, F13, F14, F42, F51, F55

1. Introduction

Since coming into being in 1995, the World Trade Organization's (WTO) Dispute Settlement Understanding (DSU) has played a key role in resolving disputes that emerge following the implementation of international trade agreements. The DSU was introduced as a means of overcoming a major problem of its predecessor, the General Agreement on Tariffs and Trade (GATT), which had no provisions by which it could settle trade disputes. The new system replaced the political process of the GATT system with a more rule-oriented system, applying public international law (Palmeter and Marvroidis, 2004). It is considered a significant improvement on its predecessor and the backbone of the multilateral trading system (Busch and Reinhardt, 2003). It was designed to provide a level playing field for all members, so that the poorer countries could safeguard their interests regardless of their economic power.[1]

The DSU is an exclusive and mandatory system of dispute resolution. Any WTO member has the right to launch a formal complaint about the trade practices of any other member through a formal procedure that includes consultations, a panel decision, an appeal, adoption, and implementation. The process is mandatory from the perspective that once a complainant files a request for consultation, the case proceeds along a specified timeline to its conclusion, with the defendant being unable to either block the case or engage in activities that may lead to continual delays. In this regard, any report provided by the panel or the Appellate Body (AB) must be formally adopted by the Dispute Settlement Body (DSB) shortly after its circulation. Moreover, the WTO stipulates a ruling provided in a panel report must be adopted no later than 60 days after its circulation, and no later than 30 days after circulation in the case of appellate

[1] As of July 2019, the overwhelming majority of the 164 member countries are classified as being developing countries and of these 36 are deemed by the United Nations (UN) to be least-developed.

reports.[2] In addition to its mandatory nature, the DSU is, by its own terms, exclusive. Article 23 of the DSU states members must make use of the DSU to deal with the nullification and impairment of WTO obligations and shall not make determinations about the WTO-consistency of another state's conduct except through the DSU (Guzman and Simmons, 2005).

Given the basic rules and procedures of dispute settlement under the WTO are the same for all member countries much has been said about its inability to effectively adjudicate on the trading interests of certain types of members, such as small or developing countries. Some argue that the legalization of the WTO in this manner will favour weaker actors in disputes, because strictly binding rules and procedures can protect the weak from the arbitrary use of the power by the strong (Moon, 2006; 2010). In contrast, others argue there is evidence that developing countries are in a disadvantageous position in the dispute settlement system with stronger states taking advantage of weaker states through the WTO dispute mechanism. Many argue that the current system of self-representation means that countries must have sufficient resources to not only monitor and recognize relevant WTO violations but also fund legal proceedings in cases in which their rights have been violated (Bown, 2005). Furthermore, the self-enforcing nature of the system puts the onus on complainant countries to threaten respondents that fail to adhere to WTO panel rulings. Moreover, it requires experienced bureaucratic agencies within each complainant country that administer trade remedy investigations with resources and access to provide sophisticated legal (and economic) analysis (Bown, 2004b). Finally, dispute settlement activity may be restricted due to special political relationships that may exist between countries. This may be particularly prevalent for developing economies that rely on foreign governments

[2] Strictly speaking, a panel or appellate report is not automatically adopted because the dispute settlement body can decide by consensus not to adopt it. Because the dispute settlement body includes all WTO members, including both parties to the litigation, however, adoption is all but certain (Guzman and Simmons, 2005).

for development assistance or through membership in a common preferential trade agreement (Holmes et al., 2003; Besson and Mehdi, 2004; Bown, 2005).

Given the complicated nature of the dispute settlement system, it is imperative that time is taken to develop a methodological approach to identify the factors that influence developing countries' participation in the dispute settlement mechanism. Examining developing nations in this manner is important even though the share of trade of developing countries still remains around 43% of global trade in general, its growth rate and tendency to increase deserve serious attention (WTO, 2016). As major developing countries like China, India, and Brazil are pivotal in expanding international trade flows, their participation and that of other developing countries within the WTO dispute settlement mechanism needs to be studied in greater detail. Another important reason is that among the total number of WTO member states, more than two-thirds are developing countries. Given that the WTO and its predecessor GATT have established a long tradition of consensus-based decision-making, the participation of developing countries within the process and their satisfaction with it, are critical for improving both the way in which the multilateral trading system operates but also its legitimacy as a strong and reliable institutional body.

In order to analyse developing countries within the WTO dispute settlement mechanism this study seeks to answer the following hypotheses.

H1: The stronger the intensity of developing countries' exports to other WTO members, the more likely developing countries are to initiate trade disputes, as the possibility of exporters encountering unfair treatment increases with the growth of export intensity.

H2: The stronger the ability to retaliate, the more likely developing countries are to initiate trade disputes, as dispute settlement mechanism doesn't have any enforcement power.

H3: The stronger the level of economic power, the more likely developing countries are to initiate trade disputes, as the cost for the use of dispute settlement mechanism is huge.

H4: The more likely a country is to encounter an economic threat from the target country, the less likely a developing country is to initiate trade disputes, as respondents may resort to retaliation.

The paper proceeds as follows. Section 2 details the utilization of the WTO dispute settlement process by providing both a very brief sketch of the DSU and by introducing some of the basic data on dispute resolution. Section 3 presents an assessment of the key literature of the theoretical arguments that inform our expectations about dispute initiation. Section 4 describes the methodological approach used in this study and the key hypotheses analysed as well as discussions of estimation results. Finally, Section 5 provides some concluding remarks and areas of future research opportunity.

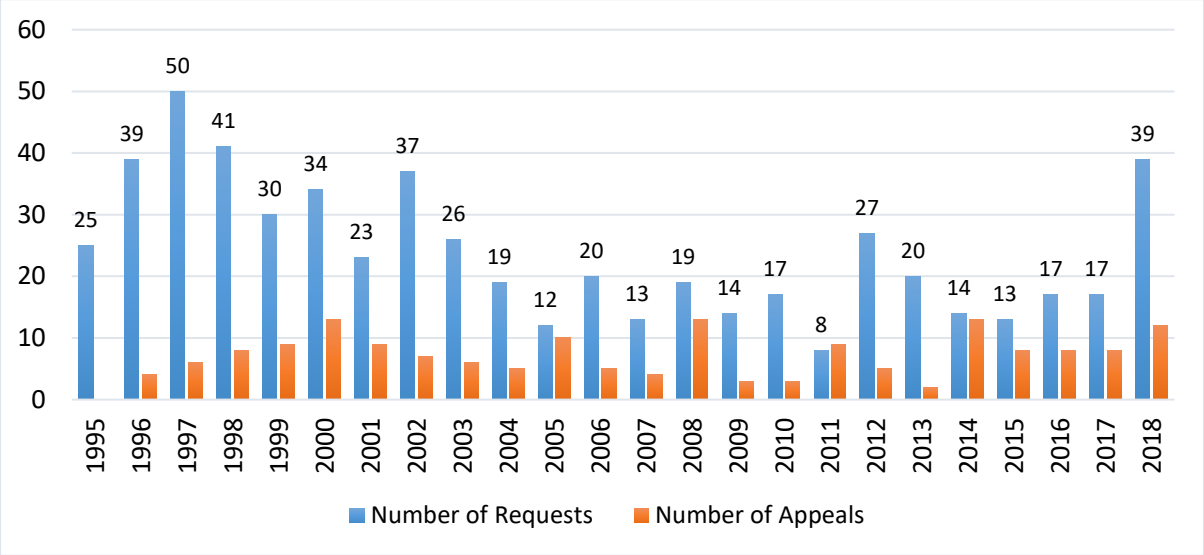
2. The utilization of the DSU by WTO members

Since its formation, nations containing various levels of economic development and political ideologies have used the WTO Dispute Settlement Board (DSB) and in doing so shown respect for the rulings offered by its Dispute Settlement Panel (DSP). Because of this, the DSB has been considered to be the "the backbone of the multilateral trading system".[3] In the 24 years since its formation, 574 cases (see Figure 1 and Table A1) have been brought to the DSB, of which a significant number have been heard with decisions accepted and in some instances cases appealed making it potentially the busiest international dispute settlement system in the

[3] Mike Moore, in WTO's Unique System of Settling Disputes Nears 200 Cases in 2000, Press Release (June 5, 2000) at (WTO, 2000).

world.[4] From the analysis of the 1995-2018 period, Figure 1 also shows that since 2002 there has been a downward trend in the number of disputes heard each year. In the first 10 years of operation the DSB managed on average 32 cases a year, however, since 2005 that has fallen to around 16 cases per year. The number of DSB requests re-raised again in 2018, reached 39 cases.

Figure 1: The number of DSB requests (appeals) 1995-2018



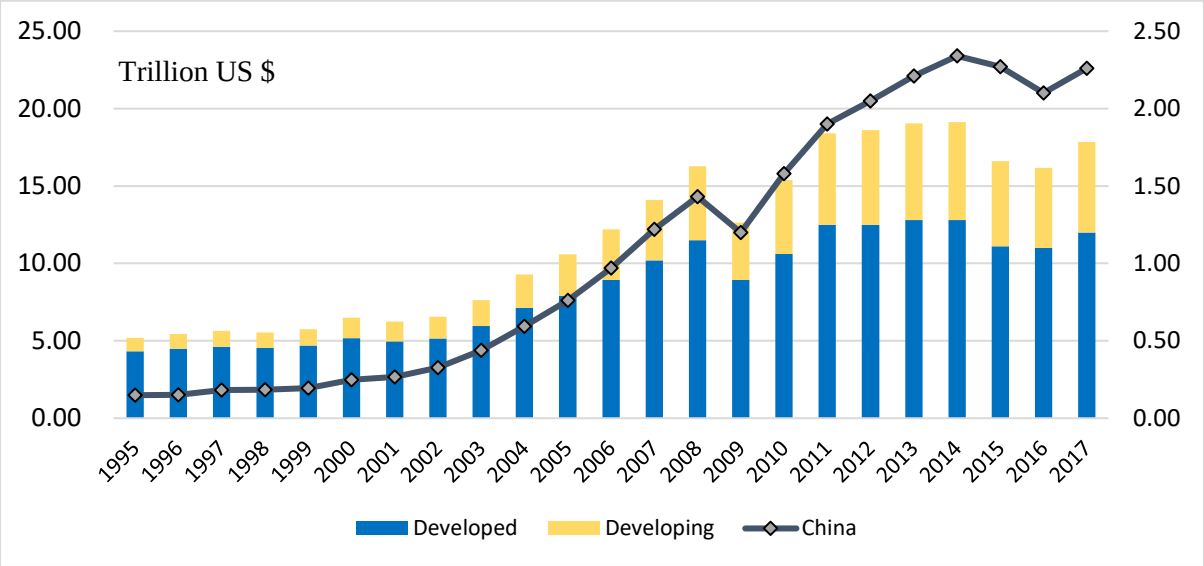
Source: Author's calculation by using the database of Dispute Settlement (WTO, 2018b; WTO, 2018c)

In contrast to the gradual decline in case hearings has been the significant growth in trade export volumes over this time. With the only exception being a drop in trade due to the Global Financial Crisis in 2008 and 2009 (see Figure 2), in which the developed economies of the world were more significantly impacted than other developing economies. The 1995 – 2017 period also coincides with the significant rise of China, particularly in the years following its introduction into the WTO in 2001. In this instance, China's merchandise trade with the rest of

[4] By comparison, the International Criminal Court has only dealt with 25 cases over the last 16 years from which 6 verdicts have been given (ICC, 2018), while the International Tribunal for the Law of the Sea, which was established in 1996 has seen 25 cases submitted (ITLOS, 2018).

the world grew from $149 billion USD in 1995 to $266 billion USD in 2001, before skyrocketing to $2.3 trillion USD in 2017.

Figure 2: Merchandise exports (Developed and Developing Country[5], China) for 1995-2017



Source: World Development Indicators

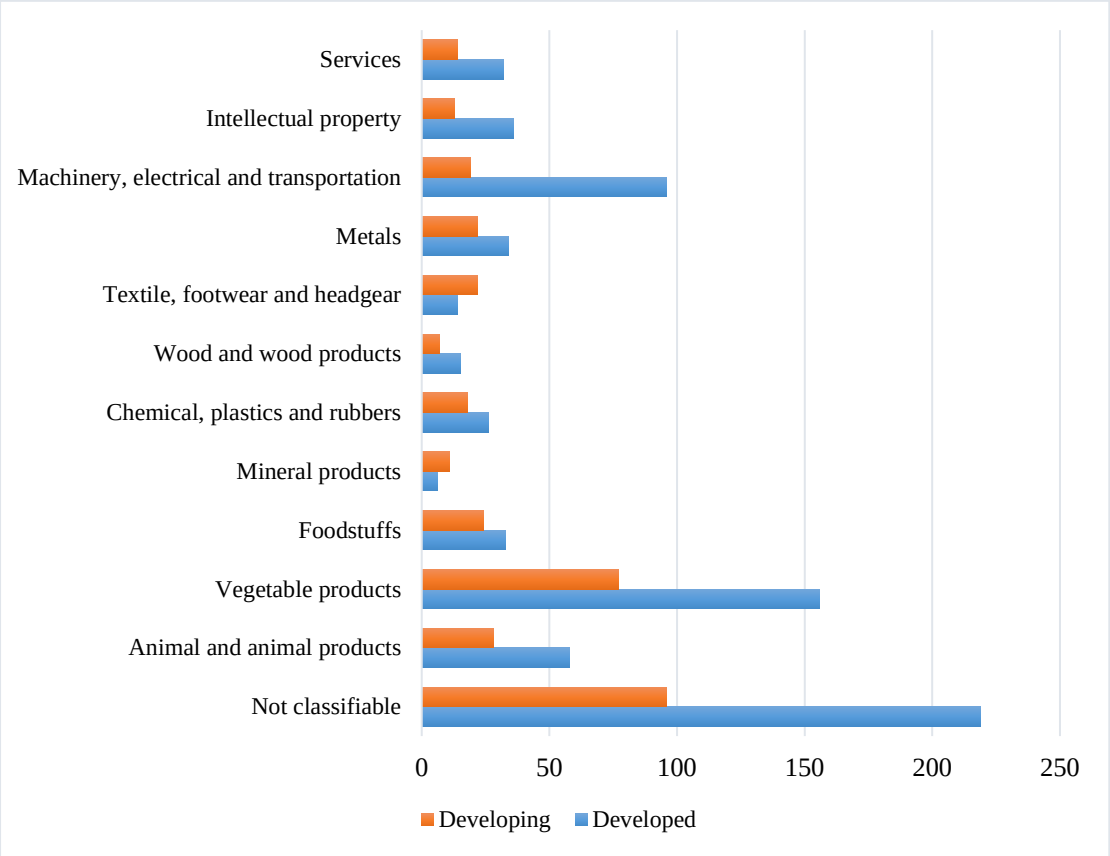
The dispute settlement system has been used by a wide range of developed and developing WTO member countries since 1995 (See Table A2). Although the US and the EU were by far the most frequent litigants, other industrialized countries (Canada, Japan, Korea, and Chile) and some developing countries (Brazil, India, Mexico, China, Thailand, and Indonesia) each initiated ten or more disputes during this study's era of analysis.

To get a more detailed appreciation of the nature of the disputes, Figure 3 assigns each bilateral dispute to one commercial sector. In this instance, the vegetable products and machinery, electrical, and transportation sectors were the two industrial sectors that experienced the highest number of complaints, of these some 156 of the 233 cases (vegetable sector) and 96 of the 115

[5] Countries are classified according to the World Bank 2017 classification. In this study, developed countries are the members of high-income countries with per capita GNI over 12,055 US $, and the rest are classified as developing countries.

cases (machinery, electrical, and transportation sector) where lodged by developed countries. The textile, footwear and headgear sector involved a significant number of dispute from developing countries, with the sector consisting of dispute cases relating, in particular, to the production of textile products.

Figure 3: WTO disputes by industrial sector and category of complainant (1995-2018)



Source: Author's calculation by using the database of Dispute Settlement (WTO, 2018b)

Despite its acceptance, the WTO DSU system has drawn criticism from many quarters about whether or not a level playing field exists among the various countries that have used its services. As such, critics argue the DSB is still susceptible to the types of power politics that have always existed within it and its predecessor GATT (Bouët and Metivier, 2017). While others argue that smaller countries simply shy away from participating in disputes or are simply unable to access the system (Bown and Hoekman, 2005). The reasons for this may include a

lack of resources, a lack of institutional capacity, or a lack of political will. Others have pointed out that overall smaller trade volumes also contribute to less usage by developing countries since there may be less potential for dispute (Kumar, 2006). While some argue the influence and power of the US (Kwon, 2016). Such areas of address form the basis of further assessment below.

3. Assessment of the Literature

The literature surrounding the WTO DSB and the DSP is abundant, bringing together an array of academic genres such as law, economics, trade, and political science. The main focus of these studies has been the effectiveness of the DSP in being able to adjust to the demands of a constantly evolving global trading environment, the DSP's lack of enforcement power, as well as its potential sources of bias against developing countries. This study examines the role of developing countries within the process and whether or not they are exposed to unfair bias within the dispute settlement process.

Early studies on the involvement of developing economies within the dispute settlement mechanism focused on how participation by developing countries could be improved. Kruvila (1997) noted that the number and spectrum of participants as well as the range of issues involving the complaints made by developing nations in the WTO was wider than was the case under the previous GATT regime. While Park and Umbricht (2001), stated that developing nations were targeted relatively more by other nations within the WTO system. In addition, Hudec (1999) noted that developing nations initiated more disputes, however, they were also targeted more often than their developed country peers during the first-three years of the WTO than they were under the previous GATT regime.

Since these early studies which were based on descriptive forms of statistical analysis, the types of empirical studies on the inclusion of developing countries within WTO disputes has become much more sophisticated in their methodological approach. Using a linear probabilistic model, Horn et al. (1999) found that due to their diversified trading portfolio and powerful economic size, G4 countries are over-represented in WTO disputes. In addition to this, Holmes et al. (2003) stated that the level of trade countries share with each other is an important indicator as to whether they will take part in WTO trade disputes. A similar study by Bown (2005) was conducted using a probit regression model. In this instance, the size of exports was identified as being a key determinant of whether to take part in the dispute settlement process. A recent study by Bouët and Metivier (2017) also supports this viewpoint. By building three different models, Bouët and Metivier (2017) found the number of products exported by i to j (rules based model) plays an important role in explaining the probability that i initiates a dispute against j at the DSP. While these studies sought to focus on the relative presence of developing nations within the dispute settlement mechanism, other studies have taken a more qualitative approach. Despite no formal evidence of bias, Busch and Reinhardt (2003) did argue that poorer economies are unable to negotiate significant concessions under the WTO format because they were unable to seek an early settlement to the dispute due to legal restraints. Such sentiments were shared by Besson and Mehdi (2004), who concluded that developing countries were less likely to achieve successful outcomes from the dispute process because of legal constraints, economic interdependencies, the threat of retaliation and international political factors.

Bagwell and Staiger (2000) emphasize that the retaliation threat is a central component of the WTO dispute settlement system. The threat of retaliation provides an enforcement mechanism

which helps to deter any violation of trade agreements. However, for such a mechanism to work the threat of retaliation must be credible (Wood, 2017). Therefore, as things currently stand, the procedure entails a bias against developing nations that have a weaker ability to retaliate. In support of this, Bütler and Hauser (2000), Breuss (2001) and Bown (2004b) argue that the nature of any authorized sanction is likely to not only discourage some poorer countries from using the dispute settlement mechanism, but more specifically, to influence the final outcome of the litigation. Moreover, Bown (2002) showed within his WTO framework model, that terms-of-trade strength can determine the credibility of a retaliation threat. Therefore, even if small countries are authorized by the DSU at the term of the procedure to apply retaliatory measures, the impact on terms-of-trade is null and the threat is then regarded as non-credible.

In addition to trade retaliation authorized by the WTO DS procedure, a country can exert a threat of retaliation against a trading partner via other available economic instruments (Besson and Mehdi, 2004). A key area of threat in this regard, is the provision of economic assistance offered to developing countries, in particular the form of bilateral economic assistance that often leads to closer economic interdependencies (Chang, 2002). During a trade dispute, the country that receives the economic assistance, may resist entering into the WTO dispute settlement process for fear that future assistance may be withheld. Another area of economic threat could be through the removal or cancelling of pre-existing preferential trade agreements between the two countries concerned. In this instance, the threat of economic relationship deterioration influences the litigant behaviours during a dispute settlement. The starting point of this economic threat can then come either from the illegal trade practice (the defendant is economically depending on the plaintiff, which will seek to sanction it while carrying a complaint) or even from the complaint (the plaintiff is economically dependent on the

defendant, which is bothered by the plaintiff initiative and will then seek to sanction him) (Besson and Mehdi, 2004).

The issue of legal costs is another significant issue, with studies by Breuss (2001), Bütler and Hauser (2000); Busch and Reinhardt (2000, 2003), Bown (2004a), Ahn et al. (2013) stressing that legal costs, and thus the legal capacity of each country to support these costs, influences the resolution of the dispute being carried. Given the legal procedures for managing a dispute can take more than 3 years to play out there are significant costs associated with the process. These costs can relate to not only material costs for lawyers and diplomats wages (Guzman and Simmons, 2002) but also the costs associated with gaining access to information about the complex legal characteristics of the litigation. Many therefore argue that given these costs, developing countries are not as well equipped to fight legal challenges nor are they as capable of identifying suspicious trade barriers.

The issue of international political factors can also influence country positions during the dispute settlement process. Of the vast amount of literature on the subject, realist and neo-realist models have examined the economic and political impact of the power relationships that exist between nations and the need for hegemonic powers to create and maintain the frameworks of international organizations (Kindleberger, 1981; Puchala, 2005). From an international trade perspective, the notion of free trade has been pushed by the most powerful economies in a way that seeks to weaken others while also strengthening their global hegemonic grip. As such, the WTO, an organization that champions free trade was created by hegemonic powers in a way that includes small countries because of their relative weakness and of their incapacity to resist to the influence of large dominant economies (Besson and Mehdi, 2004). Applied to the dispute settlement mechanism, the transposition of such a

theoretical paradigm can therefore help to explain some of the determinants which can bias the final result of the litigation against developing nations. In this perspective, trade disputes are partly generated by political relationships and are the result of the structures of power and conflicts between countries. Power is traditionally defined by its means, i.e. by the resources which make it possible to impose ones will on others (or to prevent the others from being opposed to its will). Iida (1999) argues that power, through bilateral relationships can influence dispute settlement procedures, in a manner which allows for favourable verdicts for parties that may engage in trade practices that deviate from WTO rules. In addition, Griffin (2002) examines how military factors may potentially impact the final outcome of a trade dispute. In this instance, it was assumed that the greater the gap that exists in military spending between two parties the greater the probability that the settlement procedure can be influenced. The results from the study showed that the probability of a dispute settlement panel being formed depends on relative differences in military expenditure (as a share of GDP).

Furthermore, Allee (2005) even distinguished the level of democracies as factors that influence settlement performance gaps. In contrast, Moon (2006) showed that the procedural or substantive dispute outcomes of the WTO were not significantly affected by power disparity. However, the study did also note that stricter substantive provisions of recently included agreements were more advantageous to developed countries. In a subsequent study by Kim (2008), which compared the WTO regime with that of the GATT era, it was found that developed countries, ones with greater capacity, are much more likely to utilize dispute settlement in the WTO than developing countries. Moreover, the benefits that have resulted from institutional change have accrued disproportionately to developed member countries in the WTO. Nonetheless, Davis and Bermeo (2009), argued that some developing countries, having overcome initial huddles with participating experiences, were likely to participate more

actively. In this instance, they found that prior association with the trade adjudication process is a strong predictor of future dispute initiation for developing countries. Experience gained through participation in the dispute process as either a complainant or a defendant increases the probability of filing a complaint. Meanwhile, a more recent research by Lee (2018) finds that the "legalized WTO" favors developing countries more than the "less legalized or non-legalized GATT" because the legalization of an international institution makes a member country's economic capacity less important while making its previous experiences important for its use of the dispute settlement mechanism. In contrast, Ahn et al. (2013), found that the symmetric information gap that might encourage smaller developing nations to delve more into the litigation processes. However, in order to overcome informational asymmetry or improve the level of communication between disputing parties in the WTO there is a need to potentially reform the consultation process.

4. Methodological Approach

In this section, we detail our model to examine the performance of developing countries within the WTO dispute settlement process. We construct our database from the WTO website, which provides a list of all initiated disputes from 1995 to 2018. Following Horn et al (1999), Busch and Reinhardt (2003), and Bouët and Metivier (2017), we divide disputes involving more than one plaintiff into as many as bilateral cases as there are complainants. Using data obtained from the WTO website, we find that 574 dispute settlement mechanisms are initiated from 1995 to 2018. As shown in table A2, a total of 109 countries and regions (45 developed countries and 64 developing countries) participated in the dispute settlement mechanism. At the bilateral level, there are 615 trade disputes, among which 210 were initiated by developing countries and 405 by developed countries. Further, we find that out of 210 disputes initiated by

developing countries, only 93 choose to settle trade disputes through third party rulings, while 117 choose negotiated settlement[6]. In contrast, developed countries are more inclined to settle trade disputes through third party rulings, with 207 out of 405 measures settled by this way.

The goal of this paper is to identify the influencing factors for developing countries' participation in dispute settlement mechanisms (a developing country initiate a dispute against another country). As Lee (2018) points out, participation in dispute settlement as a complainant is regarded as a benefit since dispute settlement benefits start from participation in dispute settlement. Participation itself is also important because there is no disadvantage for developing countries in terms of winning verdicts or compliance from defendants (Busch and Pelc, 2015). We now provide a more detail description of the variables used in our study.

4.1 Dependant variable:

Using data obtained from the WTO website, we construct a binary dependent variable Y_{ijt}: a dummy variable takes on a value of 1 if country i has filed at least one complaint against country j in year t, 0 if not. Since we are using bilateral annual data, the proportion of initiating trade disputes between countries is very small, that is to say, the frequency of Y_{ijt}=1 is very small and belongs to "rare events". If a general MLE (such as Probit or Logit) method is used to estimate the binary choice model, there will be rare event biases. There are usually two ways to solve the rare event bias. One is the rare events logistic estimation (stata package: *relogit*)

[6] Here, the negotiated settlement means the procedure that two disputants settle their disputes without the rulings of the panel or the Appellate Body, whereas the third party ruling means the procedure in which the panel rules or the Appellate Body adjudicates for the settlement of disputes. (Lee, 2018, p.9)

proposed by King and Zeng (2001a, 2001b)[7]. The other one is to use the asymmetric extreme value distribution to obtain a complementary log-log model (stata package: *cloglog*) to correct the rare event bias. This paper conducts a regression analysis based on the logit model, and then use the two methods to solve the rare event bias. The basic empirical model used in our study is as follows:

$$\Pr\left(Y_{ijt} = 1 \middle| \alpha, X_{ijt}\right) = \emptyset(\alpha + \beta X_{ijt})$$

Where $\emptyset(\cdot)$ is the logistic cumulative distribution function, X is the set of the explanatory variables and β the set of the coefficients to be estimated. Since our study focuses on developing countries, thus, i represents the complainant which is limited to developing countries and j represents the respondent, which can be any WTO member country. We estimate the marginal effects of the explanatory variables on the probability of developing countries initiate a dispute. The independent variables are categorized into 5 categories: export intensity, retaliation capability, economic power, economic threat, and other related control variables.

4.2 Independent variables:

1. *Export intensity*

Export intensity is represented by the number of products exported by country i to country j (EXP_Num_{ijt}) and the share of country 's exports received by country j (EXP_ratio_{ijt}) in year t. According to the 'rules based' model proposed by Bouët and Metivier (2017), the number of exports is an important factor that affect the complainants desire to initiate a dispute, as the probability that an exporter encounters unfair treatment increases with the number of

[7] King and Zeng (2001a, 2001b) developed STATA command program 'relogit', which can be downloaded from the author's website (https://gking.harvard.edu/relogit).

exported products. Similarly, if country i has a high level of export share to country j, then it is more likely that country i uses the dispute settlement mechanism to deal with trade disputes, because the dispute involves most of its export interests. Using data obtained from BACI databases, we calculated the number of products as well as the share of exports by country i to country j from 1995 to 2017[8]. Both of the two variables are expected to have a positive effect on developing countries participation in the dispute settlement mechanism[9]. Therefore, as stated in hypothesis H1: *The stronger the intensity of developing countries' exports to other WTO members, the more likely developing countries are to initiate trade disputes*.

2. Retaliation capability

Retaliation capability is represented by the number of products imported by country i from country j (IMP_Num_{ijt}) and the share of country i 's total imports from country j (IMP_ratio_{ijt}) in year *t*. We need to be aware that there is no strong enforcement mechanism under the dispute resolution mechanism. The DSU stipulates that if the losing party does not implement the recommendations and rulings of the panel or the Appellate Body within a reasonable period of time, the complainant may be authorized to retaliate. However, the lack of retaliation for the respondent may make it impossible for the complainant to file a complaint. The capacity to retaliate through trade policy is determined by whether the retaliating country accounts for a sufficient amount of its trading partner's exports (Bown, 2004a). In this instance, we select two variables IMP_Num_{ijt} and IMP_ratio_{ijt} to measure the complainant's capacity to retaliate. The raw-data for these two variables is collected from BACI database, and has been further analysed by the author's of this study. We expect both of the two variables to have a

[8] The database is available until 2017.

[9] However, it should be noted that the greater the export intensity, the greater the risk of retaliation from the defendants, and thus preventing developing countries from initiating trade disputes. However, according to the previous study (i.e. Bouët and Metivier, 2017), this negative effect is less likely to occur, so we ignore this negative effect here.

positive effect on a country's decision to participate in the DSP. Therefore, as stated in hypothesis H2: *The stronger the ability to retaliate, the more likely developing countries are to initiate trade disputes.*

3. Economic power

The third category of variables measures the impact that economic power or economic capacity has on developing countries participation in the dispute settlement mechanism. Economic power is represented by the gross national income (GNI_{it}) of developing country i and its share of total world trade ($Tarde\_s_{it}$) in year *t*. Data of GNI is collected from the World Bank's World Development Indicators and share of total world trade is calculated by authors using trade data from the BACI database. Considering the duration and legal resources of the conflict needed, there must be a huge cost for the use of dispute settlement mechanism. The probability of a country filing a complaint depends on its economic ability to bear the cost. Therefore, both of the variables are expected to have a positive effect, as stated in hypothesis H3: *The stronger the level of economic power, the more likely developing countries are to initiate trade disputes.*

4. Economic threat

The fourth category of explanatory variables consists of proxies which measure the threat of political and economic retaliation effects on developing countries performance. In order to assess this, two indicators are used to understand the types of pressure WTO member countries can place on developing nations. In this regard, we use bilateral Official Development Assistance per capita received by a developing country from WTO member countries (ODA_per_{ijt}), using data collected from the OECD. From a retaliation threat perspective, we might expect a negative relationship between Y_{ijt} and ODA_per_{ijt}. Moreover, a developing country that is reliant on the developed country for bilateral assistance may exercise self-

constraint during the dispute process. The second indicator PTA_{ijt} is a dummy variable that takes the value of 1 if there is Preferential Trade Agreement (PTA) in effect with the respondent before *t* year, and zero if no PTA is in place[10]. As developing country *i* enjoys preferential treatment in the country *j*'s market, the former might fear losing this kind of privileged trading position if it opposes its trade partner in a formal dispute. A regional trade agreement results in close trade interdependence which gives the respondent a way in which they may exert the threat of retaliation which is in addition to the trade dispute. Therefore, the expected relationship between Y_{ijt} andPTA_{ijt} is negative. Therefore, as stated in hypothesis H4: *The more likely a country is to encounter an economic threat from the target country, the less likely a developing country is to initiate trade disputes, as respondents may resort to retaliation.*

5. Other related control variables

The fifth category also includes two variables: the share of trade as a proportion of GDP ($Trgdp_{ijt}$) and the total population (Pop_{ijt}). We follow Lee (2018) by using the average value of country *i* and country *j* to describe the two variables. For example, '$Trgdp_{ijt}$' refers to the average share of trade out of GDP between country *i* and country *j* in year *t*. These two variables are added to control the potential effect of the characteristics of sample countries.

4.3 Data description and empirical results

Data summary statistics are shown in Table 1. As the data for the dependent variables can only be obtained until 2017, our sample is bilateral country-level data from 1995 to 2017. The variables of EXP_Num_{ijt}, IMP_Num_{ijt}, GNI_{it}, and Pop_{ijt} are logged due to high dispersions, and EXP_ratio_{ijt}, IMP_ratio_{ijt}, $Tarde\_s_{it}$, and $Trgdp_{ijt}$ are expressed as percentages. It

[10] Data from 1995 to 2015 are from the world bank group (Hofmann, Osnago, and Ruta, 2017), and data from 2015 to 2017 are from DESTA (constructed by Dür, Baccini, and Elsig, 2014).

can be seen from Table 1 that the frequency of occurrence of Y_{ijt}=1 is only 0.08%, which can be regarded as a rare event. Therefore, we first perform a normal Logit regression and then further analyze it using the rare event bias correction model.

Table 1: Summary statistics of variables

	Count	Mean	Median	s.d.	Min	Max
Dependent variable						
Initiating a dispute (Y_{ijt})	216,021	0.0008	0	0.03	0	1
Independent variable						
Export intensity						
Number of exports (EXP_Num_{ijt}, log)	216,021	2.81	2.4	2.17	0	8.47
Share of exports (EXP_ratio_{ijt})	216,021	0.82	0.02	3.76	0	91.29
Retaliation capability						
Number of imports (IMP_Num_{ijt}, log)	216,021	3.14	2.77	2.3	0	8.47
Share of imports (IMP_ratio_{ijt})	216,021	0.83	0.02	3.25	0	85.54
Economic power						
Gross national income (GNI_{it}, log)	216,021	23.72	23.4	2.05	19.07	30.13
Share of total world trade ($Tarde\_s_{it}$)	216,021	0.32	0.04	1.05	0	11.62
Economic threat						
ODA per capita (ODA_per$_{ijt}$)	216,021	0.41	0	5.5	-170.25	481.06
PTA (PTA_{ijt})	216,021	0.12	0	0.32	0	1
Other related control variables						
Share of trade out of GDP ($Trgdp_{ijt}$)	216,021	80.38	74.94	32.39	10.36	316.48
Total population (Pop_{ijt}, log)	216,021	16.84	16.76	1.38	10.94	21.03

Considering the potential multicollinearity problem that may exist between the explanatory variables, we first examine the correlations among right hand side variables before conducting the formal analysis. We can see from Table A4, that there is no high correlation between variables, so it can be considered that there is no multicollinearity problem in our analysis model.

As mentioned earlier, we hypothesize that a decision by developing countries initiating a dispute against WTO members depends on the factors of export intensity, retaliation capacity, economic power, and level of economic threat. The estimation results are presented in Tables 2 through 5. They are organized into three groups representing 'Full sample', 'Early WTO (1995-2005)', and 'Late WTO (2006-2017)'. As the research results may vary with the defendant countries, we further divided the samples into 'All', 'Developed', and 'Developing' country groups. Table 2 shows the estimation results of logit regressions for separate sample analysis. In terms of first category variables, which capture the export intensity present in a trade dispute, the coefficient results of the number of exports (EXP_Num_{ijt}) are significant and positive (0.83~1.41) in all estimations. This finding is line with the expectation that increases in number of exports should lead to an increase in probability of initiating a trade dispute. The other export intensity variable, share of exports (EXP_ratio_{ijt}) is found to be positive and statistically significant in the sample as a whole and in the developed country group (0.04~0.09), however, the sign was negative for the developing country group (-0.33~-0.17). We argue this is likely because the potential negative effect of export intensity on the initiation of trade disputes may exist between developing countries. That is, the greater the export intensity, the greater the risk of retaliation from the defendants, and thus preventing developing countries from initiating trade disputes against developing countries. In terms of the second category of variables, which capture the retaliation capability present in a trade dispute, the results regarding the number of imports (IMP_Num_{ijt}) were found to be positive and statistically significant as predicted in all estimations (0.24~0.84); the exception being equation (5) which dealt with developed country groups. However, the results regarding share of imports (IMP_ratio_{ijt}) were mixed and had limited effects on the initiation of trade disputes. In terms of the third category of variables, which captures the level of economic power present in a trade

dispute, the results for gross national income (GNI_{it}) was found to have predictive effect for both the sample as a whole and the developed country group (0.22~0.51), while having a mixed impact on the developing county group. In addition, the coefficients results for the share of total world trade ($Tarde\_s_{it}$) are negative which is not in line with expectations. In terms of fourth category of variables, which captures the level of economic threat present in a trade dispute, both the ODA per capita (ODA_per_{ijt}) and the PTA (PTA_{ijt}) were shown to have a negative effect on both the sample as a whole and the developed country group, while coefficient signs for the developing country groups are mixed and insignificant[11]. This suggests that, developing countries are more afraid of the economic threat posed by developed countries than other developing economies, as the economic threats from developed countries have seriously hindered developing countries initiating formal trade dispute proceedings at the WTO.

As mentioned earlier, our study uses rare event logistic regressions and complementary log-log regressions in order to correct the rare event bias. The estimation results from these analyses are shown in Tables 3 and 4. In general, these empirical findings are similar to those displayed in Table 2. More specifically, the number of exports (EXP_Num_{ijt}) were shown to have a statistically significant effect in all estimations. The results for share of exports (EXP_ratio_{ijt}) were found to be positive and statistically significant for both the sample overall and for developed country groups, while the effects were statistically negative for developing defendant countries. In regards to the number of imports (IMP_Num_{ijt}), our findings were positive and statistically significant for almost all estimations, while the share of imports (IMP_ratio_{ijt}) was found to have statistically significant positive effect on initiating trade disputes but only when the target countries was a developing economy.

[11] At the early stage of WTO, ODA's investment data from developing countries were very few. Therefore, the variable ODA per capita was droped automatically in the analysis of Equation (5).

The coefficients of gross national income (GNI_{it}) were found to be significant for both the sample as a whole and for developed country groups but were mixed for developing country groups, as shown in Table 2. This suggests that economic power is an important factor for developing countries when considering whether they should enter into a trade disputes against a developed country. However, our results also show that it becomes significantly less important when the target country is a developing country. Moreover, our estimates for the share of total world trade ($Tarde\_s_{it}$) were also similar to those in documented in Table 2, although the negative effects are not in line with expectations, these effects are insignificant over the 2006-2017 period when the target countries in question are more developed.

In other results, the ODA per capita (ODA_per_{ijt}) was found to have a predictive negative effect for all estimations shown in Table 4. However, Table 3 shows the impact becomes positive when the target countries are developing countries. Similarly, when the target country is a developing economy, the negative impact of the PTA (PTA_{ijt}) becomes less significant, especially over the 2006-2017 period. Such a finding demonstrates the fact that economic threats do not affect a country's decision to enter into a formal WTO trade disputes against developing countries, which may have something to do with the limited retaliatory capacity of these poorer economies.

Finally, in reference to Moon and Perron (2018) and Lee (2018), seemingly unrelated estimations [12] are conducted, in order to test whether there are any statistically significant

[12] Seemingly unrelated estimation, proposed by Zellner (1962), is a generalization of a linear regression model that comprises several individual regression equations that are linked by the fact that their disturbances are correlated (Moon and Perron, 2018). It allows us to compare the estimated coefficients of several regression equations (Lee, 2018).

differences in the coefficients of the main explanatory variables for the different periods and different target countries. The results from these analyses are shown in Table 5. Moreover, equations (1) and (2) document the results of the combined regressions for the two different periods analysed namely the earlier and later years of the WTO handling of disputes. Through the comparison of the main explanatory variable coefficients of these two periods, we were able to ascertain that there are statistically significant differences in the coefficients of the three independent variables, number of imports (IMP_Num_{ijt}), share of total world trade ($Tarde\_s_{it}$), and ODA per capita (ODA_per_{ijt}). The positive effect of number of imports ((IMP_Num_{ijt}) representing the retaliatory ability of initiating trade disputes increases over the later WTO period, while the negative effect of ODA per capita (ODA_per_{ijt}), which represents the economic threat, also becomes stronger during the same period of time. Finally, the share of total world trade ($Tarde\_s_{it}$) is statistically insignificant during this later period. These results show that in more recent years, the retaliation capacity of developing countries themselves (plaintiffs) has had a stronger influence on whether to initiate trade disputes, while at the same time they are more afraid of the economic threat from the defendants.

Equations (3) and (4) show the combined regression results for both the different categories of country development level and the sample as a whole. From our analyses, we demonstrate that as the accused country faces different nations, the factors of influence change. For example, when the defendants are developing countries, the effects of number of exports (EXP_Num_{ijt}) and share of exports (EXP_ratio_{ijt}) representing export intensity on initiation of trade disputes become weaker, while the positive effect of share of imports (IMP_ratio_{ijt}), which represents the ability to retaliate, becomes stronger. At the same time, it seems that the plaintiff's own economic strength and the defendant's economic threat become less important when the defendant is a developing country.

Equations (5) and (6) present the results of the combined regressions for developed and developing countries in the years immediately following the formation of the WTO (1995 – 2005). The coefficients of the two independent variables, share of exports (EXP_ratio_{ijt}), and gross national income (GNI_{it}) are found to be statistically different. The results are similar to the overall comparisons given in (equation (3) vs equation (4)), when the defendant is a developing country, the positive effects of EXP_ratio_{ijt} and GNI_{it} are weakened and no longer statistically significant.

Finally, equations (7) and (8) present the results of the combined regressions for developed and the developing countries in more recent years (2006 -2017). From our analysis, we found that there are statistically significant differences in the coefficients of the four independent variables, share of exports (EXP_ratio_{ijt}), share of imports (IMP_ratio_{ijt}), share of total world trade ($Tarde\_s_{it}$), and PTA (PTA_{ijt}) between the developed and developing groups during the late WTO period. According to the change of coefficient, we can infer that the retaliatory ability of the plaintiff is more effective when the defendant is a developing country during this time, and the economic threat from developed countries is more effective at restraining the plaintiff from initiating a trade dispute.

Table 2: Estimation results of logit regressions: separate-sample analysis

Sample type	Full sample			Early WTO (1995-2005)			Late WTO (2006-2017)		
Respondent	All	Developed	Developing	All	Developed	Developing	All	Developed	Developing
Equation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
EXP_Num	0.97***	1.38***	0.95***	1.01***	1.41***	0.96***	0.88***	1.08***	0.83***
	(0.12)	(0.24)	(0.17)	(0.16)	(0.31)	(0.23)	(0.18)	(0.36)	(0.28)
EXP_ratio	0.04***	0.07***	-0.19**	0.04**	0.06***	-0.33	0.04**	0.09***	-0.17*
	(0.01)	(0.01)	(0.09)	(0.02)	(0.02)	(0.24)	(0.02)	(0.02)	(0.10)
IMP_Num	0.42***	0.29*	0.57***	0.24**	0.21	0.48***	0.67***	0.45*	0.84***
	(0.08)	(0.16)	(0.12)	(0.10)	(0.21)	(0.16)	(0.14)	(0.25)	(0.22)
IMP_ratio	-0.01	-0.03	0.03	-0.01	-0.03	0.03	-0.00	-0.03	0.04
	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)	(0.07)	(0.03)	(0.04)	(0.04)
GNI	0.22***	0.36***	0.03	0.33***	0.45***	-0.05	0.25**	0.51***	0.26
	(0.07)	(0.09)	(0.15)	(0.11)	(0.14)	(0.25)	(0.12)	(0.19)	(0.24)
Trade_s	-0.07	-0.07	-0.28**	-0.24**	-0.30**	-0.19	-0.03	-0.05	-0.36*
	(0.04)	(0.05)	(0.14)	(0.12)	(0.14)	(0.24)	(0.05)	(0.06)	(0.22)
ODA_per	-0.05***	-0.05***	-0.20	-0.04***	-0.05***		-0.22***	-0.21***	-0.15
	(0.01)	(0.01)	(0.64)	(0.01)	(0.02)		(0.06)	(0.08)	(0.55)
PTA	-0.94***	-2.10***	-0.44	-1.29***	-1.51***	-1.70**	-0.69**	-2.98***	0.24
	(0.23)	(0.45)	(0.35)	(0.41)	(0.58)	(0.71)	(0.30)	(0.85)	(0.46)
Trgdp	-0.03***	-0.03***	-0.02***	-0.03***	-0.02**	-0.04***	-0.02***	-0.03***	-0.01
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Pop	-0.24**	-0.26	-0.27*	-0.24*	-0.15	-0.47**	-0.24	-0.29	-0.28
	(0.11)	(0.19)	(0.15)	(0.14)	(0.24)	(0.22)	(0.15)	(0.30)	(0.21)
Constant	-14.40***	-19.51***	-9.24***	-15.65***	-23.54***	-1.63	-16.91***	-22.51***	-17.29***
	(2.22)	(3.50)	(3.23)	(3.39)	(5.02)	(5.53)	(3.55)	(5.99)	(4.98)
Observations	216,021	89,362	126,659	89,255	37,702	51,553	126,766	51,660	75,106
Pseudo- R^2	0.34	0.42	0.26	0.35	0.41	0.27	0.35	0.45	0.30

Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Estimation results of rare event logit regressions: separate-sample analysis

Sample type	Full sample			Early WTO (1995-2005)			Late WTO (2006-2017)		
Respondent	All	Developed	Developing	All	Developed	Developing	All	Developed	Developing
Equation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
EXP_Num	0.96***	1.36***	0.92***	1.00***	1.37***	0.92***	0.86***	1.03***	0.76***
	(0.11)	(0.22)	(0.13)	(0.16)	(0.30)	(0.18)	(0.15)	(0.31)	(0.15)
EXP_ratio	0.04***	0.07***	-0.17**	0.04***	0.06***	-0.24	0.04**	0.09***	-0.14
	(0.01)	(0.01)	(0.08)	(0.01)	(0.02)	(0.23)	(0.02)	(0.02)	(0.09)
IMP_Num	0.41***	0.28*	0.55***	0.23***	0.18	0.43***	0.65***	0.42*	0.81***
	(0.07)	(0.15)	(0.10)	(0.08)	(0.20)	(0.11)	(0.11)	(0.23)	(0.17)
IMP_ratio	-0.01	-0.03	0.04***	-0.01	-0.03	0.06*	-0.00	-0.03	0.05**
	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.04)	(0.02)	(0.03)	(0.02)
GNI	0.22***	0.35***	0.02	0.31***	0.42***	-0.06	0.23**	0.46***	0.22
	(0.06)	(0.09)	(0.13)	(0.10)	(0.14)	(0.17)	(0.10)	(0.16)	(0.20)
Trade_s	-0.06	-0.06	-0.22***	-0.21***	-0.27***	-0.08	-0.03	-0.04	-0.21**
	(0.04)	(0.04)	(0.07)	(0.08)	(0.09)	(0.14)	(0.05)	(0.06)	(0.10)
ODA_per	-0.05***	-0.06***	0.05	-0.05***	-0.06***		-0.22***	-0.23***	0.23***
	(0.01)	(0.01)	(0.07)	(0.01)	(0.01)		(0.03)	(0.05)	(0.06)
PTA	-0.92***	-2.04***	-0.40	-1.24***	-1.42***	-1.56**	-0.67**	-2.80**	0.29
	(0.22)	(0.44)	(0.31)	(0.38)	(0.50)	(0.74)	(0.27)	(1.14)	(0.35)
Trgdp	-0.03***	-0.03***	-0.02***	-0.03***	-0.02**	-0.03***	-0.02***	-0.03***	-0.01*
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Pop	-0.23**	-0.25	-0.26**	-0.23*	-0.14	-0.44**	-0.22*	-0.26	-0.28**
	(0.10)	(0.16)	(0.11)	(0.13)	(0.21)	(0.18)	(0.13)	(0.22)	(0.13)
Constant	-14.31***	-19.13***	-8.90***	-15.25***	-22.73***	-1.48	-16.46***	-21.11***	-15.72***
	(2.29)	(3.47)	(3.11)	(2.90)	(4.23)	(2.99)	(3.86)	(6.56)	(4.52)
Observations	216,021	89,362	126,659	89,255	37,702	51,553	126,766	51,660	75,106

Robust standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Estimation results of complementary log-log regressions: separate-sample analysis

Sample type	Full sample			Early WTO (1995-2005)			Late WTO (2006-2017)		
Respondent	All	Developed	Developing	All	Developed	Developing	All	Developed	Developing
Equation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
EXP_Num	0.97***	1.37***	0.94***	1.01***	1.40***	0.95***	0.88***	1.09***	0.83***
	(0.11)	(0.22)	(0.13)	(0.16)	(0.29)	(0.18)	(0.15)	(0.30)	(0.15)
EXP_ratio	0.04***	0.06***	-0.19**	0.04***	0.06***	-0.33	0.04**	0.09***	-0.17**
	(0.01)	(0.01)	(0.08)	(0.01)	(0.02)	(0.23)	(0.02)	(0.02)	(0.09)
IMP_Num	0.42***	0.30**	0.56***	0.24***	0.21	0.48***	0.67***	0.46**	0.83***
	(0.07)	(0.15)	(0.10)	(0.08)	(0.20)	(0.11)	(0.12)	(0.23)	(0.17)
IMP_ratio	-0.01	-0.03	0.03**	-0.01	-0.03	0.03	-0.00	-0.03	0.04**
	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)	(0.04)	(0.03)	(0.03)	(0.02)
GNI	0.22***	0.36***	0.03	0.33***	0.44***	-0.05	0.25**	0.50***	0.26
	(0.06)	(0.09)	(0.13)	(0.10)	(0.14)	(0.17)	(0.10)	(0.15)	(0.20)
Trade_s	-0.07*	-0.07	-0.28***	-0.24***	-0.29***	-0.19	-0.03	-0.05	-0.36***
	(0.04)	(0.04)	(0.07)	(0.08)	(0.09)	(0.14)	(0.05)	(0.06)	(0.10)
ODA_per	-0.04***	-0.05***	-0.19***	-0.04***	-0.05***		-0.20***	-0.20***	-0.15**
	(0.01)	(0.01)	(0.07)	(0.01)	(0.01)		(0.03)	(0.04)	(0.06)
PTA	-0.94***	-2.08***	-0.45	-1.28***	-1.48***	-1.70**	-0.71***	-3.01***	0.23
	(0.22)	(0.43)	(0.31)	(0.37)	(0.50)	(0.74)	(0.27)	(1.12)	(0.34)
Trgdp	-0.03***	-0.03***	-0.02***	-0.03***	-0.02**	-0.04***	-0.02***	-0.03***	-0.01*
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Pop	-0.24**	-0.26*	-0.27**	-0.24*	-0.16	-0.46**	-0.24*	-0.28	-0.28**
	(0.10)	(0.16)	(0.11)	(0.13)	(0.20)	(0.18)	(0.13)	(0.22)	(0.13)
Constant	-14.43***	-19.51***	-9.24***	-15.66***	-23.28***	-1.66	-16.90***	-22.67***	-17.28***
	(2.27)	(3.42)	(3.10)	(2.89)	(4.19)	(2.98)	(3.83)	(6.43)	(4.50)
Observations	216,021	89,362	126,659	89,255	37,702	51,553	126,766	51,660	75,106

Robust standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Seemingly unrelated estimation of logit regressions

Sample type	Full sample		Full sample		Early WTO (1995-2005)		Late WTO (2006-2017)	
Respondent	Early WTO	Late WTO	Developed	Developing	Developed	Developing	Developed	Developing
Equation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EXP_Num	1.01***	0.88***	**1.38*** **	**0.95*** **	1.41***	0.96***	1.08***	0.83***
	(0.16)	(0.15)	(0.22)	(0.13)	(0.30)	(0.18)	(0.31)	(0.15)
EXP_ratio	0.04***	0.04**	**0.07*** **	**-0.19** **	**0.06*** **	**-0.33**	**0.09*** **	**-0.17** **
	(0.01)	(0.02)	(0.01)	(0.08)	(0.02)	(0.23)	(0.02)	(0.09)
IMP_Num	**0.24*** **	**0.67*** **	0.29**	0.57***	0.21	0.48***	0.45**	0.84***
	(0.08)	(0.11)	(0.15)	(0.10)	(0.20)	(0.11)	(0.23)	(0.17)
IMP_ratio	-0.01	-0.00	**-0.03**	**0.03** **	-0.03	0.03	**-0.03**	**0.04** **
	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.04)	(0.03)	(0.02)
GNI	0.33***	0.25**	**0.36*** **	**0.03**	**0.45*** **	**-0.05**	0.51***	0.26
	(0.10)	(0.10)	(0.09)	(0.13)	(0.14)	(0.17)	(0.16)	(0.20)
Trade_s	**-0.24*** **	**-0.03**	**-0.07**	**-0.28*** **	-0.30***	-0.19	**-0.05**	**-0.36*** **
	(0.08)	(0.05)	(0.04)	(0.07)	(0.09)	(0.14)	(0.06)	(0.10)
ODA_per	**-0.04*** **	**-0.22*** **	**-0.05*** **	**-0.20*** **	-0.05***		-0.21***	-0.15**
	(0.01)	(0.03)	(0.01)	(0.07)	(0.01)		(0.05)	(0.06)
PTA	-1.29***	-0.69**	**-2.10** **	**-0.44**	-1.51***	-1.70**	**-2.98*** **	**0.24**
	(0.38)	(0.27)	(0.44)	(0.31)	(0.50)	(0.74)	(1.14)	(0.35)

Robust standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; Coefficients in bold type imply significant differences ($p < 0.10$) between two different groups (i.e. Early WTO vs Late WTO; Developed vs Developing).

4.4 Discussion of Results

Our study analyzes the factors that affect the initiation of trade disputes by developing countries using four specific characteristics (export intensity, retaliation capability, economic power, and economic threat). Of the four hypotheses analyzed, almost all of the variables have recorded the kinds of statistically significant results that we expected prior to conducting our empirical analyses.

Firstly, the positive effects of the export intensity variables show that a developing country is more likely to initiate a trade dispute against WTO members as the number and value of exports increases, which are in line with the rules-based model proposed by (Bouët and Metivier, 2017). As mentioned above, as the quantity of exported products increases, the possibility of unfair treatment against exporters also increases. Moreover, from the comparison between developed and developing countries, we showed that export intensity has a stronger impact on initiating trade disputes against developed countries. This suggests that exports to developed countries are at greater risk of unfair treatment, making them more likely to initiate trade disputes.

Secondly, the positive effects of retaliation capability variables (especially for the variable of (IMP_Num_{ijt}) show that it is more likely for developing countries to initiate trade disputes when the retaliation capacity is high. Furthermore, the effect of retaliation capability becomes stronger in in more recent years than in the 1995-2005 period of analysis. This may be due to the lack of enforcement power of the dispute settlement mechanism, as the complainants are increasingly aware of the importance of retaliation capability. We also established that retaliation capability has a more significant impact on developing countries filing a complaint against developing countries than against developed ones. This shows that the role of retaliation

is more pronounced when trade disputes are initiated between countries with similar levels of development.

Thirdly, the GNI_{it}, which represents economic power, is an important factor in initiating trade disputes against developed countries but the effect is insignificant when the potential defendant countries are developing countries. The results for the developed country group confirms hypothesis H3 that the stronger the level of economic power, the more likely developing countries are to initiate trade disputes, as the cost for the use of the dispute settlement mechanism is huge. Furthermore, our findings also provide some support for the capacity theory but go against the underlining notion of the legalization theory (Lee, 2018) that economic capability does not determine the initiation of trade disputes. From this perspective, we can conclude that only when the developing countries initiate trade disputes against the developing countries, the trade dispute settlement mechanism is relatively legalized.

Finally, the negative effects of the economic threat variables, especially for developed groups, show that a developing country is less likely to initiate a trade dispute against developed countries when the developing country is reliant on a developed country for bilateral aid assistance as well as a series of preferential trade terms. From our results, we can concur that developing countries exercise self-constraint during the litigation process in order to not jeopardize any privileged economic arrangements that they depend on. The negative findings of ODA per capita and PTA highlight that the reluctance that many developing countries may have in using the dispute settlement system in the first place (Griffin, 2002). The costs associated with launching legal procedures are significant and given the repercussions they may face through the removal of bilateral aid programs which act as an important source of

social and economic support, many developing countries may think twice before entering into any formal legal hearings.

5 Concluding Remarks

Our research examined the factors that affect a developing country's decision to file a complaint against WTO members utilizing bilateral country level data from the 1995 to 2017 period. In light of our findings, there is sufficient empirical evidence to suggest that the export intensity, retaliation capability, economic power, and economic threat are the main factors that determine the initiation of trade disputes by developing countries. This means that not all developing countries can participate in trade dispute settlement mechanisms, to be specific, the stronger the export intensity, the retaliation capability, and the economic power, as well as the less economic threat, the more likely developing countries are to initiate trade disputes against other WTO members.

Moreover, through the seemingly unrelated estimations of different periods and different target countries of the accused, we further find that: (1) overall, export intensity has a stronger impact on initiating trade disputes against developed countries. (2) the retaliation capability has a more significant impact on developing countries filing a complaint against developing countries than against developed ones, with the effect being more pronounced over the 2006-2017 period. (3) the impact of economic power on initiating trade disputes is stronger when the potential defendants are from developed countries. (4) Economic threats from developed countries are more likely to deter developing countries from initiating trade disputes against them.

Given the significance of our findings, further areas of empirical endeavour now appeal. In particular, the factors that influence the probability of a dispute settlement panel forming would be an interesting and relevant area to better understand. In addition to this, future research should also focus on examining the types of case, in terms of both industry and legal infringement areas that are most likely responsible for achieving the best dispute settlement outcomes for developing countries. Finally, a clearer understanding of why so many WTO trade disputes are initiated but never completed. Given the costs associated with initiating a trade dispute, this is an unusually high number, as such also requires a closer examination.

Appendix

Table A1: Current Status of Disputes

Type	Definition	Number
In consultations	Complainant requests consultations with respondent, no dispute panel established and no withdrawal or mutually agreed solution notified.	174
Panel established, but not yet composed	The dispute settlement body has agreed to establish a panel, but the panelists have not yet been chosen.	29
Panel composed	Panelists have been selected according to procedures laid down in Dispute Settlement Understanding Article 8. The panel report has not been adopted or appealed, and no withdrawal or mutually agreed solution has been notified.	30
Panel report circulated	Panel report circulated to members, not yet appealed or adopted.	2
Panel report under appeal	Cases currently being reviewed by the Appellate Body following appeal of the panel report.	10
Appellate Body report circulated	Appellate Body circulated to members but not yet appealed.	0
Reports adopted, no further action required	Appellate Body and/or panel reports adopted. Case resolved without need for respondent to take further action.	35
Reports adopted, with recommendation to bring measure(s) into conformity	Appellate Body and/or Panel finds the disputed trade measure(s) to be inconsistent with WTO law. Recommendation to bring the measure(s) into conformity with WTO law is adopted by the DSB.	43
Implementation notified by respondent	The respondent has notified that is has implemented the DSB recommendation to bring the disputed measure into conformity with WTO law. No compliance proceeding initiated.	95
Mutually acceptable solution on implementation notified	Parties have notified an agreement on implementation	23
Compliance proceedings ongoing	If the parties disagree whether the respondent has implemented the recommendations and rulings, either party can request a “compliance” panel under Article 21.5 of the DSU.	9
Compliance proceedings completed without finding non-compliance	Appellate Body and/or panel report under Article 21.5 Adopted, no finding or non-compliance or other consistency	6
Compliance proceedings completed with finding(s) of non-compliance	Appellate Body and/or panel report under Article 21.5 adopted, with findings that the respondent has not complied with the rulings.	7
Authorization to retaliate requested (incl. 22.6 arbitration)	If the Member concerned does not comply with the DSB recommendations and rulings within the prescribed time, the complainant may request permission to impose retaliation measures against the respondent	9
Authorization to retaliate granted	Appellate body/compliance panel find DSB recommendations have not been fully implemented; authorization for complainant to suspend concessions or other obligations granted.	15
Authority for panel lapsed	Panel proceedings suspended under Article 12.12 of the DSU, and not resumed after 12 months.	16
Settled or terminated (withdrawn, mutually agreed solution)	Request withdrawn, measure terminated, or mutually agreed solution under Article 3.6 of the DSU notified prior to adoption of Appellate Body and/or panel report (s).	112

Source: World Trade Organization Dispute Settlement

Table A2: WTO member dispute participation as complainant, respondent, and third party, 1995–2018.

Country[1]	Number of times Complainant	Number of times Respondent	Number of times Third Party
United States	99	96	199
European Union (formerly EC)	131	164	150
Other industrialized countries			
Canada	39	23	145
Japan	25	15	203
Argentina	22	22	62
Korea, Republic of	20	18	126
Chile	10	13	48
New Zealand	9		61
Australia	8	16	108
Panama	7	1	10
Taiwan	6		121
Switzerland	5		26
Hungary	5	7	2
Norway	5		102
Qatar	4		13
Poland	3	1	1
United Arab Emirates	1	1	7
Antigua and Barbuda	1		
Czech Republic	1	2	
Denmark	1	1	
Hong Kong, China	1		22
Singapore	1		54
Uruguay	1	1	14
Belgium		3	
Bahrain, Kingdom of		1	13
Barbados			4
Germany		2	
Spain		3	
France		4	
United Kingdom		3	
Greece		3	
Croatia		1	
Ireland		3	
Iceland			18
Israel			11
Italy		1	
Saint Kitts and Nevis			3
Kuwait, the State of			1
Netherlands		3	
Oman			13

Portugal		1	
Saudi Arabia, Kingdom of		2	47
Slovak Republic		3	
Sweden		1	
Trinidad and Tobago		2	4
Developing countries			
Brazil	33	16	139
India	25	25	158
Mexico	25	15	103
China	22	43	171
Thailand	14	4	93
Indonesia	11	14	38
Guatemala	9	2	52
Ukraine	9	4	40
Honduras	8		29
Russian Federation	7	9	70
Colombia	5	5	60
Costa Rica	5	1	15
Pakistan	5	4	10
Philippines	5	6	17
Turkey	5	11	93
Viet Nam	5		33
Ecuador	3	3	36
Peru	3	6	19
Venezuela, Bolivarian Republic of	2	2	30
Bangladesh	1		1
Cuba	1		18
Dominican Republic	1	7	9
Sri Lanka	1		4
Moldova, Republic of	1	1	3
Malaysia	1	1	22
Nicaragua	1	2	17
El Salvador	1		19
Tunisia	1		
Afghanistan			2
Armenia		2	
Benin			1
Belize			4
Bolivia, Plurinational State of			2
Côte d’Ivoire			4
Cameroon			1
Dominica			3
Egypt		4	32
Fiji			3
Ghana			1
Grenada			1

Guyana			3
Jamaica			8
Kazakhstan		1	35
Kenya			3
Kyrgyz Republic		1	
Saint Lucia			3
Morocco		2	
Madagascar			4
Mauritius			6
Malawi			6
Namibia			1
Nigeria			6
Paraguay			21
Romania		2	
Senegal			2
Suriname			1
Eswatini			3
Chad			1
Tanzania			3
Saint Vincent and the Grenadines			1
Yemen			2
South Africa		5	19
Zambia			2
Zimbabwe			6
Total[2]	615	615	3077

1: European Union, Hong Kong and Taiwan are treated as separate countries for the purposes of analysis.
2: Because there are often a number of countries listed as complainants and respondents, each dispute can appear more than once. The table is calculated by dividing disputes involving more than one complaints into as many as bilateral cases, so the total number is bigger than the number of dispute cases.
Source: World Trade Organization (WTO, 2018a)

Table A4: Contemporaneous correlations of explanatory variables

	EXP_Num	EXP_ratio	IMP_Num	IMP_ratio	GNI	$Trade\_s$	ODA_per	PTA	$Trgdp$	Pop
EXP_Num	1									
EXP_ratio	0.27***	1								
IMP_Num	0.69***	0.33***	1							
IMP_ratio	0.30***	0.69***	0.41***	1						
GNI	0.59***	-0.04***	0.23***	-0.04***	1					
$Trade\_s$	0.40***	-0.01***	0.15***	-0.02***	0.54***	1				
ODA_per	0.07***	0.19***	0.11***	0.22***	-0.07***	-0.02***	1			
PTA	0.25***	0.10***	0.22***	0.11***	0.01*	-0.00	0.01***	1		
$Trgdp$	-0.04***	-0.07***	-0.00	-0.06***	-0.12***	-0.03***	-0.02***	0.04***	1	
Pop	0.51***	0.20***	0.42***	0.24***	0.55***	0.41***	0.04***	-0.09***	-0.37***	1

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

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