



The impact of European Union agricultural preferences

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Object: EU trade preferences in the agricultural sector

- The goal is to assess the impact of the preferential margins on trade flows
- We use a gravity equation approach in order to single out the contribution of the preferential policy to the deviation from the “normal” trade levels

why preferential policies?

Because over the time a large number of preferential trade arrangements has been concluded between the EU and developing countries in order to integrate them in world trade and to promote their economic growth

why the agricultural sector?

Because it is a crucial sector for many poor economies and most of the EU agricultural imports benefit from preferential tariffs



Literature review

Two fields of analysis about preferences:

- Value of preferences

(Bacchetta and Bora, 2001; Alexandraki and Lankes, 2004; Anson e al., 2005; Augier et al., 2005; Bouët et al., 2005; Cadau and Jean, 2005; Estevadeordal and Suominen, 2005; Hoekman and Ozden, 2005; Manchin, 2005; Bureau et al, 2006; Low et al., 2006; and others)

- Impact of preferences (gravity models)

(Panagariya, 2000; Piermartini and Teh, 2005; Persson and Wilhelmsson, 2005; Nilsson, 2002, 2005; Aiello et al., 2006; and others)



Methodology: Gravity approach

- Following Anderson and van Wincoop (2004) we derive our gravity equation including many commodity classes of goods (denoted by k where $k=1,2,\dots,K$) flowing between EU and DCs.
- The trade cost factor, T_{ijk} , reflects the impact of transport costs, proxied by distance (d_{ij}), common language (L_{ij}) and colonial links (C_{ij}), and trade policies, proxied by the ad valorem equivalent tariff factor ($t_{ijk}=1+\tau_{ijk}$) imposed by country j (EU) on imports of commodity k from country i (DCs):
- Trade preferences reduce border costs as a consequence of the tariff reduction. In the case of preferential imports, then, the trade cost is a function of the preference factor:
“ higher preferences decrease trade cost and, thus, reduce the negative trade impact of the bilateral tariffs”.



Data

We estimate a cross-sectional model, covering imports in 689 agricultural commodities (Harmonized System at 6-digit – HS6) from 161 developing countries to 15 EU “old” members in the period 2003-2005.

Data on trade at HS6 level of detail are taken from Eurostat Comext database, whereas data on tariffs are from the MAcMap-V2 database.

The Comext database allows to distinguish the tariff regimes (MFN or preferential) under which imports take place



Data: *Preferential trade*

Using the information on the tariff regimes, we add to the model:

- *A preferential dummy equal to "1" if imports enter under a preferential regime and "0" if not*
- *An interaction term between the previous dummy and the preference margin is our variable of interest.*

Methodology: *Theoretically grounded gravity equation*

$$\ln m_{ijk} = \alpha - \ln Y_{wk} + \ln Y_{ik} + \ln E_{jk} + \rho(1 - \sigma_k) \ln d_{ij} + \delta_1(1 - \sigma_k) L_{ij} + \delta_2(1 - \sigma_k) C_{ij} + (1 - \sigma_k) \ln(1 + \tau_{jk}^{mfn}) MFN \\ + [(1 - \sigma_k) \ln(1 + \tau_{jk}^{max}) + (\sigma_k - 1) \ln(1 + pref_{ijk})] PRE + (\sigma_k - 1) \ln P_{ik} + (\sigma_k - 1) \ln P_{jk} + \varepsilon$$

Where:

- σ_k = CES elasticity of substitution
- m_{ijk} = imports of commodity k from country i to country j
- Y = GDP
- φ_{ik} = imported good k 's expenditure share
- τ_{ijk} = the duty imposed on imports of commodity k .
- d_{ijk} = bilateral distance
- $pref_{ijk}$ = preferences
- $P^{\sigma-1}$ = Multilateral resistance terms
- Z = set of control variables (dummies for language and colonial links)
- MFN and PEF = dummies for tariff regimes of imports

- We use importer, exporter and products fixed effects



Estimation Issues: What's new in our gravity model?

The **first contribution** of the paper is the use of a more refined measure of trade preferences compared to the binary variables commonly used in the literature.

We use a quantitative variable for preferential margin:

“our definition focuses on actual preferences with respect to possible competitors, rather than a measure of theoretical margins with respect to Most Favoured Nation (MFN) tariffs, either bound or applied”.



Estimation Issues: What's new in our gravity model?

In particular, we measure the preference margins in relative rather than in absolute terms.

The preference factor is computed in relative terms, as the ratio of the maximum applied duty factor by importer j (EU) across all possible exporters on product k , and the duty incurred by a specific exporter i :

$$(1 + pref_{ijk}) = \frac{(1 + \tau_{jk}^{max})}{(1 + \tau_{ijk})}$$



Estimation Issues: What's new in our gravity model?

- **we use disaggregated data for products and importer countries (15 European countries and EU15)**

The use of disaggregated data is recommended (Anderson and van Wincoop, 2004; Aiello et al., 2007) since preferential policies are quite differentiated across products

More generally, the aggregation process produces an estimation bias (aggregated data pretend that there is only one trade barrier for all products, while trade costs vary across goods and countries)

- We estimate this impact by modelling bilateral EU imports at 6-digit level, allowing trade costs and substitution elasticities to be heterogeneous across industries.



Estimation issues: Zero Trade Flows

The existence of observations for which the dependent variable is zero creates problems for the use of the log-linear form of the gravity equation:

- missing observations: the logarithm of "0" does not exist
- possible bias: limiting the analysis to observations where bilateral trade flows are positive is a significant source of bias because the selected sample is not random (zero flows do not reflect unobservable trade values but they are the result of economic decisions about the potential profitability of engaging in trade at all)



Estimation issues: Zero Trade Flows

Possible approaches:

- drop the pairs with zero trade from the data set and estimate the log-linear form by OLS;
- estimate the model using $M_{ij} + 1$ as the dependent variable;
- use a Tobit estimator (Carrère, 2006; Rauch, 1996, Rauch and Trindade, 1999; Yeyati, 2003)
- use the Poisson pseudo-maximum likelihood estimator (Martinez-Galàn et al, 2005; Siliverstovs and Schumacher, 2006; Silva and Tenreyro, 2003, 2005, 2009).

Our approach: ***Heckman two stage procedure*** (Linders and de Groot, 2006; Helpman, Melitz and Rubinstein, 2007; Martin and Pham, 2008).

It transforms a selection bias into an omitted variable one: in the first stage the probability to export is estimated and a new variable (inverse Mills ratio) is derived and introduced in the second stage



Estimation issues: Heckman Two-Step

The two stage approach does not only correct possible biases but also allows us to distinguish the impact of preferences on the extensive as well as on the intensive margin:

-an increased probability of registering a positive trade flow, as a matter of fact, signals the existence of a larger set of traded goods (**extensive margin**),

-while, the coefficient associated with the preference margin in the second stage refers to the trade of larger quantities than would have been the case without the preference (**intensive margin**).

-The **second contribution** of the paper is to provide a micro-founded assessment of trade preferences impact on the intensive as well as on the extensive margins of trade.



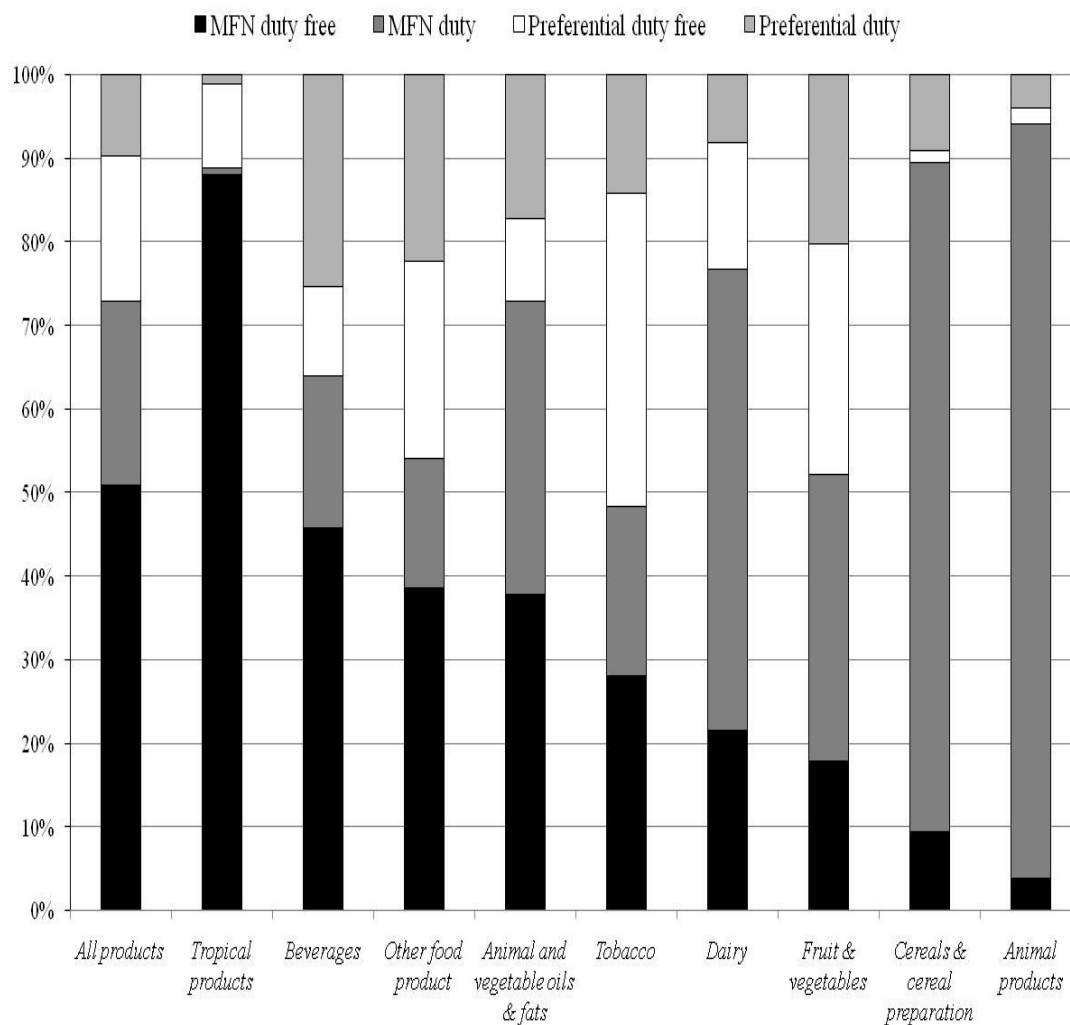
Estimation issues: preference effect

Finally, we compute the percentage change due to the hypothetical elimination of existing preferences as follows (Lai and Zhu, 2004):

$$\text{Preference effect} = \frac{\sum_{ijk} (E[m_{ijk} \mid \text{pref}_{ijk} > 0] - E[m_{ijk} \mid \text{pref}_{ijk} = 0])}{\sum_{ijk} E[m_{ijk} \mid \text{pref}_{ijk} > 0]}$$

In calculating these results, we estimate the counterfactual change in the dependent variable, total EU imports, that would follow from the removal of the preferential advantage, i.e. the trade flows that would not take place in the absence of preferences.

Descriptive Statistics: Share of EU agricultural imports by type of tariff regime (2003-2005)



Almost **half** of agricultural imports refers to the **MFN duty-free** tariff lines although this percentage is much **lower** for **animal products, vegetables and cereals**. If we consider the products facing a **positive MFN duty**, a significant share of imports (**30%**) **benefits** from a **positive preference margin**.

On the other hand, some differences emerge when we look at the commodity groups: the share of **preferential imports** ranges from **6% for animal products** to almost **52%** (most of it duty-free) in the case of **tobacco**.

Descriptive Statistics: Value and preference margins for commodity groups with preferential trade flows

15 EU members	Bilateral applied tariff (%)	Preference factor ($1+pref_{ijk}$)	Value of preference (Ml €)	Total trade volume (Ml €)
Animal products	31	1.73	132	3701
Beverages	11	1.14	110	1929
Cereals & cereal preparation	20	1.23	31	1720
Animal and vegetable oils & fats	4	1.07	41	4508
Tobacco	4	1.16	136	1824
Tropical products	1	1.04	10	9934
Fruit & vegetables	7	1.10	636	16062
Dairy	19	1.22	9	457
Other food products	8	1.25	245	2022
All Above Sectors	8	1.14	1,350	42,157

Looking at the relative preferential factors, it emerges that the overall simple average is 1.14 with large differences across sectors. In addition to **animal products**, which stand out with a relative preferential factor equal to **1.73**, the next most preferred sectors appear to be **food products, dairy, and cereals** (these are the most protected EU agricultural sectors).

The **value** of EU agricultural preferences is equal to **€1,350**

The rent for the fruit and vegetables sector alone amounts to almost half of the overall value, which is not surprising given the importance of this sector, but generally the connection between rent value and trade flow intensity is irregular.

Empirical Results: Overall results – 15 EU members imports

Model Dependent variable	Probit regression, marginal effects Pr ($m_{ijk} > 0$)	Heckman Selection $\ln m_{ijk}$	
Independent variables	Estimated coefficients	Estimated coefficients	Standard Errors
Intercept (α)	-	60.7***	(5.14)
$\ln d_{ij}$	-0.06***	-11.3***	(0.75)
$\ln (1+pref_{ijk})$	0.06***	-	-
$\ln (1+pref_{ijk}) * PRE$	-	2.75***	(0.88)
C_{ij}	0.04***	7.59***	(0.53)
L_{ij}	0.04***	-	-
λ	-	12.6***	(1.22)
Elasticity of substitution, σ			3.75
Preference effect			2.2%
Trade volume (Ml. EUR)			1.358
N. of obs.	433917	41801	
Prob > χ^2	0.00	-	
Pseudo R^2	0.31	-	
Rho (ρ_{eu})	-	0.58	
Sigma (σ_{ϵ})	-	12.6	

Notes: (*) significant at 10% level; (**) significant at 5% level; (***) significant at 1% level; Importer, Exporter and product specific-fixed effects; Fixed effect coefficients not reported.

-The results showed in Table confirm that preferential access leads to a significant expansion in trade between the EU and DCs, in terms of both the extensive and the intensive margins.

- The estimated coefficient of 0.06 implies that a 10% increase in the relative preference factor – roughly corresponding to an average reduction of 10 percentage points in the bilateral applied tariffs at the estimation point – increases the probability of registering positive trade flows (i.e., the extensive margin) by 6%.

-The estimated preference effect is over 2%, which means that an absence of preferences would reduce bilateral trade volume between DCs and the 15 EU member countries by €1,358 million.

Empirical Results: Results for commodity groups – Extensive margin

Probit regression, marginal effects, Pr ($m_{ijk} > 0$)	Independent Variables			
	$\ln d_{ij}$	$\ln(1+pref_{ijk})$	C_{ij}	L_{ij}
Animal products	-0.03***	0.04***	0.02***	0.01*
Beverages	-0.04***	0.13***	0.07***	0.06***
Cereals & cereal preparation	-0.08***	0.12***	0.16***	0.05
Animal and vegetable oils & fats	-0.06***	0.14***	0.03***	0.02***
Tobacco	-0.09***	0.18***	0.02	0.04**
Tropical	-0.07***	0.04***	0.04***	0.04***
Fruit & vegetables	-0.11***	0.03***	0.04***	0.05***
Dairy	-0.04***	0.02*	0.03***	0.02*
Other food products	-0.06***	0.07***	0.06***	0.05***

In almost all cases, preferences significantly **increase** the **probability of exporting into EU markets**. The increase in the probability of registering a positive trade flow as a consequence of preference treatment, varies between **3% for fruit and vegetables and 18% for tobacco**. These differences are obviously related to the structure of applied tariffs as well as of the preference margins. A **low impact** on the probability of registering positive trade flows is obviously related with the **small preference margins** granted to **tropical products, oils and fats, and fruit and vegetables**. However, a **small impact** on the extensive margin is also registered by a sector such as **animal products** characterized by **high applied tariffs**.

Empirical Results: Results for commodity groups – Intensive margin

Heckman Selection	Independent Variables				N. of	Elasticity of
$\ln m_{ijk}$	$\ln d_{ij}$	\ln $(1+pref_{ijk})*PRE$	C_{ij}	λ	obs.	substitution, σ
Animal products	-8.94*** (3.06)	0.67 (3.27)	3.13** (1.63)	6.49* (3.77)	1871	1.67
Beverages	-6.44*** (1.70)	7.22*** (2.63)	-2.27** (1.10)	-15.1*** (2.67)	4974	8.22
Cereals & cereal preparation	-6.60*** (1.90)	3.81** (1.89)	6.25*** (1.09)	14.4*** (2.47)	4542	4.81
Animal and vegetable oils & fats	-6.59*** (2.67)	2.38 (5.70)	1.37 (1.31)	0.23 (3.19)	2528	3.38
Tobacco	-7.41*** (2.19)	7.89*** (2.67)	2.76** (1.32)	-8.58*** (3.21)	4560	8.89
Tropical	-11.1*** (1.28)	15.9** (7.17)	7.79*** (0.68)	15.1*** (1.52)	9007	16.9
Fruit & vegetables	-19.9*** (0.66)	3.66*** (0.79)	12.5*** (0.47)	25.4*** (1.15)	48622	4.66
Dairy	-10.3** (4.87)	4.99 (3.84)	-1.99 (3.75)	8.29 (7.95)	1131	5.99
Other food products	-9.39*** (0.76)	3.90*** (0.74)	7.90*** (0.49)	8.45*** (1.25)	31011	4.90

Notes: 15 EU members imports; Standard errors in parenthesis; (*) significant at 10% level; (**) significant at 5% level; (***) significant at 1% level; Importer, Exporter and product specific-fixed effect; Intercept and fixed effect coefficients not reported.

The estimates for the elasticity of substitutions are statistically significant for six out of nine classes of goods. Almost all the significant estimates are within the range of the values in the literature, with the exception of tropical products, which reaches a value of 16. The value of the elasticities should be related with the product homogeneity within the different sectors.

Empirical Results: The estimated preference effect – Results for commodity groups

Sectors	Preference effect	Trade volume (Ml. EUR)	% of Preferential trade
Beverages	1.4%	27	4%
Cereals & cereal preparation	2.5%	43	24%
Tobacco	2.3%	42	4%
Tropical	6.0%	596	54%
Fruit & vegetables	9.2%	1478	19%
Other food products	5.9%	119	13%
TOTAL	-	2,305	14%

Results only refer to the sectors where preferences have a significant impact on the intensive margin. In the other cases (**oils and fats, animal products, and dairy**), the impact seem to be on the **extensive margin** only.

The impact of EU preferences is around **2%** in the case of **beverages, cereals, and tobacco**; around **6%** in the case of **tropical and other food products**; and over **9%** for **fruit and vegetables**.



CONCLUSIONS (I)

Our results establish robust estimates of the impact of EU preferences on bilateral trade flows.

We control for possible biases in three dimensions: measurement of the intensity of the (relative) preference margins, impact on the extensive as well as on the intensive margins of trade, distinction between preferential and MFN trade flows.

We quantify the intensity of the preference margins, rather than relying on a simple dummy. In order to emphasise the advantages granted with respect to other importers, preferential margins are computed, for each product, as the difference between the highest tariff applied by EU and the actual duty paid by each exporter.

From a policy perspective, our results show that preferential schemes have a significant impact on trade.

First, preferences influence the extensive margins of trade since we register a significant increase in the probability of registering positive trade flows.

This implies that countries benefiting from preferential schemes export a larger set of goods, and some recent works have pointed out the contribution of export variety to growth (Broda and Weinstein, 2006).

This impact ranges from 2% for dairy to 18% for tobacco.



CONCLUSIONS (II)

As far as the impact on trade volumes is concerned, we find that EU agricultural imports increased as consequence of preference margins, by more than €2 billion, representing almost 14% of preferential trade flows. The results for different commodity groups have some potentially interesting policy implications.

DCs may be concerned about the consequences of *preference erosion*, either in terms of the negative impact on trade – in the case of **tropical and other food products**, and especially **fruit and vegetables** – or *loss of rents* – in the **case of animal products, beverages and tobacco**.

On the other hand, there may be room for extending or deepening the current schemes, given that 54% of EU imports from DCs still incur positive duties.

In this perspective, negotiations to **increase preference margins** are likely to be most effective in the case of **cereals, other food products and fruit and vegetables**, while additional preferences may not be able to increase exports in those sectors, especially animal products and dairy, where DCs are likely to face high standards in terms of technical, sanitary, phytosanitary and traceability requirements set by public or private bodies,



THANK YOU FOR YOUR ATTENTION

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