What makes countries initiate WTO disputes on food-related issues?

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Abstract— **This paper analyses relevant determinants for the probability to initiate a dispute on policy measures under the World Trade Organization (WTO) dispute settlement system. The empirical analysis differs from existing assessments by focusing on agri-food related disputes and provides a more in-depth analysis of specific country and sectoral characteristics not considered in previous studies. Contrary to recent analyses of overall trade disputes, the results show that some determinants such as legal capacity and monetary means are not statistically significant. Own protectionist behaviour, endured protectionism, and the duration of WTO membership, however, could be identified as relevant determinants with the expected direction of impact.**

Keywords— **WTO dispute, agri-food sector, binary choice model**

I. INTRODUCTION

The dispute settlement system of the World Trade Organization (WTO) was set into force as a part of the WTO Agreement on January 1, 1995. It is the device for the resolution of conflicts arising between Members over the interpretation of their commitments under the regime of the organization. Dispute settlement must be self-enforcing, i.e. from the consultation to the potential compliance phase all actions are driven by Members. Referred to as the "central pillar of the multilateral trading system" [1] the design of the WTO dispute settlement system is central to the debate on institutional reforms of the WTO and has also been under negotiation at the current WTO Doha round of negotiations. A major desire is to make the settlement system more effective and to allow for the appropriate consideration of developing countries' demands. Reform proposals span a wide field. However, the understanding of the factors that drive the system is required for targeted improvement.

The question addressed in this paper is, therefore, which Members' characteristics explain their activity as complainants in WTO food-related trade disputes. Compared to previous empirical studies, this investigation provides an in-depth analysis of food-related disputes and considers new potential determinants that may supplement the understanding of what drives the use of the dispute settlement system. The empirical investigation is based on a dispute distribution model developed by [2].

The paper is organised as follows: The model description is followed by a discussion of considered determinants. Statistical implementation and estimation results are subsequently presented before concluding.

II. A BINOMIAL DISPUTE INITIATION MODEL

This analysis is based on the model first presented by [2]: The initiation decision is described through a binary choice model in which the Member's probability to complain against another Member is dependent on a set of the complainant's traits or the characteristics of its specific environment. The implicated conditional probability function for this binary choice situation is the Bernoulli distribution

$$f\left(y_{ij}\left|\mathbf{x}_i,\boldsymbol{\beta}\right.\right)=\pi_i\left(\mathbf{x}_i\boldsymbol{\beta}\right)^{y_{ij}}\left[1-\pi_i\left(\mathbf{x}_i\boldsymbol{\beta}\right)\right]^{1-y_{ij}}, \quad (1)$$

where y_{ij} is the binary dependent variable which takes 1 for a complaint and 0 for no complaint, $\boldsymbol{\beta}$ denotes the vector of K coefficients, i and j indicate the complainant and the defendant respectively. The set of K influences is merged in vector $\mathbf{x}_i$. Function $\pi_i\left(\mathbf{x}_i\boldsymbol{\beta}\right)$ calculates the individual probability to complain for a prospective complainant i. Here, we use the widely employed conditional logistic distribution,

$$\pi_i(\mathbf{x}_i\boldsymbol{\beta}) = \exp(\mathbf{x}_i\boldsymbol{\beta}) \big/ \left[1+\exp(\mathbf{x}_i\boldsymbol{\beta})\right], \qquad (2)$$

which would result in the well-known Logit model when applied to single trials. The proceeding for the assessment of determinants is the reproduction of the observed sample of dispute initiation over the period from January 1, 1995 to June 30, 2006 based on a dispute distribution function. Assuming that the probability for a litigation decision is constant from one trial to the next and that successive trials are independent, Member $i's$ probability for c_i complaints in n_i trials against all other WTO Members is then specified through the Binomial distribution,

$$f(c_i|\mathbf{x}_i,\boldsymbol{\beta},n_i) = \binom{n_i}{c_i}\pi_i(\mathbf{x}_i\boldsymbol{\beta})^{c_i}\left[1-\pi_i(\mathbf{x}_i\boldsymbol{\beta})\right]^{n_i-c_i}, \qquad (3)$$

where $c_i = \sum_j y_{ij}$. The expected number of Member $i's$ complaints against all other WTO Members is then given by the expected value of the Binomial distribution,

$$E(c_i) = n_i\pi_i(\mathbf{x}_i\boldsymbol{\beta}), \qquad (4)$$

which is strictly proportional to the number of independent Bernoulli trials n_i .

The applied method is maximum likelihood estimation. Assuming that the data drawn from this Binomial distribution is independent and identically distributed with unknown parameter $\boldsymbol{\beta}$, the likelihood function is specified by

$$L(\boldsymbol{\beta}|c_i,\mathbf{x}_i,n_i) = \prod_{i=1}^{m}\binom{n_i}{c_i}\pi_i(\mathbf{x}_i\boldsymbol{\beta})^{c_i}\left[1-\pi_i(\mathbf{x}_i\boldsymbol{\beta})\right]^{n_i-c_i}. \qquad (5)$$

Restricting the vector of determinants to a constant, the probability to complain reduces to $\pi_i = \pi$ for all Members and can be determined analytically by solving the first derivative of the logarithmic likelihood function with respect to π leading to $\pi = \frac{\sum_i c_i}{\sum_i n_i}$. Hence, for the restricted model, the maximum likelihood estimator of the probability to initiate a dispute is simply the number of observed complaints over the total number of independent Bernoulli trials.

For the reason that we have no a priori information about the existence of inconsistent trade measures the analysis is based on an assumption about their distribution. For [2] the number of independent Bernoulli trials is dependent on a country's export diversification, i.e. its number of different exported goods over all products and trading partners under the regime of the WTO. Each counted bilateral export flow is considered as one trial. They worked on the assumption that "disputable trade measures" (DTM) are uniformly distributed over all bilateral export flows. Following the approach of [2] we try to mitigate the problem of missing information about the distribution of infringements by incorporating two new indicators: Endured Protectionism by Trade Partner and Own Imposed Protectionism. In addition to this information on the likelihood of DTM in export flows, the attempt of [2] to select the relevant export flows is slightly modified by taking empirical instead of parameterized values for average induced litigation costs into account.

III. DETERMINANTS CONSIDERED

Disputes data: Dispute initiations were collected that affected products of the food sector. The investigation covers the period from January 1, 1995, to June 30, 2006. For jointly filed initiations, each participant is assigned one dispute. When one Member simultaneously requests for consultations on the same subject but with different defendants each one is counted on its own.

Export diversity: Here we adopt the approach first presented by [2]. The underlying principle lies in the expectation of an increased probability to encounter infringements if a Member's export diversity increases. This is self-evident if we assume infringements to be uniformly distributed over all markets, products and trading partners. Hence, we expect the number of disputes to be positively related to Members' amount of different bilateral export flows. Export flows come from [3] available on an aggregation level comparable to the HS-4-level.

Induced costs of litigation: [2] were the first analysing the litigation costs involved and demonstrated their relevance. Their approach is followed through the implementation of a threshold for counting a Member's bilateral export flows, thus excluding flows under a certain value not being worth to fight for. According to calculations of [4], average costs for dispute settlement proceedings range from $128K to $706K. Hence, the analysis is conducted for four different litigation cost levels, i.e. excluding all flows below the respective threshold: $0 when no threshold is applied, $300K for low costs, $500K for medium costs and $700K for high litigation costs.

Endured protectionism by trade partner: It is assumed that the more protective the trade policy of a country's trading partners is, the higher the probability that it faces disputable trade barriers. Hence, we expect the number of initiated disputes to be positively related to a country's faced trade restrictiveness. For this purpose the Market Access Overall Trade Restrictiveness Index (MA-OTRI) provided by [5] is used. It comprises a tariff equivalent of all barriers that exporters of the respective country face on average.

Own protectionist behaviour: Another hypothesis is that the number of its filed disputes is negatively related to a country's tendency towards protectionism. The rationale behind this is the assumption that a more protective Member faces also a greater likelihood to become "victim" of an accusation. We presume a more protective country to pursue a defensive and peaceful strategy to not provoke to be challenged itself. On the other hand we hypothesize that more protective countries have a lower propensity to fight for market liberalisation. For this purpose the Overall Trade Restrictiveness Index (OTRI) by [5] is used as a measure for a country's inclination to restrictive policies. It is a tariff equivalent for all trade barriers which the respective country imposes in average upon the rest of the world.

Relevance of the agricultural sector: Independent from a country's contact to a trading partner we expect the overall importance of the agricultural sector having a positive influence on initiating a case: the higher the overall economic relevance, the more sensitive a country may be regarding violations. To quantify the sector's importance the agricultural share of a Member's GDP is employed. The data is drawn from [6] and [7].

Capacity to absorb legal costs/wealth: The capacity to absorb legal costs is supposed to be essential for the accomplishment of disputes as explicit compensation for litigation costs is not intended by the system. For this reason each potential complainant must anticipate substantial costs that are involved by prosecution and, if applicable, also by enforcement of compliance. It is assumed that the number of complaints is positively related to a Member's capacity to absorb legal costs. As proxy for such financial means we use a country's GDP, provided by [6] and [7].

Legal capacity: One argument often raised to explain the limited access of the system to developing and low income countries is their lack of human and legal capacity (see e.g. [8]). [2] found empirical evidence on the matter of a country's legal capacity in respect of initiating disputes. We hypothesise that the larger a country's endowment with skilled legal personnel, the higher its capability to challenge arguable trade measures of its trading partners and we expect the number of bilateral complaints to be positively linked. Since there is no differentiated information on Members' legal capability we use, like [2], their delegation size at Geneva as proxy. The respective information comes from [9].

Influence of private actors and governmental efficiency: The influence of private pressure groups on the government is relevant as only the government may finally enter a dispute but can be persuaded by private actors in doing so. This power may differ among countries depending on the national framework for organizing private lobby activities and on their respective relevance. For this purpose two domestic variables are included which are provided by [10]: (i) the Corporate Legal Corruption Component (CLCC), measuring legal dimensions of undue political influence by the private sector and (ii) the Judicial/Legal Effectiveness Integrity Index (JLEI), assessing the effectiveness and integrity of the legal and judicial system. The greater the influence of lobbyists, e.g. by legal political finance or by the voice of interests of powerful firms, the more successful the private sector is supposed to be in achieving its export interests. Accordingly, the number of challenged disputes should be positively correlated to the amount

of undue influence, aggregated in the CLCC variable. It is hypothesized, that the higher the efficiency and integrity of the legal and judicial system of a country, the higher its ability to identify illegal trade measures and to pursue a legal action. Hence, the probability for litigation is presumed to be positively dependent on the JLEI variable.

Membership time: The time of membership may be negatively related to the costs of filing a dispute as learning occurs. Hence, we suspect a Member's experience through its membership in the WTO to be positively related to its number of filed disputes. An index is created over the time since the inception of the organization until June 30, 2006, relating each Member's membership time to the whole observation period. The associated data is from [11].

IV. STATISTICAL IMPLEMENTATION AND RESULTS

For the restricted model, improved model prediction is merely owing to the introduction of thresholds for accounting only export flows beyond a certain value. The average number of export flows declines from 5530 in case of no threshold to 65 when the highest threshold of $700K is used. The fit of the model is measured by two different indicators: the fraction of exact predictions and the mean absolute deviation (MAD) between observed and predicted disputes.

Both indicators prove that the thresholds regarding the incorporation of export flows is important as raising the threshold increases the fit of the model. This result supports the findings of [2] that the pattern of dispute initiation is to a large extent reflected by differences in Members' diversity and value of trade. The threshold of $300K has no substantial influences on the results compared to no threshold. Using the middle threshold of $500K, the MAD decreases by 30% to 1.67 compared to 2.38 for the model without threshold. The fraction of exact predictions increases from 23% to 43%. When the highest threshold is applied, the MAD decreases further by 38% to 1.04 while the fraction of exact predictions slightly increases to 49%.

For the unrestricted model the Akaike information criterion is utilized to select the relevant variables. Based on this, the incorporation of additional variables is traded off against the increased fit of the model, thus mitigating the danger of over-fitting. It is then sought after the model specification showing the lowest information criterion value. The proceeding is stepwise: Starting from the restricted model, one additional variable is included and corresponding information criterion calculated. In the next step the variable that yielded the lowest value is retained and the additions of the remaining variables are assessed one by one. Additional variables are included as long as they reduce the information criterion. For the final model, standard errors of the coefficients are derived using the bootstrap methods. The quality of the unrestricted model is further on validated by a likelihood ratio test.

According to this proceeding only four of the considered determinants are retained in the final model: (1) Endured protectionism, (2) Own imposed protectionism, (3) Influence of pressure groups and (4) WTO membership time result in a sufficient increase in the goodness of fit for no threshold and the threshold $300K. For the application of the $500K threshold the variable Influence of pressure groups and for the highest threshold of $700K both Influence of pressure groups and Own imposed protectionism are discarded in the selection process. All included variables show the hypothesized sign and except for the variable Influence of pressure groups, their influence is proven to be statistically significant. The variables' joint significant influence is verified by an asymptotic significance test based on the bootstrapped sampling distribution of the estimator (see [12]). Compared to the restricted model, the fraction of correct predictions are slightly higher for all thresholds. The mean absolute deviation between observed and predicted complaints decreases as well. This is mainly due to improved model behaviour for Members with a large number of observed disputes, predominantly for the EC and the U.S. Both measures show that the model amendment is much higher for the $300K threshold and the specification without threshold.

The likelihood ratio test proves a significant amendment of the model based on the incorporation of the addressed determinants. For the first three thresholds the concerned variables' contribution could

be substantiated at a 1% level, for the highest threshold at a 10% level of significance.

The findings of [2] on a significant influence of legal capacity could not be supported in our analysis of food related disputes. This may be explained by the fact that legal capacity increasingly becomes an internationally tradable good such that each Member can purchase legal expertise, provided that it has sufficient financial resources. On the other hand, the findings of [13] with respect to the influence of monetary means is not confirmed by our results either. Therefore, it seems more likely that legal capacity and monetary means are more relevant determinants for the overall number of dispute initiations but simply less important for the variation of probabilities across countries for the smaller food sector.

The indicators on Governmental efficiency and Relevance of the agricultural sector did also not survive the variable selection process. The latter might simply be an insufficient proxy for the relevance of a Member's agri-food-industry. Variables are not discarded due to multicollinearity, since the pairwise coefficient of correlation between selected and unselected variables is at most 0.34 for Legal capacity and WTO membership time.

V. CONCLUSIONS

The results show that some of the determinants relevant in previous dispute studies such as legal capacity and monetary means could not be confirmed as statistically relevant in the context of the agri-food sector. It could be shown that increasing own protectionist attitude lowers the probability to complain and the level of protection faced by a country leads to an increase as both variables prove to be statistically significant determinants of dispute initiation in the agri-food sector. At the same time, the duration of WTO membership clearly contributes to a larger likelihood to initiate a WTO dispute. Though selected for two of four possible model specifications with its expected sign, the Influence of private pressure groups does not turn out to show a significant influence. Further research should focus on the improvement of data quality to validate or disprove the findings on insignificant influences of some variables, for example the importance of the agri-food sector for the country considered. A generalisation of the model allowing to simultaneously incorporate characteristics of the defendant country would also be very useful. Currently, the implied assumption that probabilities to be a defendant is equal across all countries could only be partially mitigated by including the determinant Endured protectionism of the complaining country.

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