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Development and the Dispute Settlement Body of the World Trade Organization: a survival analysis

Samuel Rufino de Carvalho*
Andréa Freire de Lucena**

Abstract: This paper analyses whether the level of development affects a state's participation in the Dispute Settlement Body (DSB) of the World Trade Organization (WTO). The methodology relies on the Survival Analysis with two different tools. First, the Kaplan-Meier Curve, which indicates the survival time of an individual until the occurrence of an event, was plotted. Thereafter, the Cox Regression was used. This tool associates Survival Analysis to linear regression in order to examine the impacts of some independent variables on the time until the occurrence of the observed events. The results showed that states with higher levels of GDP and HDI, and with a larger population, have more chances of initiating a dispute and being a respondent. Likewise, the American and the European continents are more likely to experience these events. Developed and Developing countries experience the incidence of an event more easily when compared to Least Developed Countries.

Keywords: World Trade Organization; Dispute Settlement Body; development; Survival Analysis; international trade disputes.

1. Introduction

The Dispute Settlement Body (DSB), governed by the Understanding on Rules and Procedures for the Settlement of Disputes (DSU), represents the pivotal institution of the World Trade Organization (WTO). The DSB is an institution through which member countries can challenge their partners' trade measures. The main duties of the DSB are to supervise, monitor and verify compliance regarding the commercial standards agreed on by the states. Furthermore, the organization functions as an arena of debate for the nations, in which their desires and discontents can be clearly, democratically, and equitably stated.

* Pontifícia Universidade Católica do Rio de Janeiro (PUC-Rio), Rio de Janeiro-RJ, Brazil; samuelrc15@gmail.com. ORCiD 0000-0002-0146-9658.

** Universidade Federal de Goiás (UFG), Goiânia-GO, Brazil; andrealucena@ufg.br. ORCiD 0000-0003-2984-3688

Least Developed Countries (LDCs) and Developing Countries (DCs) comprise more than two thirds of the WTO member states (WTO 2021)[1]. However, the participation of these countries in the DSB, as complainants and respondents, falls far short of this proportion. Developed Members (DMs)[2] operate before the DSB with much more expressiveness and volume when compared to DCs and LDCs. Carvalho and Lucena have quantified the discrepancy in performance before the DSB among DMs, DCs and LDCs in the period of 1995-2016 (Carvalho e Lucena 2018). The authors noted that, despite representing 65% of the number of members, DCs and LDCs initiated only 45% of the disputes. The authors also found that the probability of litigation being resolved (ended) is considerably higher for DMs, reaching approximately 70%, while the probability for DCs and LDCs was 61%.

Moon points out that the Dispute Settlement Mechanism (DSM) of the WTO is fair and without much political bias regarding the results of the disputes (Moon 2006). However, he asserts that the norms and rules that form the basis of the DSM, negotiated in different political and economic contexts, reflect the inequality present in the international trading system and are more favourable to DMs than to LDCs and DCs. Tallberg and Smith, in turn, claim that DMs are more able to reach consensus during the beginning of a dispute (Tallberg and Smith 2014). Abbott argues that the low participation of developing nations is even more discrepant when it is observed that only 10% of the DCs and LDCs were responsible for initiating litigations and the other 90% have never even started a single dispute (Abbott 2007).

Horn, Mavroidis and Nordström (2005), Guzman and Simmons (2005), Francois, Horn and Kaunitz (2008), Reich (2017), and Carvalho and Canesin (2018) propose quantitative analyses and quite good insights and reflections on the initiation of disputes in the WTO. Nonetheless, some of these studies lack a robust observation of the existing WTO disputes (Horn, Mavroidis and Nordström 2005; Francois, Horn and Kaunitz 2008); others do not offer proper numbers of independent variables related to the initiation of disputes (Reich 2017); others do not focus on all the disputes (Carvalho and Canesin 2018); and some also revealed methodological struggles (Francois, Horn and Kaunitz 2008).

Given this asymmetrical background of the WTO and some gaps present in the literature, the purpose of this article is to contribute to the literature in three aspects: i) with a different estimation method which focuses not only on the dependent variables (DV) (participation), but also on the time until this participation happens; ii) with a robust observation of all disputes held by the DSB from 1995 to 2018; and iii) with the analyses of both the initiation of disputes and the responses to them (complaints and responses).

Through Survival Analysis,[3] it is possible to examine to what extent the participation of a country in the DSB is influenced by its degree of development. In this regard, the longer a country survives the event (initiating or responding to a dispute as DV), the lower its participation is before the institution, since surviving indicates that the country is not experiencing the event. Therefore, Survival Analysis is a unique contribution as it both measures the degree of participation and emphasizes the time until the occurrence of this event. In addition, through Cox Regression, it is possible to assess the weight of the influence of independent variables (Gross Domestic Product - GDP, Human Development

Index - HDI, number of exports, and the size of the population and continents of member states) on the time until the event (participation).

The time frame of the database begins in 1995, with the first litigation (entitled DS1 by the DSB), and ends in 2018, with litigation number 561 (DS561). The independent variables were collected according to the year of the event.[4] The flagship of Survival Analysis is the treatment of individuals whose events did not happen. In this regard, states that have never initiated or responded to a dispute are also included in the sample and the reference data were collected according to the last year of the study, which was 2018.

The structure of this paper is as follows. Moving forward, Section 2 provides a framework of the disputes initiated in the DSB, focusing on the participation of member countries according to their development status, from 1995 to 2018. Section 3 offers an overview of the literature on quantitative studies regarding WTO disputes and the main features of Survival Analysis methodology, which represents the cornerstone of this research. Section 4 focuses on the results, aiming to observe, through Kaplan-Meier curve and Cox Regression, which variables are statistically significant to influence the time until the participation of the members in the DSB. The last section is reserved to some concluding remarks.

2. An overview of the participation of LDCs, DCs and DMs in the DSB

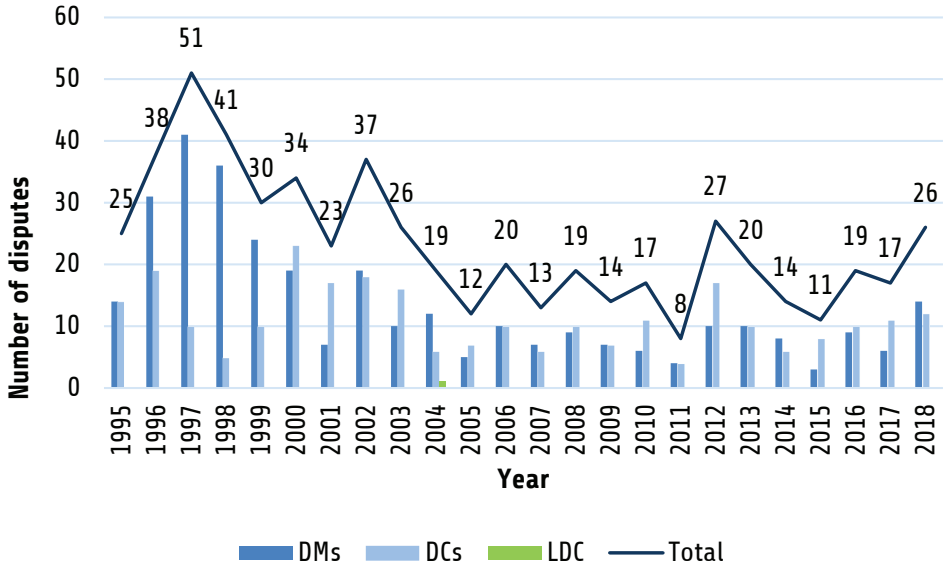
The WTO currently has 164 member states. Among them, more than two thirds are classified as developing countries[5] – including the least developed states (WTO 2021). The DSB presents itself as one of the pillars of the organization, which allows members to resolve their differences through a legally and structurally organized apparatus. International dispute resolutions, through institutions and courts, emerged after the Second World War as the principal means of resolving conflicts among countries and modified the form of tackling disagreements, which used to be dealt with through armed conflicts (JIDS 2021).

The DSB, in terms of litigation, is one of the most active institutions in the international arena. It is only 25 years old and has already dealt with a great number of litigations (especially when compared to other international institutions). As an illustration, the International Civil Aviation Organization (ICAO), created in 1947, also has a difference-solving mechanism. By 2018, only seven cases had been brought to the organization (Opolot 2017). The International Court of Justice (ICJ), in turn, managed the initiation of 132 litigations since its creation in 1945 (ICJ 2018). Furthermore, before the International Tribunal for the Law of the Sea, which came into force in 1994, 25 disputes have been initiated (ITLS 2018). Similarly, since 1987, the Investor–State Dispute Settlement (ISDS) of the United Nations Conference on Trade and Development (UNCTAD) accounted for 855 litigations (UNCTAD 2018).

The DSB has acted in 561 cases. The dispute settlement mechanism of the General Agreement on Tariffs and Trade (GATT), in turn, from 1947 to 1994, dealt with only 300 disputes, an average of 6.38 cases per year (Carvalho and Lucena 2018). Below, figure 1 describes the beginning of disputes by date and by development status. It is observed that

the DSB computed an average of 23 disputes per year, 3.6 times higher than GATT. DMs participated as complainants in 321, while DCs in 267. Only one country classified as least developed, Bangladesh, sued another (India) before the DSB[6]. On average, developed states initiated 13 cases per year, while developing ones, 11.

Figure 1. Disputes by year and development status (1995 – 2018).



Source: Authors' calculations based on WTO data.

Although the discrepancy of participation among DMs and DCs has decreased in general terms since 2000, the access to the DSB is still an obstacle, once the total number of disputes is quite disproportional regarding the quantity of developing members. According to Maswood, 'developing countries enjoy numerical superiority but without any commensurate level of influence' (Maswood 2006: 87). For the author, this situation is a 'hangover' of how the roles of nations were played before the old GATT. In the DSB, the disproportionality is also visible: 54.49% of all disputes were initiated by only 38 developed members.[7] The 93 DCs and the 33 LDCs, which together represent more than 75% of the members of the institution, were responsible for only 45.51% of the disputes.

The discrepancy is even more striking when we look at the participation of each member. The United States (USA), with 122 disputes, and the European Union (EU), with 99 disputes, have initiated 37.52% of the complaints. Canada (39), Japan (24) and New Zealand (9) remain at the top of the requests of DMs. Brazil has a remarkable participation regarding the initiation of disputes. This South American state is the fourth member in number of inquiries before the DSB, with 34 requests. Mexico (25), India (24), Argentina and South Korea (both with 20 disputes) are the DCs that have most sued others in the institution. The Chinese situation also deserves to be highlighted. The Asian country has already initiated 17 disputes in only 17 years.

With regard to participation as a respondent member, developed regions remain at the centre of disputes. Altogether, DMs and DCs have been sued 313 and 248 times, respectively. The USA and the EU, alone, have responded to 41% of the litigations brought to the DSB until August 2018. Canada (23), Australia (16) and Japan (15) remain on the list of the most respondent DMs. Concerning DCs, China is at the top of sued members, having responded, from 2001 to 2018, to 45 requests. Despite its late adherence, the Chinese participation is noteworthy due to the fact that, out of all member states, the country already has the third highest number of requests to adjust its domestic trade policies. India (25), Argentina (22), South Korea (17) and Brazil (16) are among the developing nations most sued by members.

LDCs have never been sued by other members. We consider two explanations for this. First, the WTO, in the face of all its institutional apparatus, promotes, to a large extent, ideas in favour of special and differential treatment for economically weaker countries. Even though there is an equality of actions, which means that any member, at any time when they feel undermined, can question another one before the DSB, the DSU seeks to resolve disputes in the least harmful way possible for those weaker countries. That, in some way, influences countries to avoid suing those which are economically feeble, given the political content of such action.

Another explanation is related to the low expressiveness of international trade in such countries. LDCs accounted for only 0.94% of total world exports in 2016. This value represented a decrease of 6% in the share of these countries when compared to 2015 (WTO 2012). The small influence on world trade interferes with the amount of participation of such countries, which act before the DSB mainly as observers (third parties).

Although LDCs have a greater role as a third party, in relation to complaints and responses, the numbers are almost insignificant. Out of the total participation as third party, LDCs represented only 0.65%. Overall, the DSB computed 2920 dispute observations. The number is high due to the possibility of a single dispute having several member states as observers. LDCs have therefore participated 19 times as third party. Only nine of the 33 least developed nations have observed other disputes: Malawi (6); Tanzania (3); Afghanistan (2); Senegal (2); Zambia (2); Bangladesh (1); Benin (1); Chad (1); and Yemen (1).

Participation as third party allows countries to understand the course of disputes, to learn how the DSB operates in practice, to access new action strategies and, most of all, gives them voice, even though their opinions may have no influence on the resolution of the process itself. Of the 19 participations of LDCs as third party, seven occurred in 2002 and four in 2012. The other years revealed an average of approximately two observations. Although the number of participations of LDCs as third party is larger, in relation to that of complaints and responses, their performance is far below what it is expected in order to promote legal and structural support so that these nations may be able to use the DSB more frequently. The lack of technical and legal support is one of the reasons why only one LDC has managed to initiate a dispute in all 24 years of the WTO (Lopes 2014).

The numbers are even more alarming when compared to the total of observations. As mentioned above, taking into consideration the 561 disputes, there have been 2920

participations as third party. This means that each dispute was attended by five observing countries on average. In this aspect, DCs are more participative, with 1931 observations. DMs, in turn, have acted 970 times. Only in this regard, the USA is not ahead. Japan is the member state that has participated the most as an observer before the DSB, having been present in 194 disputes.

The EU (192), the USA (147), Canada (138) and Australia (105) follow it with the highest numbers of observations from developed countries. Once again, China stands out as an observer, closely analysing 164 disputes. India (150), Brazil (132) and South Korea (122) complete the ranking of developing countries. The autonomous Chinese city, Taipei, considered a specific actor before the DSB, reveals a considerable performance. In addition to its six complaints, the capital of Taiwan has observed 115 disputes, being the fifth DC in this type of participation.

The following table summarizes the participation in the DSB by status of development. The last line 'probability of resolution', as mentioned in the introduction of this paper, represents the likelihood of a country having its dispute resolved after it was initiated. In summary, it is noted through the descriptive observation of the disputes that DMs have more expressiveness with regard to direct participation in disputes: as complainants and as respondents. Conversely, it seems that DCs have been attempting to be more active before the body, thus managing to include some of their demands in the international trade agenda. As an illustration, in the years of 2008, 2010, 2012, 2015, 2016 and 2017, DCs initiated more disputes than DMs. With respect to third party participation, DCs have been responsible for 66.13% of all observations, thus ensuring greater practices and knowledge regarding the handling of disputes.

Table 1. Summary of the asymmetries by development status

CATEGORIES	DMs	DCs	LDCs
Member countries	23.17%	56.70%	20.12%
Complaints	54.49%	45.33%	0.16%
Responses	55.69%	44.20%	–
Third parties	33.21%	66.13%	0.65%
Probability of resolution (2016)	69.40%	60.98%	–

Source: Authors' calculations based on WTO data.

Although DCs have been gaining more strength before the DSB, it is clear that the number of participations is considerably disproportionate, especially when considering the number of developed member countries compared to developing ones. Furthermore, even among DCs, there is a discrepancy in participation: the developing members with the most economic power are those that guarantee the highest numbers of participation, such as the cases of China, Brazil, India and Mexico. Contrarily, LDCs represent 20% of the number of member states and their participation as complainants, respondents and third parties was equivalent to 0.16%, 0% and 0.65%, respectively, involving only nine states.

Hopewell argues that one main factor that contributed to a significant activity in the WTO by Brazil, India and, lately, China is the attempt to act in coalition, which culminated in a fight for a pro-developing countries agenda (Hopewell 2016). Brazil and India, after the 1999 WTO Ministerial Conference, 'sought to spotlight at the WTO' and became the leaders and the voice of the G20-T group (Hopewell 2016: 93). This leadership was necessary to shift the scenario and enable some reactions to DCs. In this sense, LDCs need to search for coalitions assured by a strong leadership, such as that of DCs, in order to obtain more space of participation in the WTO.

3. Methodology and literature review

Litterature on quantitative research on the WTO revolves around three general explanations as to why countries participate in the institution: power, trade, and legal capacity (LC). Power represents the political implications members face to initiate a dispute in the DSB. The variables used to measure this category often refer to members' income, such as Gross Domestic Product (GDP), Gross National Income (GNI), and dummy variables such as 'developed', 'developing', 'rich', 'poor', etc. The general argument consists in the positive correlation between power and participation, according to which the more powerful a country is, the more active it is in the institution.

Trade is measured mainly by export and import. Another important feature present in the literature is the nature of the products and the diversity of the trade product basket of a country. Some authors argue that there is a positive propensity between the number and diversity of trade flow and the initiation of a dispute, such as Francois, Horn and Kaunitz (2008), and Carvalho and Canesin (2018).

Legal explanations constitute a controversial category. The overall idea assumes that the stronger the legal capacity of a country, the bigger the number of disputes. Michalopoulos (1999) was the first to bring a proxy into the analysis of trade disputes. The variable used was the number of delegators present in the WTO headquarters in Geneva. However, some authors questioned the explanatory contribution of the variable. Guzman and Simmons (2005), for instance, inserted three other proxies in their analysis: number of embassies, government expenditures, and Bureaucratic Quality Index (BQI) provided by International Country Risk Guide (ICRG). Francois, Horn and Kaunitz (2008), and Carvalho and Canesin (2018) agree that LC cannot be measured only by the number of delegators, instead they argue that a country's income should also compose the proxy of LC.

Nonetheless, Reich (2017), Busch, Reinhardt and Shaffer (2009), and even Francois, Horn and Kaunitz (2008) argue that income alone cannot be a valid indicator of LC. Another controversial issue regards the lack of available data to compose a more robust dataset, as a panel for example. There is not a data repository which includes the number of delegators in the WTO in its two decades of operations. A WTO report, for instance, presents data on the missions and staff in the intuition; however, data are available only for the years 1997, 2002, 2006 and 2012 (VanGrasstek 2013).

Table 2 summarizes the litterature on quantitative research approach to the WTO participation and highlights the dependent variables (DV), the time frame, the estimation methods, the main independent variables, and concluding remarks. As it is restricted to manuscripts which use quantitative methods and are related to the initiation of disputes in the DSB, authors such as Michalopoulos (1999) and Busch, Reinhardt and Shaffer (2009) did not compose the table.

Our main contribution to the literature consists in, first, using a different estimation method to quantitative studies on the participation in the WTO. Francois, Horn and Kaunitz, for instance, argue that their model presents a problem of 'heavy dominance of zeros', once their dataset comprehends all the members of the WTO (132 countries at the time of their study). As there are few countries which initiated or responded to disputes, many observations would not present any value. In a Survival Analysis method, the missing values are not a problem, since it does not include countries which did not initiate or respond to a dispute – this will be better explained further on.

A second contribution consists in data analysis. This study relates to all the disputes held by the DSB from the creation of the WTO, in 1995, to 2018. It is, thus, a robust and over wide-ranging observation. Horn, Mavroidis and Nordström (2005), and Guzman and Simmons (2005), despite the extensive analysis and diversity of variables, do not present updated data. Reich (2017), in turn, brings a quite updated study, but his method and variables are not robust, since the author does not include other variables besides GDP and GNI. Carvalho and Canesin (2018) present a significant data contribution; however, their study concerns only the disputes that involved the EU and the US. The third contribution consists in the observation of not only the initiation of a dispute, but also of the reasons why countries are challenged by others (responses). This research, therefore, is prominent to fill some of these gaps in the literature.

3.1 Survival Analysis and variables selection

Survival Analysis is a methodological approach used mainly in health studies. In summary, its main concern is to provide explanatory material for the occurrence of an event in relation to time. Several surveys, for example, look at the average time until the death (if it occurs) of individuals who have some form of cancer (Hosmer, Lemeshow and May 2008). In this sense, the observed event is death, and the time can be given in days, months, or years, depending on how the data will be computed. The name of the methodology, therefore, refers to an individual's ability to survive if he or she is at risk. In the example above, the individual is at risk of the event occurring (death) from the moment that he or she acquired the disease (cancer). Also known as Time-to-Event Analysis, this methodological tool is quite useful when the importance of time for an object of study is present (Despa 2010).

The applications of the models in Political Science investigations include aspects such as cabinet/government durations, political careers, civil wars, policy adoption, and decisions by legal/executive institutions (Golub 2008). In this research, Survival Analysis will

Table 2. Summary of the literature review

Author (year)	Estimation method	Time frame	Variables	Main results
Horn, Mavroidis and Nordström (1999)	Probability model based on maximum-likelihood estimation	1995-1998	**DV: Bilateral disputes** **Trade**: Export diversity (Harmonized System): number of products exported **LC**: Number of delegators in the WTO **Power**: GNP	• Countries with diverse economies tend to find more trade measures susceptible to litigation; • Power (GNP) is not sufficient to explain why a country initiates a dispute; • Legal knowledge (number of delegators) seems to influence the initiation of a dispute.
Guzman and Simmons (2005)	Ordinary least squares regression	1995-2004	**DV: Number of disputes** **Power**: GDP **LC**: Number of delegators in the WTO **LC**: Number of embassies **LC**: Government expenditures **LC**: BQI provided by ICRG	• The lack of finance (GDP), human (delegators, embassies) and institutional capital (government expenditures) undermine poor countries' initiations of disputes.
Francois, Horn and Kaunitz (2008)	Negative binomial regression model	1998-2002	**DV: Bilateral disputes** **Trade**: Total bilateral exports and imports **LC**: Legal capacity quantity represented by GDP **LC**: Legal capacity quality represented by the World Bank Government Efficiency index multiplied by the logarithm of the GDP	• The composition of trade, the volume of trade, income levels and legal capacity (GDP) are significant variables for the initiation of disputes.
Reich (2017)	Non-parametric Spearman's rank correlation coefficient	1996-2016	**DV: Number of disputes** **Power**: GDP and GNI per capita	• GDP (0.677) presents stronger correlation to the request of consultation than GNI (0.411).
Carvalho and Canesin (2018)	Generalized Linear Models (GLMs)	1995-2012	**DV: Number of disputes against EU and US (G2)** **Power** and **LC**: Power and institutional-legal capacity represented by GDP **Power**: GNP per capita **Trade**: Relative bilateral exports **Trade**: Relative exports related to the world	• Institutional-legal capacity and market power (GDP) are the most significant factors to initiate a dispute against the EU or the US; • GNP per capita does not affect the initiation of disputes against G2; • Total or absolute trade does not determine the initiation of complaints against G2; • The extent of bilateral export participation determines the likelihood of disputes being initiated against G2.

Source: Authors' elaboration.

help to observe the behaviour of countries before the DSB. The main focus, therefore, falls upon the survival time of WTO members until the occurrence of the events, in this case, participation as a complainant and respondent.

Three factors support the use of Survival Analysis in this investigation. First, countries can be observed at different historical moments, since the methodology is based on the time until an event occurs, given that an individual is at risk. In this regard, a state will be at risk[8] of participating in the DSB from the moment when it joined the WTO, that is, when it becomes a member of the organization. Beginning in 1995, countries have gradually adhered to WTO rules. As an illustration, in a methodology based on a linear regression with data available on a panel, data related to all countries in all years available by the database is needed. In Survival Analysis, the years of analysis are computed dating back to the nation's adherence to the organization, disregarding information related to previous years.

Second, in the same way that adherence time can be counted for each individual in the sample specifically, the moment of *censoring* is also concerned by the methodology. Censoring refers to omitted cases. There are two possible situations for this: the event did not happen for an individual, from its entry into the analysis until the end of the study; or the individual left the sample before the investigation was over (Kartsonaki 2016). When it comes to international organizations, this methodological contribution is of great value, since members can stop participating in an institution at any time (in accordance or not with the rules previously stipulated by the treaties, given that states are sovereign). In the case of the DSB, many members did not experience any event until August 2018 and no state left the organization. To illustrate that, only 74 out of the 164 members have initiated a dispute. In this regard, the other 90 states will also be part of the sample, providing more comprehensive explanatory information.

Finally, Survival Analysis can interact with other methodological tools, such as linear regression or logistic regression. Put simply, the Cox proportional hazard model, more commonly known as Cox Regression, is the combination of Survival Analysis with linear regression. Substantially, Cox Regression verifies the effect of other variables on survival time (Kartsonaki 2016). In this study, we observed how a series of independent and controlled variables can influence member states to access the DSB through litigation.

Mostly, studies that use Survival Analysis are concerned with the occurrence of an event which happens only once for each individual, such as death and rare diseases. Nonetheless, repeated events can also be analysed by this approach (Yang et al. 2017), such as the participation in the DSB, which is characterized by many disputes concerning a single member. A member state, from the moment it joins the WTO, is at risk of initiating a dispute as many times as it deems necessary. The United States, for example, has experienced the litigation initiation event 122 times. Restricting the analysis to only the first event would result in a huge loss of information.

Consequently, some models were created with the purpose of analysing the cases in which the events can be observed multiple times for the same individual. In the literature, the most used models are those suggested by Andersen and Gill's estimation (from 1982),

Prentice, Williams and Peterson (1981), Wei, Lin and Weissfeld (1989), and Kelly and Lin (2000) (Hosmer, Lemeshow and May 2008). In summary, the proposals differ in the relationship between one event and the other – whether they are independent or not – and in the time scale – that is, all events in relation to the year of entry or the time of an event in relation to the time of the previous event.

For Prentice, Williams and Peterson's model, events are conditional, which means that in order for the second event to exist, the first must necessarily have occurred. In this regard, it is possible to analyse the probability of a member triggering the DSB a second time, given that it did it previously, and so with the third, fourth, fifth, until the umpteenth occurrence. The model by Prentice, Williams and Peterson was run via Cox Regression. The database of this research has the format described in Table 3.

Table 3. Composition of the database

Te	Ct	Tt	Event	Str	Country	Stat	Pop	GDP	Exp	HDI	Cont
Te_1	Ct_1	Tt_1	E_1	Str_1	1	$Stat_1$	Pop_1	GDP_1	Exp_1	HDI_1	$Cont_1$
...	...	...	...	...	...	...	...	...	...	...	...
Te_n	Ct_n	Tt_n	E_n	Str_n	n	$Stat_n$	Pop_n	GDP_n	Exp_n	HDI_n	$Cont_n$

Source: Authors' elaboration.

Where:
Te - Time of entry: year of a member's adherence to the WTO (WTO 2018);
Ct - Censoring time: year of the event. Year in which the member leaves the WTO or final year of the study, in this case, 2018 (WTO 2018);
Tt - Total time: time from entry until censoring (Tc-Te), that is, the number of years until the event occurs (WTO 2018);
Event - Binary variable for the occurrence of the event (initiate a dispute or respond to one): 1 if the event occurred, 0, otherwise (WTO 2018);
Str – Stratum. 1, for the first time the event occurs, 2, for the second, and so forth;
Country - Individuals that compose the analysis. WTO members, 164 countries (WTO 2018). Each individual multiplied by the number of occurrences of the event;
Stat - Development status of a country (UN 2018);
Pop - Population of the country (WB 2018);
GDP - Gross Domestic Product (GDP) (current dollars) of the country (WB 2018);
Exp - Exports of goods and services (current dollars) of the country (WB 2018);
HDI - Human Development Index (HDI) of the country (UNDP 2018);
Cont - Continent referring to the country. Categorical variable: Africa (1), America (2), Asia (3), Europe (4) and Oceania (5) (UNSD 2018).

The selection of total GDP is in accordance with Francois, Horn and Kaunitz (2008), Reich (2017), and Carvalho and Canesin (2018), who did not find a strong correlation between GDP per capita or GNI and the initiation of disputes; however, GDP was significant. The choice of total exports of goods and services are also underpinned by the literature

as in Horn, Mavroidis and Nordström (2005), Francois, Horn and Kaunitz (2018), Reich (2017), and Carvalho and Canesin (2018) (See Table 2). Although some authors referred to the bilateral export values, our research focuses on the characteristics of both parties of a dispute not in a bilateral perspective, but with two different datasets: one related to complainants and the other related to respondents, which represents an alternative to bilateral dispute observations.

Regarding legal capacities, although we recognise their importance, we did not select any variables to measure them. The reason is the inexistence of a proper proxy which is accurate enough to measure legal capacities. There is not sufficient data on all 23 years of the study on the number of delegators, embassies or member staff in the WTO. Also, government indexes such as government expenditure of quality of bureaucracy do not present a direct proxy to LC, besides the lack of available data. Population was the base for the construction of Francois, Horn and Kaunitz's (2008) index of LC. The authors argue that the size of the population contributed to government expenditure in education, which influences the capacity to build strong legal institutions. In our research, population is conceived as a control variable, so is HDI, which can provide explanation regarding education, health and income.

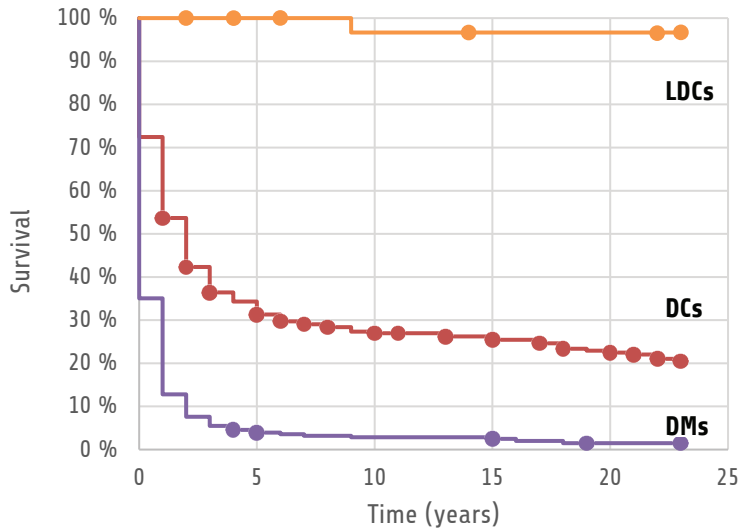
When dealing with cases of multiple events, the same individual will be equally multiplied in the sample, according to the number of events (Hosmer, Lemeshow and May 2008). For example, Peru has been a member of the organization since 1995 and the first time it started a litigation was in 1995 (DS12). The second time the nation experienced the event was in 2001 (DS231). And the third was in 2010 (DS410). In this sense, the year of entry is 1995 and the year it leaves the database (exit) is also 1995 (first event). Then, the state inserts itself in the sample again: the entry, then, will be the year of 1995 and the exit, 2001 (second event). Because of the third event, the individual gets in the sample again, year of entry 2001 and exit, 2010. As Peru did not experience any more events until 2018, the last entry of this individual will be the year 2010 and the exit, 2018 (end of study time). To that end, Peru would compose the database with four cases. For each case, the independent variables will be compiled, always in relation to the year of exit.[9]

In this research, two databases were created: one concerning participation as complainant and the other one as respondent. The dependent variable in the first database is the time until the recurrence of the event *complaint*. In the second one, the dependent variable is the time until the event *response*. As the exit time changes in relation to complainant and respondent individuals, the years of independent variables collected will be different in the two databases. Both consist of the same representation in Table 3. Thus, it will suffice to list some internal factors of the countries that influence the survival time of the states in the disputes. The software used to estimate the analyses was the Statistical Package for the Social Sciences (SPSS).

4. Results and discussions: Survival Analysis

One of the methods frequently used to analyse the survival to the occurrence of a certain event consists in the Kaplan-Meier Curve, also known as Product-Limit Estimator. The tool fits into a non-parametric method because it assumes that the data behaves in a non-distributional manner in relation to the observed survival time (Kartsonaki 2016). The method offers a simplified analysis of how individuals perform over time. One of the most significant contributions of the Kaplan-Meier Curve concerns the possibility of observing how distinct groups of individuals survive for different amounts of times until they experience the event. Figure 2 reveals the survival of countries until they initiate a dispute before the DSB.

Figure 2. Survival Analysis of complaints by status.



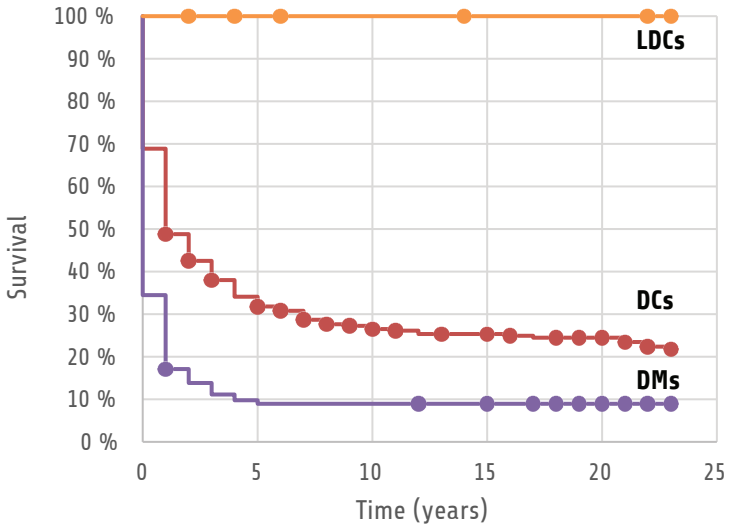
Source: Authors' calculations based on WTO data.

This figure indicates that almost 100% of the members classified as least developed survived the initiation of a dispute in the institution. This means that they were unable to start a litigation before the body. The exceptional event was the DS306 dispute, in which Bangladesh was the only LDC to sue another member. In 2004 (year 10 in Figure 2), the nation filed a complaint against India on certain anti-dumping measures implemented by the Indian state. In this specific case, the countries reached a mutually agreed solution and the dispute was resolved in the consultation phase.

The number described by the X-axis refers to the time it takes an individual to experience an event. In relation to DMs, for example, approximately 68% of cases occurred in time 0. This means that, in two thirds of the cases, these states took less than a year between the initiation of a dispute and another. Regarding DCs, only 28% of the disputes took less than a year to begin. In other words, the higher the level of development of a

member state, the faster it starts a new dispute. Censoring, evidenced by the dots symbols on the curves, represents the time until the non-occurrence of the event or until the end of the study. For example, the first dot of the blue curve (LDC), which is equivalent to time 2 on the X-axis, reports the participation of Afghanistan and Liberia. Both countries became members of the WTO in 2016 and had not experienced the event until 2018. That is, these nations took two years to be censored, since the final year of the study is 2018, so they are located in time 2 of the curve. Figure 3 consists of the Kaplan-Meir Curve of the members until the occurrence of the event *responses*.

Figure 3. Survival Analysis of responses by status.



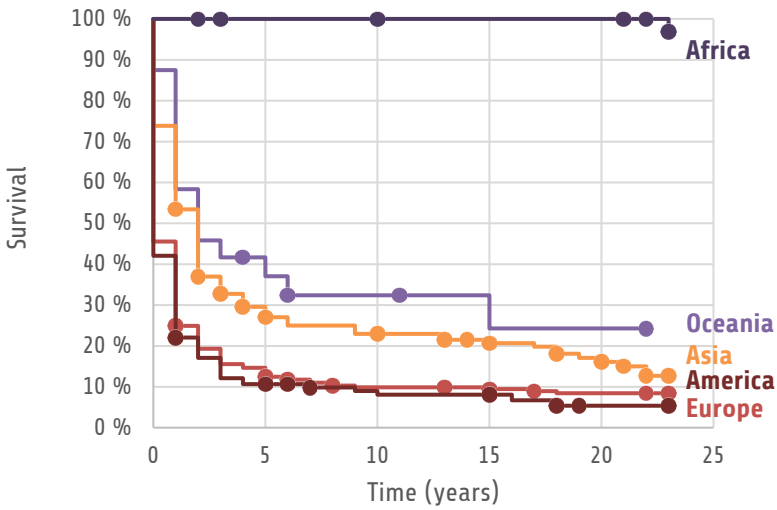
Source: Authors' calculations based on WTO data.

Figure 3 is similar to Figure 2 in relation to the distribution of the curves. Once again, LDCs are highlighted. These states, until 2018, had never experienced the event, that is, none of these countries was sued by another nation before the DSB. On the one hand, this characteristic is positive, since a member must provide clarification on the commercial conduct concerning the dispute when requested. On the other hand, this represents less commercial participation by LDCs, given that their actions in the global market are so small that it is not worth filing complaints against them. Participation as respondent by DMs and DCs presents almost the same percentages as their participations as complainant. In this aspect, it can be seen that DMs act more expressively in both initiating and responding to disputes. Figure 4 demonstrates the initialization of the disputes regarding the continent of the complainant member.

There is an evident asymmetry in the distribution of participation as complainant across continents. America represents the largest number of inquiries (294) equivalent to 52.4% of all disputes brought to the WTO. Interestingly, Asia surpasses Europe: the eastern continent initiated 143 disputes, while the European one initiated 134. In spite

of that, the survival curve of Europe is, on average, the lowest of all. This means that the percentage of European individuals that compose the sample and experienced the event of initiating a dispute is higher. Thus, a European member is more likely to sue a state in comparison to other continents. Oceania, in turn, has only 17 disputes, and Africa has only one.

Figure 4. Survival Analysis of complaints by continent.



Source: Authors' calculations based on WTO data.

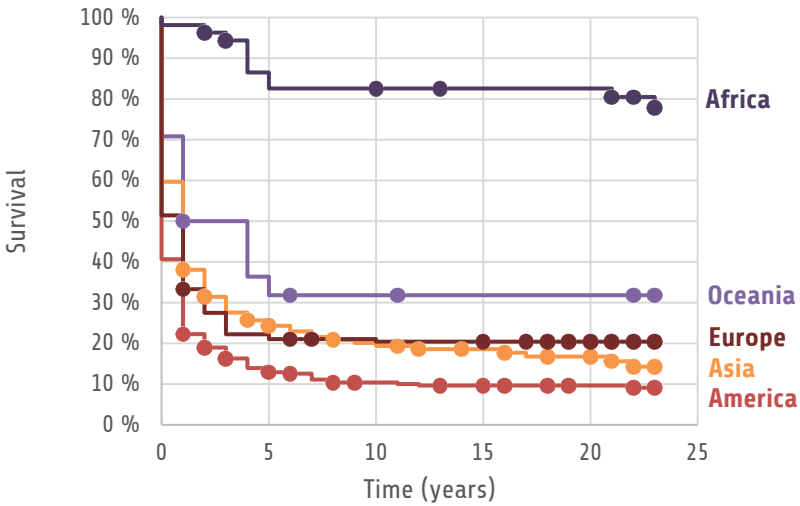
The performance of the African continent draws attention. Until 2017, no country in the region had started a dispute before the DSB. Tunisia was the only member state on the continent to sue another country. In July 2018, the African country filed a complaint against Morocco regarding some anti-dumping measures imposed by the Moroccan state. The dispute is still in the consultation phase and no mutual agreement has been reached so far. The prominence of participation recurs, once again, in rich countries. Europe and America reveal themselves to be the regions with the lowest survival curve regarding the initiation of disputes. The expressiveness of the performance is concentrated in two hubs: the United States and the European Union. The two members were responsible for 39.39% of all disputes of the body until 2018 – equivalent to 222 disputes (99 European and 122 American).

Even though the USA is the prominent actor not only in the American continent but also in the whole world, given that it has the greatest number of complaints, some cases deserve attention, especially those of developing countries. Brazil (31 disputes), Mexico (25) and Argentina (20) stand out as third, fourth and fifth, respectively, in the ranking of complainants of the continent, behind the USA and Canada (39). Furthermore, the Chinese participation as a representative of the Asian continent must be spotlighted. Despite being the fourth country in terms of complaints in the region, its participation is significant, given that the state became a member of the WTO only in 2001 and, since

then, it has already started 17 disputes. India (24), Japan (24) and South Korea (20), members since 1995, remain at the top of Asian requests. Oceania, for its part, does not display extensive participation. Only Australia and New Zealand sued other WTO members, acting in eight and nine disputes, respectively.

Figure 5, likewise, looks at the performance of the continents. However, it highlights the number of times that states have responded to the requests of other members. Regarding the number of responses, the distribution follows the same position as that of complaints. America, Asia, Europe, Oceania and Africa responded to 279, 143, 140, 16 and 11 disputes, respectively. The survival curves of the responses, however, follow a different distribution from those of complainants. The American continent curve is reasonably lower than the European one, a factor which is influenced mainly by the number of disputes initiated against the USA. Africa, in turn, gains more prominence in the curve regarding the number of responses: almost 20% of the individuals that are part of the sample had to respond to some dispute.

Figure 5. Survival Analysis of responses by continent.

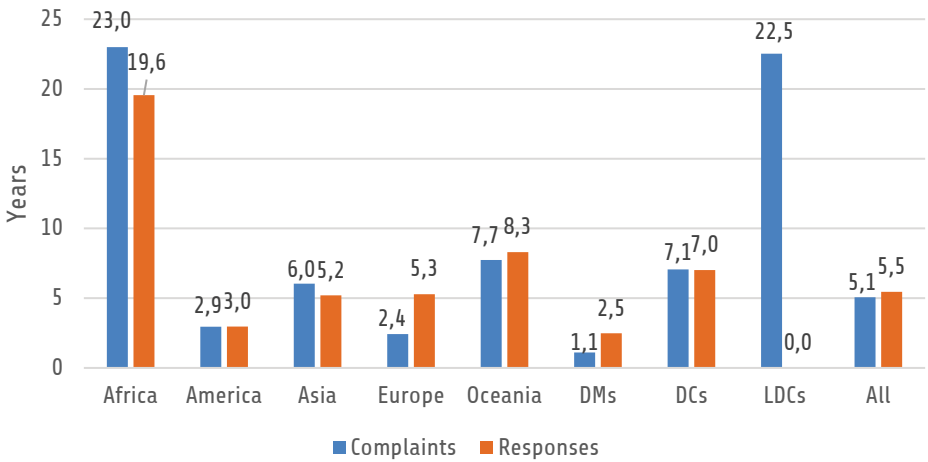


Source: Authors' calculations based on WTO data.

On the African continent, three countries were sued: South Africa (5 times), Egypt (4) and Morocco (2). Participation as respondent is pivotal, as it can report the importance of a state's actions in global trade. In spite of this, the fact that Africa, and more specifically these three states, is more of a respondent than a complainant proves to be a problem. Providing answers to a dispute is an obligation of all member countries, regardless of their level of development or their ability to understand all the legal procedures of the DSB. The South African nation, for example, despite having responded to five disputes, has never sued any other member. In Oceania, the opposite occurs. Two countries, Australia and New Zealand, have challenged others, but only Australia has been sued. Australia responded to 16 disputes, twice the number of complaints initiated.

In Asia, the values are quite expressive. China remains the country which has responded to disputes the most in the region, with a total of 42 disputes. The amount stands out, mainly, due to the weight that the country has in global trade and the large number of changes in its domestic market to become a member of the WTO. It took China about ten years to adapt to WTO rules, having to modify more than 3000 domestic laws (WTO 2019a). The USA, as expected, remains as the most sued country before the institution, responding to 159 disputes. Canada (23), Argentina (22), Brazil (16) and Mexico (15) follow, again, as those with the highest participation as respondents in the American continent. In Europe, the EU stands out with 96 responses, while Russia, Hungary[10] and Ukraine follow as respondents to eight, seven and four disputes respectively. Figure 6 indicates the survival averages by development status and by continent, for both complaints and responses.

Figure 6. Average time until the occurrence of events.



Source: Authors' calculations based on WTO data.

It can be seen that LDCs and the African continent take, on average, much longer to initiate or respond to a litigation before the DSB. It took, on average, almost 23 years – almost the entire existence of the WTO – for these countries to initiate a dispute. As respondents, the average of African countries is lower in comparison to their complaints, 19.6 years. However, that of LDCs is zero, given the absence of disputes against least developed nations. The disparity in time until the occurrence of these events is extreme when looking at the values of DMs and Europe. DMs take an average of 1.1 year to initiate a dispute, while DCs take 7.1 years. Europe, in turn, needs 2.4 years to sue a state and 5.3 years to respond.

4.1 Cox Regression applied to litigation

As aforementioned, two databases were created in order to calculate the Cox Regression. The first one has the event *complaint* as a dependent variable. Its independent variables comprise some of the premises commonly observed in gravity models, such as population, exports and continent. Moreover, HDI and the development status of the complainant country were added. All values refer to the year in which the member experienced the event. If a state has never initiated a dispute in the DSB, the reference year is 2018 and the event is '0'. The second one has the same independent variables as the first. The change, therefore, consists in the dependent variable, in this case, the *responses*. The values of each independent variable refer to the year in which a country responded to the dispute and, for those that have never been sued, the data will be related to the year 2018 and the event will be, equally, '0'.

In order to apply the Cox Regression method, the following model was estimated:

$$h(t, x, \beta) = h_0(t) * e^{(\beta 1X1 + \beta 2X2 + \ldots + \beta nXn)}$$

where $h(t, x, \beta)$ is the cumulative hazard function (dependent variable), t refers to time, x is the covariate (independent variable) and β is the parameters estimated (coefficient), which represents the effect of a covariate on the outcome. Following, $h_0(t)$ is the baseline hazard when all the other covariates are equal to zero. It represents the constant variable that does not depend on the others. Thus, e stands for the exponential function, demonstrating that the hazard is positive (Kartsonaki 2016).

Table 4 lists the country variables and their respective impacts over time until a complaint occurs. Regarding the development status, categorical variables were used, whose classifications are LDCs, DMs and DCs (UN 2018). Because they are categories, they have been transformed into binary variables, all in relation to the least developed states (DC (1), LDC (0); DM (1), LDC (0)). With regard to the continent, the referring variable was Africa (thus, America (1), Africa (0); Asia (1), Africa (0) and so forth). GDP and exports of goods and services were compiled in current dollars. Population is the absolute value of the number of people in each country. HDI, in turn, varies from 0 to 1. Each value refers to the year in which the dispute started (the event).

Four equations were run (represented by the columns of the table), which are distinguished by development proxies. The red values refer to the variables that have statistical significance at the level of 5% and, as can be seen, the development status is a weight factor. The variable is statistically significant and highly explanatory. The positive signs of the coefficients (β) show that DMs and DCs are at greater risk of initiating litigation when compared to LDCs. In Cox Regression, the sign (positive or negative) is more important than the value of the coefficient itself (Hosmer, Lemeshow and May 2008). HDI, on the other hand, did not show statistical significance in the second equation. However, in the third, without the variables referring to GDP and exports, HDI proved to be significant.

Table 4. Impacts of variables on complaints

Equation Variables																
	Equation 1				Equation 2				Equation 3				Equation 1			
	β	df	Sig.	HR	β	df	Sig.	HR	β	df	Sig.	HR	β	df	Sig.	HR
Status (complainant)	–	2	0.000	–	–	–	–	–	–	–	–	–	–	–	–	–
DMs	3.201	1	0.002	24.546	–	–	–	–	–	–	–	–	–	–	–	–
DCs	2.403	1	0.017	11.056	–	–	–	–	–	–	–	–	–	–	–	–
Population	0.000	1	0.000	1.000	0.000	1	0.000	1.000	0.000	1	0.000	1.000	0.000	1	0.000	1.000
GDP	0.000	1	0.721	1.000	0.000	1	0.002	1.000	–	–	–	–	0.000	1	0.000	1.000
Exports	0.000	1	0.747	1.000	0.000	1	0.231	1.000	–	–	–	–	0.000	1	0.114	1.000
Continent	–	4	0.000	–	–	4	0.000	–	–	4	0.000	–	–	4	0.000	–
America	3.731	1	0.000	41.702	4.313	1	0.000	74.663	4.176	1	0.000	65.100	4.498	1	0.000	89.862
Asia	3.300	1	0.001	27.103	3.789	1	0.000	44.216	3.502	1	0.001	33.167	3.986	1	0.000	53.858
Europe	3.259	1	0.001	26.025	4.210	1	0.000	67.325	3.972	1	0.000	53.082	4.448	1	0.000	85.415
Oceania	2.989	1	0.004	19.864	3.835	1	0.000	46.292	3.544	1	0.001	34.616	4.072	1	0.000	58.690
HDI	–	–	–	–	0.950	1	0.073	2.586	2.050	1	0.000	7.771	–	–	–	–
χ^2	253.518	9	0.000	–	226.040	8	0.000	–	201.668	6	0.000	–	223.976	7	0.000	–
N	714				714				714				714			

Source: Authors' calculations based on WTO data.
Note: the cells with no value mean that the variable did not compose the equation.

As argued by Guzman and Simmons (2005), Francois, Horn and Kaunitz (2008), Reich (2017), and Carvalho and Canesin (2018), GDP is also significant in our analysis (second and fourth equations) (See Table 2). HDI, in the second equation, may not be statistically significant since a collinearity problem may have occurred[11] between the variable and GDP, so the significance of GDP can also be refuted in the second equation. HDI, when alone in the calculation (third equation), showed statistical significance. GDP without the influence of HDI, in the fourth equation, is statistically significant. The coefficient equal to zero does not rule out the explanatory potential of the variable, since Cox Regression focuses on the sign, not on the value. This happens due to the fact that it is accounted for in dollars, and not, for example, in billions of dollars, so that the coefficient does not gain much expressiveness. The population is significant in all equations, which reveals that the bigger the population, the lower the chances to survival to an event. Consequently, bigger countries are more likely to experience the events.

The hazard ratio (HR), alternatively to the coefficient, can offer more information on the impact of the variables. The HR shows how the change of a unity of time may affect the chances of survival presented by a variable. Taking the first model of Table 4 as an example: the HR number of 24.546 means that DMs are 24 times more likely to initiate a dispute compared to LDCs; DCs, otherwise, are 11 times more likely to initiate a dispute, also compared to LDCs (HR of 11.056).

Total exports did not show any significance in any of the equations. The analysis may be in accordance with Carvalho and Canesin (2018), who did not find evidence that the total or absolute trade determines the initiation of complaints against EU and US (G2). Although we had previous knowledge that the total exports should not present statistical significance, based on Carvalho and Canesin (2018), we intended to observe and test how this variable behaved related to all disputes, not only those initiated against G2. The literature finds significances on bilateral export trade and on export diversity. However, as explained in topic 3.1, bilateral observation is not the focus of this paper.

The Continent variable was also highly significant. In all equations, it can be seen that the four regions, America, Asia, Europe and Oceania, are at a greater risk of experiencing the event in relation to the African continent. The coefficient and HR values show that the chances of an Asian country triggering the DSB is slightly higher than those of a European member (β 3.300 and HR 27.103, and β 3.259 and HR 26.025, respectively, in the first equation). America stands out as being the continent with the greatest risk of initiating a dispute and Oceania appears in the penultimate place, ahead only of Africa. Chi-square (χ^2) proved to be statistically significant, at the level of 5%, in the four equations. The χ^2 is used to ascertain whether the model as a whole is significant and resembles the p-value (F) in linear regressions. The degrees of freedom are evidenced in the column entitled df.

In summary, it is emphasized, from the analysis of the model, that countries from the Centre, located in the northern hemisphere, have greater chances of including their

demands on the commercial agenda, from the creation of the WTO to the present. Development status, HDI and GDP were highly significant in the first, third and fourth equations, respectively. In this regard, the DSB reflects the struggles for power of the member states under the International Trade Regime. If more developed nations are more likely to experience the events, they have more opportunities to modify their adversaries' commercial actions in their favour. However, as the institution itself claims, the initiation of a dispute does not tell the whole story (WTO 2018). Placing demands on the agenda does not mean that they will be attended by the DSB. Nevertheless, when compared to DMs and DCs, it is clear that LCDs are far behind. Their requests are not even taken to the DSB.

Table 5 presents the same analysis as Table 4. Notwithstanding, the dependent variable was modified to *responses*. The second, third and fourth equations revealed approximately the same statistical significance as the previous model. The difference is in the first equation. As no LDCs experienced the event of being a respondent, the values were not significant. However, for statistical verification, a fifth equation was run, which featured a (fictitious) response event for LDC Zimbabwe. In this case, both DMs and DCs obtained statistical significance at the level of 5% (0.001 and 0.004, respectively). Thus, the development status is also a relevant variable to the analysis.

The asymmetries among DMs, DCs and LDCs in relation to their participation in the institution can be overcome by strong coalitions. As explained in topic 2, DCs gained some advantages as a result of the alliance of G20-T, as well as of the strong leadership of Brazil, India and, lately, China (Hopewell 2016). Thus, LDCs should engage in strategic actions based on a uniform behaviour in the institution. Francois, Horn and Kaunitz (2018)'s study analysed LDCs as a single actor; they merged the data into a 'LDC Union'. Their model showed that 'LDC would double its amount of dispute initiations when acting through a union.'

Likewise, it is clear that the risk of being sued is greater for countries in the northern hemisphere and for those with a larger population and GDP, and a higher HDI. In this regard, development, measured by GDP, HDI or status, comprises a significant impact variable for a state to be a respondent before the DSB. The body, therefore, represents countries according to their participation in the global market. The weakest states commercially and economically do not experience high numbers of occurrence of the event. Even though this is something positive, given that these members are less likely to be compelled to modify their domestic actions, a smaller number of responses mean that these states are less likely to learn about the functioning of the body and, consequently, to include their demands on the agenda. A LDC, for example, which does not have any type of participation in the institution, when triggered by a DM or a DC, will have legal, political, logistical costs, among others, with which it is not used to dealing. Consequently, it is not without reason that the WTO offers specific support to the weakest countries when dealing with disputes (WTO 2021).

Table 5. Impact of variables on responses

Equation Variables																
	Equation 1				Equation 2				Equation 3				Equation 4			
	β	df	Sig.	HR	β	df	Sig.	HR	β	df	Sig.	HR	β	df	Sig.	HR
Status (respondent)	–	2	0.000	–	–	–	–	–	–	–	–	–	–	–	–	–
DMs	9.816	1	0.676	0.549	–	–	–	–	–	–	–	–	–	–	–	–
DCs	9.215	1	0.694	0.000	–	–	–	–	–	–	–	–	–	–	–	–
Population	0.000	1	0.000	1.000	0.000	1	0.000	1.000	0.000	1	0.000	1.000	0.000	1	0.000	1.000
GDP	0.000	1	0.263	1.000	0.000	1	0.000	1.000	–	–	–	–	0.000	1	0.000	1.000
Exports	0.000	1	0.310	1.000	0.000	1	0.415	1.000	–	–	–	–	0.000	1	0.491	1.000
Continent	–	4	0.000	–	–	4	0.000	–	–	4	0.000	–	–	4	0.000	–
America	1.204	1	0.000	3.332	2.013	1	0.000	7.484	1.781	1	0.000	5.936	1.942	1	0.000	6.973
Asia	0.897	1	0.006	2.451	1.578	1	0.000	4.845	1.044	1	0.002	2.841	1.509	1	0.000	4.521
Europe	0.506	1	0.148	1.658	1.719	1	0.000	5.580	1.353	1	0.000	3.868	1.627	1	0.000	5.088
Oceania	0.762	1	0.063	2.142	1.762	1	0.000	5.822	1.263	1	0.002	3.537	1.674	1	0.000	5.333
HDI	–	–	–	–	-0.358	1	0.530	0.699	1.604	1	0.000	4.975	–	–	–	–
χ^2	243.925	9	0.000	–	228.131	8	0.000		186.525	6	0.000	–	227.920	7	0.000	–
N	741				741				741				741			

Source: Authors' calculations based on WTO data.
Notes: the cells with no value mean that the variable did not compose the equation.

5. Concluding remarks

This article aimed at analysing the participation of member states before the DSB of the WTO according to their degree of development. First, a descriptive analysis of all the disputes brought to the DSB from its creation, 1995, until the year 2018 was carried out. It was found that developed countries have a much higher level of participation in relation to developing and least developed countries. However, in order to answer whether the level of development is indeed the variable which influences the participation of states in the institution, Survival Analysis was used.

Three reasons supported the use of Survival Analysis in this study. First, it was possible to verify the implication of several independent variables, covering a timeframe of 25 years. Other studies, as aforementioned, bring a limited scope of analysis. Second, it contributes to the field of international organizations with an innovative method to analyse international disputes. Third, Survival Analysis allowed us to focus not only on the initiation of a dispute, but also on the reasons why countries are challenged by others (responses).

Survival Analysis allowed us to observe the behaviour of states before the DSB, according to their levels of development. The Kaplan-Meier Curve of complaints and responses showed that members of the organization that are located in the poorest regions of the globe are less likely to experience the events. Cox Regression, based on the variables referring to countries, made it possible to verify the statistical significance of the independent variables *development status*, *GDP*, *HDI* and *population* concerning the time until the occurrence of the events. In other words, the greater the degree of development of a member states, the higher its chances are of participating in the DSB (initiating or responding to a dispute). Total exports did not show any statistical significance.

The data presented draws attention to an interesting point: the weakest countries, the LDCs and those located on the African continent have been slowly increasing their participation in the DSB. Tunisia and Bangladesh are relevant cases. However, this change in the profile of members will not happen without new power struggles. A significant example is the role of the USA. The country has been attempting to delegitimize the actions of the WTO[12]. For instance, it is clear the intention of the US Congress to block the appointments of new judges for the Appellate Body. As a general rule, the body has seven judges, who assume four-year terms. As their choices are made through positive consensus, the negative vote of only one member can block the designation of judges and affect the entire structure of the DSB. Gallardo-Salazar and Tijmes-Ihl argue that US behaviour is causing a deep crisis in the WTO (Gallardo-Salazar and Tijmes-Ihl 2020).

Currently, several disputes are stagnated before the body. On the WTO dispute news feeds, statements are easily found regarding the impossibility of complying with the deadlines described by the Understanding on Rules and Procedures for Dispute Resolution (DSU). The justifications are, above all, the large amount of work that the Panel and the Appellate Body have been facing[13] and, in order to reduce the political content, those in charge add that the disputes in question are too complex for the reports to be made available within the scheduled deadlines.

The purpose of the United States, and of other countries, is to delegitimize and paralyse the body, as a means to protest against the way the WTO operates, so that these states can incur fewer losses in the world trade (Payosova, Hufbauer and Schott 2018)[14]. The actions of the USA are intelligible: the country was the most sued before the institution, having responded to 147 disputes, and lost in 92 cases. On the other hand, the USA has initiated 122 disputes, and has won 78 of them, which they consider to be far from the expected. The DSB made it possible for any state to complain another one. In this respect, countries do not need trade rounds like those that occurred in GATT for their demands to be placed on the agenda. The USA, when losing more than winning, through the DSB, takes a critical and delegitimizing stance, with the intention of having commercial measures formulated and resolved regionally, if not bilaterally, as it used to happen at the period of GATT.

The WTO, as an international institution, comes to life from the moment the states create it. Although it is the result of the claims of its creators, it becomes an actor in the international system. As an actor, its legal-structural character takes a strong stance in favour of the poorest countries and the development of nations, points that can easily be found in its principles. In comparison to GATT, the WTO has overcome numerous obstacles of commercial nature. However, much remains to be done.

Even if the organization has an extensive and somewhat comprehensive scope of agreements and regulations, some issues still require much concern. Positive consensus, for example, was a characteristic of the dispute resolution body of GATT, so if a state was not in agreement with the outcome of a dispute, it just needed to express its non-acceptance regarding the recommendations of the judges. One of the first changes which occurred in the DSB concerned this issue. Currently, it is necessary to solve the other problem caused by the positive consensus: the choice of its judges.

Likewise, strict measures to unblock the WTO rounds should be discussed. The Doha Round was the first wave of negotiations held by the institution. Started in 2001, with an estimated end to 2005, the Round is stagnant until the present day. The obstacle point, again, consists of the disagreements between developed and developing nations, especially regarding tariff protections. Nonetheless, our argument consists in highlighting that the possibility of change relies on DCs and LDCs' acting in coalition to assure their positions in a strong and coherent attitude.

Much remains to be done until the institution gains sufficient strength to reduce the asymmetries of the international system effectively. Meanwhile, the members of the organization and the actors of the international trade system struggle to obtain individual, rather than global, gains. Therefore, the WTO navigates between the aspirations of development and free trade, being unable to achieve any of them until there is a consensual balance of demands, which requires a strong institution.

Notes

[1] The WTO does not classify the status of development of its members. This definition is made by self-declaration. Nonetheless, 'other members can challenge the decision of a member to make use of provisions available to developing countries' (WTO 2022: n.p.). In practice, there is a consensus among member states concerning the development status of the countries. In this regard, the WTO points out that the classification of countries' development is in accordance with the United Nations Conference on Trade and Development (UNCTAD). On that matter, although Brazil and South Korea announced their interest in changing their status to developed nation, both in 2019, the WTO still classifies them as developing countries. Therefore, in this research, it was applied the WTO's classification. For more information, see: https://www.wto.org/English/Tratop_E/devel_e/d1who_e.htm).

[2] Although the literature and institutions in general do not employ acronyms for developed and developing countries, in this paper, DM stands for developed country while DC refers to developing country. The main purpose of this use is to avoid misunderstandings concerning DMs and DCs, especially in the figures and graphics plotted throughout this paper. Moreover, given that not all members of the DSB are necessarily countries, as in the case of the European Union, it is more accurate to refer to them as 'members.'

[3] A Survival Analysis is a method of observing the time until an event occurs (See Despa 2010; Hosmer, Lemeshow and May 2008; Kartsonaki 2016) and is known by different nomenclatures. In Sociology, it is called Event History Analysis. In the area of Political Science and Economic Science, in turn, the Duration Model. In biostatistical and epidemiological studies, it is called the Hazard Model or Hazard Rate Model. In the field of engineering, it is defined as Failure-Time Model. The application of the model in International Relations investigations is used to verify the duration of wars and peace, the longevity of alliances, and the duration of trade agreements, etc. (See OSS 2007).

[4] For example, Brazil presented an event in 1997 with the beginning of dispute DS69. Data related to independent variables, such as GDP and HDI, were collected from 1997. In 1998, Brazil initiated another dispute, therefore, the country was added to the sample again as another individual and the data are related to 1998. The process is repeated until it contemplates all the disputes. The same is done for the event *response*.

[5] The development classification used in this article is that provided by the United Nations World Economic Situation and Prospects (2018), which divides countries into developed (described here as DMs), developing and least developed countries (UN 2018).

[6] Although the total of disputes is 561, the sum of 321 plus 267 plus 1 is 589. It is so due to the fact that some disputes have more than one complainant. For example, dispute DS217 has nine complainants. The same does not happen to the number of responses.

[7] When counting the European Union as being a single member, such as the DSB does, the number of developed complainants is even smaller, only 12 member states.

[8] The use of the word 'risk' does not imply a negative connotation. It is in accordance with health studies nomenclatures.

[9] Since 1995 until August 2018, no member state left the organization, all countries present data for the last year of study. As the sources from which data were collected did not provide the results for 2018 (until the elaboration of this article), the values of GDP, exports and population were estimated. For this purpose, the percentage of growth of the variables in the year 2017 was verified and added to the values of the year, thus conjecturing the data of 2018. For the HDI of 2018, in particular, the indexes of 2017 were repeated. Some observations, in turn, deserved special attention, such as Taiwan, a partially autonomous state, whose information was not found in the same database as the World Bank, for example, which only provides data from countries as a whole.

[10] Although Hungary is part of the European Union, the country, in these specific cases, was sued alone. This happens sometimes in the WTO. However, when a European state initiates or responds to a dispute by itself, it is not counted as belonging to the European Union member. In that sense, there are no double-counting issues.

[11] The collinearity or multicollinearity problem occurs when two or more independent variables are correlated. Since GDP is part of the HDI calculation, the chances of collinearity are high. Hence the need for the third equation.

[12] In several interviews, US President Donald Trump claims that the WTO is a disaster for the trade of his country and that the agreements in place at the institution are damaging the United States immensely. See BBC (2018).

[13] The DS486 dispute, for example, has a submission from the Appellate Body: '[the] Appellate Body informed that it would not be able to circulate the report of that appeal within 60 days, nor in 90 days, due to the substantially increased workload in 2017, the large number of appeals in parallel and the increase in the overlap of Division meetings due to the vacations of members of the Appellate Body'. See WTO (2018b).

[14] Since 2017, the USA has been blocking, through its veto power, the choice of new members for the Appellate Body. See Payosova, Hufbauer Schott (2018).

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About the authors

Samuel Rufino de Carvalho is an International Relations PhD student at Pontifical Catholic University of Rio de Janeiro (PUC-Rio). He holds a Master's degree in Political Science from the Faculty of Social Sciences of Federal University of Goiás (UFG). He holds a Degree in French Language Teaching from the Faculty of Letters of UFG. He also holds a Degree in International Relations from the Faculty of Social Sciences of the same institution. Research fields: Dispute Settlement Body of the World Trade Organization, International Relations, International Institutions, International Regimes, French teaching and learning. Experience in quantitative methods.

Andréa Freire de Lucena is a Professor of Economics, Political Science and International Relations at the Faculty of Management, Accounting and Economics and at the Faculty of Social Sciences, Federal University of Goiás, Goiânia, Brazil. Coordinator of Fundação de Amparo à Pesquisa do Estado de Goiás (FAPEG), a Brazilian public funding institution. She holds a PhD and a Master's degree in International Relations from de University of Brasília (UnB) and a Degree in Economic Sciences from the Federal University of Ceará. Research fields: International Economy, commercial policies, public policies, dispute settlement, international regimes.

Desenvolvimento e o Órgão de Solução de Controvérsias da Organização Mundial do Comércio: uma análise de sobrevivência

Resumo: Este artigo analisa se o nível de desenvolvimento de um Estado afeta sua participação no Órgão de Solução de Controvérsias (DSB) da Organização Mundial do Comércio (OMC). A metodologia se baseia na Análise de Sobrevivência com o apoio de duas ferramentas distintas. Primeiro, a Curva Kaplan-Meier, que indica o tempo de sobrevivência de um indivíduo até a ocorrência de um evento, foi traçada. Em seguida, foi utilizada a Regressão Cox. Esta ferramenta associa a Análise de Sobrevivência à regressão linear, a fim de examinar os impactos de algumas variáveis independentes no tempo até a ocorrência dos eventos observados. Os resultados mostraram que Estados com níveis mais altos de PIB e IDH, e com uma população maior, têm mais chances de iniciar uma disputa e de ser um respondente. Da mesma forma, os continentes americano e europeu são os mais propensos a experimentar tais eventos. Os países desenvolvidos e em desenvolvimento experimentam mais facilmente a incidência de um evento quando comparados aos países menos desenvolvidos.

Palavras-chave: Organização Mundial do Comércio; Órgão de Solução de Controvérsias; desenvolvimento; Análise de Sobrevivência; disputas comerciais internacionais.

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