Determinants of Bilateral Food Related Disputes

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Christian Götz and Thomas Heckelei

Background and problem setting

The dispute settlement system of the World Trade Organization (WTO) is the institution for the resolution of conflicts arising between members over the interpretation of their commitments under the regime of the organization. Dispute settlement has to be self-enforcing, i.e. from the consultation up to the potential compliance phase all actions are driven by members. The design of the WTO dispute settlement system is often at the core of the debate on institutional reforms of the WTO. A major requisition 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 (see e.g. Petersmann, 2003). However, the identification of improvements requires information on the factors driving the system, i.e. the determinants for complaining or not complaining. This is the starting point for the empirical analysis.

Objectives

The focus lies on agro-food related disputes with new and bilaterally dependent determinants.
- Allowance for a more in-depth analysis of specific country characteristics not considered in previous studies, especially bilaterally dependent characteristics.
- Supplement the understanding of what drives participation in the dispute settlement system. Question: What are the most relevant country characteristics?
- The identification of relevant determinants allows for the evaluation of the system's accessibility to different types of countries.

Statistical implementation

(1) A bilateral trade flow (observation) between Member i and j might entail an infringement.
(2) It is interpreted as a binary choice situation that could lead to a dispute or not.
$\Rightarrow$ Binary choice situation described as a Bernoulli trial with Bernoulli density:

$$f\left(y_{oij}\mid \mathbf{x}_{ij},\boldsymbol{\beta}\right)=\pi_{ij}\left(\mathbf{x}_{ij}\boldsymbol{\beta}\right)^{y_{oij}}\left[1-\pi_{ij}\left(\mathbf{x}_{ij}\boldsymbol{\beta}\right)\right]^{1-y_{oij}}=\begin{cases}\pi_{ij}\left(\mathbf{x}_{ij}\boldsymbol{\beta}\right) & \text{for } y_{oij}=1,\\ 1-\pi_{ij}\left(\mathbf{x}_{ij}\boldsymbol{\beta}\right) & \text{for } y_{oij}=0.\end{cases}$$

y_{oij} : Binary variable (complaint or no complaint) $\mathbf{x}_{ij}$: Matrix of uni- and bilateral control variables

$\pi_{ij}\left(\mathbf{x}_{ij}\boldsymbol{\beta}\right)$: Member i's probability to complain against j $\boldsymbol{\beta}$: Coefficient vector of K determinants

o : observation or binary choice situation, given as bilateral trade flow from Member i to j

(3) Individualization of the probability to complain is based on the logistic density – to reflect a member's traits and the characteristics of the trade relationship:

$$\pi_{ij}\left(\mathbf{x}_{ij}\boldsymbol{\beta}\right)=\frac{\exp\left(\mathbf{x}_{ij}\boldsymbol{\beta}\right)}{1+\exp\left(\mathbf{x}_{ij}\boldsymbol{\beta}\right)}$$

$\Rightarrow$ Leads to bilaterally dependent Logit model of agro-food related dispute initiations.

(4) Observations or binary choice situations are defined as bilateral agro-food related trade flows from the potential complainant to the potential defendant Member.
(5) Proceeding for the assessment of determinants $\Rightarrow$ Reproduce the observed sample of bilateral dispute initiations over the period from January 1, 1995 to December 31, 2005.
(6) Due to the limited number of disputes in bilateral relationships, efficient estimation requires application of the weighted endogenous sampling maximum likelihood estimator developed by Manski and Lerman (1977). Observations with y=1 were oversampled to enrich the skewed original sample. The resulting sample selection bias is then mitigated in the estimation process by weighing the likelihood contributions based on their proportion in the sample in relation to their true proportion in the population.
(7) Under the assumption of independent and identically distributed observations maximum likelihood is applied and the log-likelihood function is given as

$$\ln L\left(\boldsymbol{\beta}\mid \mathbf{x}_{ij};n_{ij},c_{ij}\right)=w_1\sum_{i,j;i\neq j}c_{ij}\ln\pi_{ij}\left(\mathbf{x}_{ij}\boldsymbol{\beta}\right)+w_0\sum_{i,j;i\neq j}\left(n_{ij}-c_{ij}\right)\ln\pi_{ij}\left(-\mathbf{x}_{ij}\boldsymbol{\beta}\right)$$

$c_{ij}=\sum_o y_{ijo}$, n_{ij} : number of bilateral agro-food trade flows from Member i to j

$w_1=Q_1/H_1$, $w_0=Q_0/H_0$; weighing factors for likelihood contributions

Q_1 : population proportion of $\sum_{ij,i\neq j}c_{ij}$, H_1 : sample proportion of $\sum_{ij,i\neq j}c_{ij}$

Q_0 : population proportion of $\sum_{ij,i\neq j}\left(n_{ij}-c_{ij}\right)$, H_0 : sample proportion of $\sum_{ij,i\neq j}\left(n_{ij}-c_{ij}\right)$

(8) Observations/bilateral export flows are compiled based on thresholds on their value: Only those bilateral trade flows are collected for complainant-defendant combinations that are worth enough to fight for ($300K for low, $500K for medium and $700K for high litigation costs; based on calculations of Nordström (2005).

(9) Model selection and validation:
- Selection is based on Akaike information criterion (Penalty on degrees of freedom loss).
- The variables' joint significant influence is validated using bootstrapped test statistics.
- The quality of the model is further on validated by a likelihood ratio test.

Determinants and data

Explanatory variables	Data	Source	Expected sign
Endured protectionism by trade partner	Average endured tariff equivalent	Kee, Nicita, Olarreaga (2006)	+
Own imposed protectionism	Average imposed tariff equivalent	Kee, Nicita, Olarreaga (2006)	-
Legal capacity*	Size of permanent delegation at Geneva	United Nations (2004)	+
Capacity to absorb legal costs/wealth*	Gross Domestic Product (GDP)	World Bank (2007)	+
Influence of private actors	Measure of legal dimensions of undue political influence by the private sector	Kaufmann (2004)	+
Importance of agro-food export sector	Share of agro-food related export value in GDP	Word Bank (2007)	+
WTO membership time	Index based on a member's percentage membership time over investigation period	World Trade Organization (2007)	+
Agro-food export value	Complainant's total agro-food export value to defendant	EuroCare (2006)	+
Agro-food import value	Complainant's total agro-food import value from defendant	EuroCare (2006)	- / +
Agro-food export dependency from defendant	Share of complainant's agro-food export value to defendant in complainant's total agro-food exports	EuroCare (2006)	+
Agro-food import dependency from defendant	Share of complainant's agro-food import value from defendant in complainant's total agro-food imports	EuroCare (2006)	-
Agro-food trade retaliatory capacity	Share of defendant's agro-food exports to complainant in defendant's total exports	EuroCare (2006)	+

* Influencing factors already integrated in previous empirical investigations
Unilateral explanatory variables
Bilateral explanatory variables

Results

Exploratory variables	Thresholds on export value			
	$0	$300K	$500K	$700K
BETA 0	-14.025	-12.078	-11.811	-11.643
Endured protectionism	not included	***2.150 (0.89)	***2.196 (0.92)	***2.269 (0.87)
Own imposed protectionism	not included	not included	- 0.516 (0.66)	- 0.511 (0.66)
Influence of private actors	***0.734 (0.31)	not included	not included	not included
WTO membership time	*3.923 (2.67)	*3.754 (2.47)	**3.887 (2.09)	**3.864 (2.31)
Agro-food Export dependency	**0.972 (0.47)	not included	not included	not included
Agro-food import value from defendant	***2.652 (0.21)	***1.384 (0.33)	***1.108 (0.30)	***0.981 (0.35)

* significant at the 10% level, ** significant at the 5% level, *** significant at the 1% level
Level of significance for Likelihood ratio test on model specification: 1% under all thresholds.

Conclusions

- Contrary to findings of earlier studies, *Legal capacity*, the *Capacity to absorb legal costs*, and *Own imposed protectionism* could not be confirmed as statistically relevant in the agro-food sector in this purely bilateral context.
- Consistent with the findings of Götz, Heckelei, Rudloff (2010) the influence of the variables *Endured protectionism* and *WTO membership time* could be supported as statistically relevant. The *Influence of private actors* could be verified under the lowest threshold .
- Of the bilateral variables the influence of *Agro-food export dependency* could be supported under the lowest and of *Agro-food import value* under all thresholds on export value.

Outlook and amendments

- Improve the data quality to validate or disprove the findings on insignificant influences of some variables, e.g. the *Importance of the agro-food export sector* and bilaterally dependent characteristics like Members' *Trade retaliatory capacity*. Concerning the latter indicator Members' total trade retaliatory capacity might be a more consistent measure as retaliation in different trade sectors is also possible.
- Apply methods for better data exploitation, e.g. by principal component analysis. This might help to mitigate the skewed sample problem resulting from the purely bilateral analysis.

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