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# Do Preferential Trade Policies (Actually) Increase Exports? A Comparison between EU and US Trade Policies

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ROMA TRE UNIVERSITÀ DEGLI STUDI

# Do Preferential Trade Policies (Actually) Increase Exports? A Comparison between EU and US Trade Policies

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***Abstract***

Trade preferences for developing countries have been used by the European Union (EU) and the United States (US) since the early 1960s. Most developing countries (DCs) can export to EU and US with preferential market access under different preferential schemes. Based on cross-section trade data for 2004 and an explicit measure of the intensity of the preference margins at the 8-digit tariff line level, this work estimates and compares the impact on trade of EU and US preference schemes using a theoretical grounded gravity model framework. We obtain estimates of elasticity of substitution across commodities and evaluate the impact of preferences on extensive margin and trade intensity. From a policy perspective, our results show that preferential schemes have a significant impact on trade in terms of both margins, and such effect seems to be stronger in the case of EU preferences, although with significant differences across products.

## 1. Introduction

In recent years, developed countries, such as EU and US, have increased their use of preferential regimes in order to promote the economic development as well as the integration of poorest countries in the world trading system (Bureau *et al*., 2006). This work provides a comparison of the impact on trade of European Union (EU) and United States (US) preferences to developing countries (DCs). To examine this relationship empirically, We use a gravity equation approach in order to single out the contribution of preferential policies to the deviation from the "normal" trade levels (Anderson and van Wincoop, 2003) and follow Anderson and van Wincoop (2004) in estimating a theoretical grounded gravity equation including different goods.

We use disaggregated data at the 8-digit tariff line level rather than total exports because they allows a more accurate analysis of policies that often discriminate among products. In this respect, we distinguish between preferential and MFN trade flows computing the intensity of the preference margin associated with different trade flows. The margin for each product is calculated on a bilateral basis as the ratio between the MFN (Most Favoured Nation) applied duty and the *ad valorem equivalent* (AVE) of the applied rates faced by each exporter. This is a significant departure from most of the literature estimating the impact of preferential agreements through a dummy

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variable for preferential policies. Such a dummy do not catch the variability of margins across countries and products, and it is likely to lead to an overestimation of the impact of the preferential scheme (Cipollina and Pietrovito, 2010).

The use of highly disaggregated data raises two types of problems: (*i*) the elevated percentage of "zero trade flows"; (*ii*) the impossibility for some variables to get information at the level of detail at which tariff lines are specified. As far as the latter problem is concerned, in order to control for the unobservable country and product heterogeneity we introduce product- and country-specific fixed effects.

The presence of zero values creates obvious problems in the log-linear form of the gravity equation. There has been a long debate concerning what is the best econometric approach in order to avoid the bias that would be implied by the drop of the observations with zero flows. Several authors consider the Heckman two-step estimator as the best procedure (Linders and de Groot, 2006; Helpman, Melitz and Rubistein, 2008; Martin and Pham, 2008), others argue that gravity type models should be estimated in multiplicative form, and recommend maximum likelihood estimation techniques based on the Poisson specification of the model (Siliverstovs and Schumacher, 2007; Santos-Silva and Tenreyro, 2003, 2006).

The advantage of implementing the Heckman two step procedure is that such an approach does not only allow to take into account the lack of trade, but it also allows to distinguish the impact of preferences on the extensive as well as on the intensive margin. An increased probability of registering positive trade flows in the first stage, as a matter of fact, implies that a larger set of products is traded (*extensive margin*), while a positive coefficient associated with the preference margin in the second stage is related to larger trade flows (*intensive margin*). However, because of the presence of heteroskedasticity, estimates of the log-linear form of the gravity equation are biased and inconsistent, and this may lead to prefer the Poisson specification of the trade gravity model. On the other hand, the standard Poisson model is vulnerable for problems of overdispersion and excess number of zero flows. To overcome the heteroskedasticity (in the case of the log-normality assumption) and overdispersion (in the case of the standard Poisson specification) problems, in this paper we make use of the Zero-Inflated Poisson (ZIP) model as in Burger *et al.* (2009).

We estimate cross-sectional models using data on imports at 8-digit level to EU (25 countries) and US for the year 2004. The structure of the dataset is conditioned by the absence of time series data on tariffs. It should be noted, though, that the theoretically grounded gravity equation proposed by Anderson and van Wincoop (2003) under the assumption that all bilateral trade costs are symmetric and never vary only works with cross section data (Baldwin and Taglioni, 2006). We run

separate regressions for several commodity groups defined according to the Harmonised System (HS) sections (Table 1).

This paper is part of the research effort that attempts to assess the various determinants of bilateral trade at sectoral level using highly disaggregated data (Baldwin *et al*., 2005; Cardamone, 2009; Disdier *et al*., 2008; Emlinger *et al*., 2008). The first 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. The second contribution is to use an explicit measure of the preferential margin to disaggregated trade data. We compute the preference margins in relative rather than absolute terms, as the ratio between the applied MFN duty and the AVE of the applied rates faced by each exporter. The third contribution of the paper is to assess the impact of the preference margins taking into account what is the share of preferential flows on total imports. Although we do not know the utilization rates of different schemes, the use of the available information on actual preferential trade flows allows us to provide an accurate assessment of the impact of trade preferences.

The paper is structured as follows. After the introduction, we review the main trade preferential schemes granted by EU and US as well as the most relevant literature in Section 2. Theoretical underpinnings and related methodological issues are detailed in section 3. Section 4 shows some evidence about the structure of EU and US imports and tariffs. Section 5 presents the results of our estimations. Section 6 concludes.

## 2. Preferential trade policies.

### *2.1 Major preferential schemes*

This section provides a short outline of the rather complex set of trade preferences that the EU and US have for developing countries. Most of the schemes cover much more than trade issues, such as aid and political cooperation, but we will focus strictly on the provisions that are directly trade-related, and particularly on the differences between the systems. Table 2 shows all preferential schemes included in our dataset which refers to year 2004.

Apart from numerous reciprocal trade agreements, the EU's preferential market access conditions are regulated by two main frameworks that are both relevant for the present study: the Generalized System of Preferences (GSP) and the African, Caribbean and Pacific states (ACP) regime.

In 1971, the EU introduced its first GSP scheme. It has been modified on several occasions since and the EU adopted a revised scheme in June 2008. Product coverage under the general scheme is about 6,300 tariff lines. Non-sensitive products (approximately half of the products covered) enjoy duty-free access, while sensitive products (mainly agricultural products, but also

textile, clothing and apparel, carpets and footwear) benefit from a tariff reduction of 3.5 percentage points of *ad valorem* duties compared to the MFN tariff and a 30% reduction of specific duties (with a few exceptions). For textiles and clothing, the reduction is 20% of the ad valorem MFN duty rate. Besides this general scheme, there is a 'GSP Plus' scheme for especially vulnerable countries with special development needs, which recognize labor rights and environmental standards. The scheme allows for duty-free entry to the EU market of the goods covered by the general GSP scheme and includes some additional products. The GSP is characterized by its temporary nature, with periodical revisions. The GSP scheme graduates beneficiaries if they have become sufficiently competitive as measured by the share of the Community market expressed in terms of GSP preferential imports (Nilsson, 2007).

In 2001, still in the context of GSP, the EU introduced the "Everything But Arms" (EBA) initiative in favor Least Developed Countries (LDCs). Under the EBA, all products from 49 LDCs can enter the EU duty free without quantitative limitation (except rice and sugar, which are subject to a transition period until 2009).

The Cotonou Agreement between the EC and 79 ACP countries was signed on 23 June 2000. It entered into force in April 2003 and replaced the previous Lomé Conventions, the first of which dates back to 1975. Under the Cotonou Agreement's trade pillar, the ACPs benefited from non-reciprocal trade preferences for the period 2001-2007. Industrial products originating in ACP countries were exempted from EU customs duties, while preferences for agricultural products were differentiated. Tropical products which did not compete with European products entered the EU market duty-free. Temperate products faced an exemption or reduction of customs duties, while fruits and vegetables were subject to seasonal restrictions. Other agricultural products faced quantitative restrictions or were excluded from preferential treatment. For certain products (bananas, beef, veal, and sugar), the EU provided special market access via the so-called commodity protocols. In 2008, unilateral preferences under the Cotonou Agreement were replaced by WTO-compatible reciprocal full or *interim* Economic Partnership Agreements (EPAs) between the EU and individual ACP countries or groups of countries (Bureau *et al*., 2006).

Finally, the EU has a number of bilateral or regional Free Trade Areas (FTAs) with other developing countries, offering them additional market access on top of the GSP preferences. For instance, trade is an essential component of the Euro-Med Partnership, which ultimately aims to deepen regional integration in the Mediterranean region and to eventually establish a Euro-Mediterranean FTA. Liberalization of trade in services and investment, including the right of establishment, also form part of the Association Agreements' key objectives. Bilateral FTAs have been established with Chile, Mexico, and South Africa, which provide for asymmetric liberalization

(in favor of the partner countries) of substantially all trade in manufactured and agricultural goods.

The US preferences include the GSP and the preferences granted on a regional basis, i.e. the Caribbean Basin Economic Recovery Act (CBERA), the ATPA (Andean Trade Preference Act, replaced in 2003 by the Andean Trade Promotion and Drug Eradication Act or ATPDEA), and the 2000 Trade and Development Act. The latter includes the AGOA and the CBTPA (Caribbean Basin Trade Partnership Act). All eligible imports under these preferential schemes take place duty free.

Under the GSP, the US grants preferences to 131 developing and transition countries and some 19 territories. The US GSP contains specific conditions for a list of 42 LDCs, giving them access duty free for a larger set of products. However, relative to other US preferential programs, GSP has the lowest product coverage, since items deemed sensitive are excluded. Agricultural products subject to a tariff-rate quota (TRQ) are not eligible for duty-free access on any quantities in excess of the quota. Other ineligible products include most textiles, apparel, watches, footwear, handbags, luggage, work gloves, and other apparel made partially or wholly from leather (Dean and Wainio, 2006). GSP has additional limitations, including: periodic expiration; loss of GSP eligibility due to automatic graduation once the World Bank's high income country category is reached; loss of GSP eligibility on a product once "competitive needs limits" (CNL) have been exceeded for those countries that take a large share of the market.

The African Growth and Opportunity Act (AGOA) granted duty-free status to more than 6,400 products imported from Sub-Saharan African (SSA) countries, as part of the Trade Act of 2000. In 2004, 38 countries were eligible for preferences under the AGOA program (Dean and Wainio, 2006). AGOA extended GSP duty-free status to a larger set of goods than covered by the GSP. For non-LDCs beneficiaries, products are either eligible for preferences under AGOA or under GSP, but not under both. However, for LDCs beneficiaries, some products are eligible for both programs. AGOA exempts beneficiary countries from the CNL. The program also grants duty-free and quota-free access to apparel made in eligible sub-Saharan African countries from US fabric, yarn and thread. Apparel imports made with regional fabrics were subject to a cap, with built-in growth over a period of 8 years.

The Caribbean Basin Economic Recovery Act (CBERA) is an extension of the Caribbean Basin Initiative, started in 1984 (Dean and Wainio, 2006). This program eliminated or reduced tariffs on eligible products imported from designated Caribbean and Central American countries and territories. The Caribbean Basin Trade Partnership Act (CBTPA) is the most recent extension of CBERA, and was implemented as part of the Trade Act of 2000. In 2004, 24 countries were eligible for CBERA benefits and, of those, 14 countries eligible for CBTPA. Under CBTPA, a number of import-sensitive products became eligible for preferential duty treatment, including apparel,

petroleum and petroleum products. CBTPA authorizes unlimited duty-free entry for imports of apparel assembled in CBERA countries from fabrics made and cut in the United States of US yarns. CBTPA also provides for some preferential access for apparel made from regional fabric.

The Andean Trade Preference Act (ATPA) granted duty-free access to many imports from Bolivia, Columbia, Ecuador and Peru, beginning in 1991 (Dean and Wainio, 2006). After expiring in December 2001, ATPA was renewed as the Andean Trade Promotion and Drug Eradication Act (ATPDEA) in late 2002. ATPA has broader product coverage than the GSP, and eligibility is not constrained by the CNL or by the possibility of graduation. In 2002, ATPA preferential treatment was expanded to include previously excluded import sensitive products such as petroleum and petroleum derivatives, apparel and textiles, footwear and tuna in foil packages. ATPA allows unlimited duty-free and quota-free treatment for imports of textiles and apparel articles made in ATPA countries, using yarn or fabric or fabric components wholly formed in the US. Similar to the CBTPA, ATPA also provides some preferential access for apparel made from regional fabric, but no third country fabric provision.

### *2.2 Literature review*

One might expect – given the number of preferential schemes implemented over the past forty years – that the answer to the question posed in this paper's title is rather accurate. Even if the expectation of the positive impact of preferences on trade is by far and large confirmed, international trade economists can actually claim little firm empirical support for reliable quantitative estimates of the average effect of trade preferences on bilateral trade (all else constant).

It is not an easy task to summarize the results of the large literature assessing the impact of preferences on trade. Over the past decade, the gravity equation has emerged as the empirical workhorse in international trade to study the *ex post* effects of trade preferences on bilateral merchandise trade flows. Studies report very different estimates, due to the fact that they differ greatly in data sets, sample sizes, independent variables used in the analysis and estimation methods. Regarding the estimated coefficients of the impact of preferences, comprehensive surveys of the estimated PTAs impact are provided by Nielsen (2003) and Cardamone (2007).

Most studies typically assume a dummy variable to represent the preferential treatment effect and use aggregate trade data. As far as the EU is concerned, these studies report positive coefficients ranging between 4% and around 400%, but some specification even find significant negative coefficients between 3% and more than 50% (Caporale *et al*., 2009; Peridy, 2005; Ruiz and Villarubia, 2007; Nilsson, 2002; Martìnez-Zarzoso et al., 2009). In the US case, positive coefficients range between 6% and around 700%, whereas negative impacts go from 10% to 90%

(Mayer and Zignano, 2005; Koo *et al.*, 2006; Hilbun *et al*., 2006). Some studies attempt to pin down the specific impact of different schemes. Lederman and Özden (2004) estimate that the impact of US preferences ranges between 3% and 33% for the CBI, while the estimated effects of GSP and AGOA are doubled. Other estimates provide more conservative, though still positive, results: Nouve (2005), for instance, find that the GSP beneficiaries increase their export to the US market by 17%, whereas the impact of AGOA is around 20%. However, it should be mentioned that several studies focusing on the impacts of AGOA using sectoral analyses obtain an inconclusive evidence (Mattoo, Roy and Subramanian, 2002; Nouve and Staatz, 2003; Shappouri and Trueblood, 2003; Olarreaga and Özden, 2005).

This is not the first paper in empirical international trade to call attention to the importance of the actual preferential margin(s) and the need to work on highly disaggregated data as in the case of Cardamone (2009), Emlingeret al. (2008), and Cipollina and Salvatici (2010) for the EU; and Gaulièr *et al.* (2004), Jayasinghe and Sarker (2004), and Siliverstovs and Schumacher (2007) for the US. Several studies find that the EU schemes do provide a significant boost to LDCs exports (Aiello and Cardamone, 2009; Aiello and Demaria, 2009; Demaria, 2009), and to exports from Mediterranean countries (Nilsson and Matsson, 2009) as well as from ACP countries (Francois et al., 2006; Manchin, 2006).though some specifications report highly negative coefficients. Other works conclude that EBA is not effective in increasing LDCs exports to the EU (Pishbahar and Huchet-Bourdon, 2008; Gradeva and Martinez-Zarzoso, 2009).

Even if several studies analyze either the effects of EU or US trade preference schemes, only a few aim to compare them. Bourdet and Nilsson (1997) analyze the impact of EU and US GSP schemes over the 1976-1992 period and find that the volume of exports that could be attributed to the EU GSP scheme was significantly larger (in the range of 40%) than the equivalent volume attributed to the US scheme. Haveman and Schatz (2003) estimate that EU preference programs have increased exports from LDCs by about 45 per cent, as compared to 10 per cent in case of the US. This difference in trade generating effect between the EU and US schemes, around 35 per cent, is in line with the results obtained in the study by Nilsson (2007). Finally, the literature on the effects of preference erosion (e.g., Francois et al., 2006) commonly find relatively greater negative effects of EU trade liberalization on preferences dependent developing countries' exports compared to other preference donors, thereby confirming the relative importance of EU preferences.

## 3. Methodology

### *3.1 The gravity model*

The model is based on a standard CES monopolistic competition as in Lai and Trefler (2002) and Lai and Zhu (2004). A nested CES structure aims to reproduce the Armington assumption in a simple way:

$$IM_{ij}^{k} = \alpha_{ij}^{k} M_{i}^{k} \left( \frac{PM_{j}^{k}}{PIM_{ij}^{k}} \right)^{\rho} \quad (1)$$

where $IM_{ij}^{k}$ is the nominal demand for commodity $k$ of importer $j$ by exporter $i$; $\alpha_{ij}^{k}$ is the consumer preference parameter; $PM_{j}^{k}$ and $PIM_{ij}^{k}$ are multilateral price indexes; $\rho=(\sigma-1)$ and $\sigma > 1$ is the elasticity of substitution among all varieties from different exporters.

Prices differ between locations due to trade costs so that:

$$PIM_{ij}^{k} = p_{i}^{k}(1+c_{ij}^{k})(1+\tau_{ij}^{k}) \quad (2)$$

where $c_{ij}^{k}$ is a bilateral ad valorem trade costs, $\tau_{ij}^{k}$ the bilateral ad valorem tariffs and $p_{i}^{k}$ the export price.

By substituting and taking the logs we get:

$$\ln IM_{ij}^{k} = \alpha_{ij}^{k} + \ln M_{i}^{k} + \rho \ln PM_{j}^{k} - \rho \ln PIM_{ij}^{k} + \varepsilon =$$

$$\underbrace{\alpha_{ij}^{k}}_{T1} + \underbrace{\ln M_{i}^{k}}_{T2} - \underbrace{\rho \ln p_{i}^{k}}_{T3} - \underbrace{\rho \ln(1+c_{ij}^{k})}_{T4} - \underbrace{\rho \ln(1+\tau_{ij}^{k})}_{T5} + \underbrace{\rho \ln PM_{j}^{k}}_{T6} + \varepsilon \quad (3)$$

The previous expression is very similar to a gravity equation *à la* Anderson and van Wincoop (2004):

- *T1* is a consumer preference parameter;
- *T2* is the market size;
- *T3* denotes the exporter's supply price for commodity *k*;
- *T4* trade cost component;
- *T5* is the power of applied tariff;
- *T6* is the overall price of imports and it is common for all exporters:

$$PM_{j}^{k} = \left[ \sum_{i} (\alpha_{ij}^{k} PIM_{ij}^{k})^{1-\rho} \right]^{1/1-\rho} \quad (4).$$

$PM_j^k$ plays a crucial role in explaining the total level of imports, but equation (4) is not directly useful due to the numerous unknown parameters. In the literature, there are three main approaches to multilateral price terms: (1) use of published data on price indexes (Baier and Bergstrand 2001); (2) direct estimation *à la* Anderson and van Wincoop (2003); (3) use of country fixed effects (Eaton and Kortum, 2002). The main weakness of the first method is that existing price indexes may not reflect true border effects accurately (Feenstra, 2002). Direct estimation requires the (non-linear) estimation of a structural equation in which multilateral resistance indexes are expressed as a function of the observable variables. The use of importer and exporter fixed effects in the estimation is widely used in the literature, since it is a computationally easier way to account for multilateral price terms in cross-section analysis, but we also believe that it can be justified if we assume that the bulk of exporters face the same tariff $\tau_j^k$ and have the same CIF price ($PCIF_j^k$) at the border of the importing country:

$$PM_j^k = \left[\sum_i (\alpha_{ij}^k PCIF_{i,j}^k (1+\tau_{i,j}^k))^{1-\rho}\right]^{1/1-\rho} = PCIF_j^k (1+\tau_j^k)\left(\underbrace{\sum_i \alpha_{ij}^k}_{\equiv 1}\right)^{1/1-\rho} \quad (5)$$

Accordingly, if we focus on the horizontal differentiation across main exporters, we can rely on the concept of a "reference price level" corresponding to $PCIF_j^k$, so that *T6* can be written as $\ln PCIF_j^k + \ln(1+\tau_j^k)$.

Subtracting $\ln M_i^k$ to both sides of equation (4), we get as dependent variable the share of import of product *k* from exporter *i* to importer *j*.

$$\ln\left(\frac{IM_{ij}^k}{M_i^k}\right) = \alpha_{ij}^k - \rho\ln(1+c_{ij}^k) + \underbrace{\rho[\ln(1+\tau_j^k) - \ln(1+\tau_{ij}^k)]}_{T7} + \rho\ln PCIF_j^k - \rho\ln p_i^k + \varepsilon \quad (6)$$

Trade preferences reduce border costs as a consequence of the tariff reduction. In the case of preferential imports, higher preferences decrease the negative trade impact of the regular tariffs. $T_7$ is the preferential margin defined in relative terms, as the ratio of the power of the benchmark tariff $(1+\tau_j^k)$ of product *k,* and the power of bilateral tariff $(1+\tau_{ij}^k)$ incurred by a specific exporter *i*:

$$(1+pref_{ij}^k) = \frac{(1+\tau_j^k)}{(1+\tau_{ij}^k)} \quad (7).$$

Apparently, the margin intensity is conditional on the choice of the benchmark tariff. The conventional approach would be to consider it equal to the bound MFN rate, this leads to an

obvious overestimation of the competitive advantages enjoyed by exporting countries if the applied MFN tariff is lower than the bound one. As a consequence, we compute the preferential margins using the applied MFN duty.

### *3.2 Econometric approach*

Working at a highly disaggregated level implies the presence of many zero trade flows that create obvious problems in the log-linear form of the gravitational equation. All countries do not produce all available goods, nor do they all have an effective demand for all available goods. Accordingly, we distinguish between two different kinds of zero-valued trade flows: products that are never traded and products that are not traded, but could be (potentially, at least) traded. Hence, a distinction can be made between flows with exactly zero probability of positive trade, flows with a non-zero trade probability who still happen to be zero, and positive flows. Since preferential policies cannot possibly influence the first group, in our analysis we only keep exporters that have at least one export flow at the world level at the HS6 level for the product concerned during the period 2001-2004, assuming that excluded commodities are not produced. In the same vein, we exclude products that are not imported at all in the EU and the US. This avoids the inclusion of irrelevant information that may bias the estimate, and greatly reduces the dimension of the dataset from potential bilateral flows to .

The reduced database still includes a large share (80%) of zero flows. These zeros may be the result of rounding errors: for instance, products for which bilateral trade does not reach a minimum value, the value of trade is registered as zero. If these rounded-down observations were partially compensated by rounded-up ones, the overall effect of these errors would be relatively minor. However, the rounding down is more likely to occur for small or distant countries and, therefore, the probability of rounding down will depend on the value of the covariates, leading to the inconsistency of the estimators. The zeros can also be missing observations which are wrongly recorded as zero. This problem is more likely to occur when small countries are considered and, again, measurement error will depend on the covariates. As a consequence, the most common strategies to circumvent the "zero problem" in the analysis of trade flows – i.e., to omit all zero-valued trade flows or arbitrarily add a small positive number to all flows in order to ensure that the logarithm is well-defined – leads to inconsistency.

When the dependent variable is zero for a substantial part of the sample but positive for the rest of the sample, the econometric theory suggests the use of Tobit models. As is typical in the literature, many gravity works perform Tobit estimates by constructing a new dependent variable $y = \ln(1+M_{ij})$. However, this procedure relies on rather restrictive assumptions that are not likely to hold since the censoring at zero is not a "simple" consequence of the fact that trade cannot be

negative. Zero flows, as a matter of fact, do not reflect unobservable trade values but they are the result of economic decision making based on the potential profitability of engaging in bilateral trade at all.

The Heckman two-step procedure transforms a selection bias problem into an omitted variable problem which can be solved by including an additional variable, the inverse *Mills ratio* ($\lambda$), between the regressors. The two stage approach not only corrects for possible biases, it also allows us to distinguish the impact of preferences on the extensive as well as the intensive margins. An increased probability of registering a positive trade flow, in fact, signals the existence of a larger set of bilateral trade flows (extensive margin)[1], while the coefficient associated with the preference margin in the second stage refers to trade in larger quantities than would have been the case without the preference (intensive margin).

The Heckman procedure still implements a log-normal model based on the questionable assumption that the error terms all have the same variance for all pairs of origins and destinations (homoskedasticity). Especially when there are a large number of cases in which the observed and expected flows are small, small absolute differences before performing a logarithmic transformation of the dependent and independent variables may lead to large differences in the log-normal estimation of the model: in the presence of such heteroskedasticity, not only the efficiency but also the consistency of the estimators is at stake (Santos Silva and Tenreyro, 2006). Accordingly, we tested for heteroskedasticity in the first-stage probit, using a two-degrees-of-freedom RESET test as suggested by Santos-Silva and Tenreryo (2009), and we could not accept the null hypothesis of homoskedasticity[2].

Even if the presence of heteroskedasticity in trade data seems to preclude the estimation of any model that purports to identify the effects of the covariate in the intensive and extensive margins, a way to keep the interesting two-step approach and to overcome problems heteroskedasticity and overdispersion is to use the Zero-Inflated Poisson (ZIP) model, recently suggested by Burger *et al.* (2009). The ZIP estimator does not rely on stringent normality assumptions, nor does it require an exclusion restriction or instrument for the second stage of the equation. With respect to the standard Poisson techniques the ZIP estimator provides a way of modeling the excess zeros in addition to allowing for overdispersion (Lambert 1992; Greene 1994). In particular, the estimation process of the ZIP model consists of two possible data generation steps: the first contains a logit (or probit) regression of the probability that there is no bilateral trade at all; the second contains a Poisson

[1]Starting with the seminal contribution of Hummels and Klenow (2005), there is a growing literature on the extensive margin of trade (Debaere and Mostashari, 2005; Baller, 2007; Felbermayr and Kohler, 2007; Liu, 2009).
[2]This also rules out the possibility to implement the variant of the two stage procedure proposed by Helpman, Melitz and Rubinstein (2008) to correct for firm-level heterogeneity.

regression of the probability of each count for the group that has a non-zero probability or interaction intensity other than zero.

Then, for each observation step 1 is chosen with probability $\rho_{ijk}$ and step 2 with probability (1-$\rho_{ijk}$). Step 1 generates only zero counts, whereas step 2, $\Phi(m_{ijk} \mid X_{ijk})$, where $X_{ijk}$ is a set of observed variables, generates counts from a Poisson model. In general:

$$m_{ijk} \approx \begin{cases} 0 & \text{with probability } \rho_{ijk} \\ \Phi(m_{ijk} \mid X_{ijk}) & \text{with probability } (1-\rho_{ijk}) \end{cases} \quad (8)$$

The probability of $\{M_{ijk}=m_{ijk} \mid X_{ijk}\}$ is

$$P(M_{ijk}=m_{ijk} \mid X_{ijk}, z_{ijk}) = \begin{cases} \rho(z'_{ijk}\gamma) + \{1-\rho(z'_{ijk}\gamma)\}\Phi(0 \mid X_{ijk}) & \text{if } m_{ijk}=0 \\ \{1-\rho(z'_{ijk}\gamma)\}\Phi(m_{ijk} \mid X_{ijk}) & \text{if } m_{ijk}>0 \end{cases} \quad (9)$$

When the probability $\rho_{ijk}$ depends on the characteristics of observation $ijk$ , $\rho_{ijk}$ is written as a function of $z'_{ijk}\gamma$ , where $z'_{ijk}$ is the vector of zero-inflated covariates and $\gamma$ is the vector of zero-inflated coefficients to be estimated. The probit function that relates the product $z'_{ijk}\gamma$ , which is a scalar, to the probability $\rho_{ijk}$ is called the zero-inflated link function.

In practice, in the first stage we estimate the following probit model:

$$\rho_{ijk} = \Pr(m_{ijk}=0 \mid c_{ij}^k, \tau_0^k, \tau_{ij}^k, PCIF_j^k, p_i^k) \quad (10).$$

In the second stage, we estimate the following specification:

$$m_{ijk} = \frac{IM_{ij}^k}{M_i^k} = \exp\{\alpha_{ij}^k - \rho\ln(1+c_{ij}^k) + \rho[\ln(1+pref_{ij}^k)]*PRE + \rho[\ln(1+pref_{ij}^k)]*PRE*EU + \rho\ln PCIF_j^k - \rho\ln p_i^k\} + \varepsilon \quad (11).$$

The preference factor variable (1+$pref_{ijk}$) is associated with the dummy *PRE* which is equal to 1 in the case of preferential trade flows and the dummy *EU* which is equal to 1 if the importer is the EU. In the estimation variables as $(1+c_{ij}^k)$ and $PCIF_j^k$ are proxied by fixed effects defined for importer, exporter and product, whereas the variable $p_i^k$ is proxied by the unit value by exporter.

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

$$Preference\ \ effect = \Sigma_{ijk}(E[m_{ijk} \mid pref_{ijk}>0] - E[m_{ijk} \mid pref_{ijk}=0]) / \Sigma_{ijk} E[m_{ijk} \mid pref_{ijk}>0] \quad (12)$$

In calculating these results, we estimate the counterfactual change in the dependent variable, total imports, that would follow from the removal of the preferential advantage. This could be considered the "trade creation" effect, since the trade flow would not take place in the absence of preferences. However, such an effect cannot be interpreted in welfare terms, since the additional trade flows may be the result of diversion of previously existing exports from other countries (Borchert, 2009). Moreover, this calculation may overestimate the total sum of foregone exports, since indirect effects are not captured via changes in world prices.

## 4. Data

All data – i.e., tariffs and trade – refer to 2004. EU trade flows are from the Eurostat database Comext[3], data are Cost-Insurance-Freight (CIF) values. While US trade flows are from the United States International Trade Commission. Even though CIF values raise some problems in terms of their consistency, since they will be correlated with the error term (Cardamone, 2007; Pusterla, 2007), we use CIF trade flows because they are the only one available in the case of the EU at the 8 digit level[4].

We consider 234 exporters of 10,174 products at the 8-digit level of EU Combined Nomenclature classification to the EU (25 countries) and 11,867 products for the US case. The *ad valorem equivalent* were computed using the *Tarif intégré de la Communauté Européenne* (TARIC) and the US Harmonized Tariff Schedule. We apply a similar methodology to the one applied to build the MAcMapHS6 version 2 database (Boumelassa, Laborde and Mitaritonna, 2009). In particular, to convert specific tariffs we use the 8 digit trade flows to compute 8 digit unit values relying on the same system of filter to avoid outliners. Most DCs and products may be eligible for several preferential regimes. Since data do not allow to distinguish the specific scheme under which import take place, we assume that the lowest available duty is the one actually used. It should be noted that our dataset does not include binding TRQs, since they raise a limited dependent variable estimation problem.

### *4.1 Descriptive statistics.*

Table 3 shows the percentage of imports associated with positive trade, subject to MFN or preferential duties(column 4): in the case of MFN imports, we distinguish between duty free (column 2) and positive tariffs (column 3). To give an idea of the relevance of each section in total trade, we provide the value of imports (column 5) and their respective shares (column 6). Panel A reports information from the EU25 dataset, whereas Panel B reports information from the US

[3] The Comext database (http://fd.comext.eurostat.cec.eu.int/xtweb/) contains detailed foreign trade data distinguished by tariff regimes as reported by the EU member states.

[4]This choice is motivated by our awareness that every method of conversion from CIF to FOB values requires *ad hoc* approaches that are objectionable and leading to further errors.

dataset.

A share of around 60% of total EU imports enter duty-free under MFN arrangements, the residual 40% is divided in one third as preferential imports and the remaining as imports paying positive MFN duties. Looking at Panel B for US, it emerges that half of products enter under an MFN duty-free regime, around 20% benefit from positive preference margins and around 30% are MFN duty- imports.

At the section level, both EU and US imports products of section X (paper and paperboard and articles thereof) and XXI (works of art) under an MFN duty-free regime, while for the other sections the structure of trade differs considerably. The EU imports a large percentage of products of sections V (mineral products), IX (wood and articles of wood) and XIV (natural and precious metals) with a duty-free MFN access, and more than half of products of the remaining sections without any preferences. On the other side the US imports a large percentage of products of sections I (live animals and animal products), VI (chemicals), XIV (natural and precious metals), XV **(**base metals), XVI (machineries), XVIII (cinematographic and musical instruments), XIX (arms and ammunition) and XX (other manufactured articles) under a MFN duty-free regime, and most imports other sections take place under a preferential arrangement.

In Table 4, the preference factor defined in eq. (7) is computed using the MFN applied rate. Looking at the relative preferential factors, the (simple) average is the same (1.06) both for the EU and the US even if the tariff structure of the two countries is quite different. The average protection, as matter of fact, is significantly higher in the EU than in the US. The most protected EU sectors are the agricultural ones (IV, II, III), while this is not the case for the US where the most protected sectors are raw hides and footwear (VIII, XII). Not surprisingly, these are also the sectors featuring the largest preference margins.

## 5. Results

Tables 5-6 report[5] estimates regarding the preferences by commodity groups: the first stage allows to estimate the impact of preferential policies on the extensive margin, i.e., the share of positive trade flows over the total number of possible bilateral trade flows (Table 5). While the second stage quantifies the extent to which trade preferences have increased the volume of trade (Table 6). In each table we highlight the rows referring to statistically significant estimates based on preferences, while fixed effects estimates are omitted for brevity. Finally, Table 7 presents computations of the percentage change in total imports due to the hypothetical elimination of

[5]Tables presenting results do not include all sectors, since we excluded sections without preferences (X and XXI), including a small number of products, and therefore observations, or featuring trivial trade flows.

existing preferences according to equation (12); it includes results only for those sectors with a statistically significant estimated preference impact.

Table 5 shows the preference impact on the extensive margin of trade. We estimate two coefficients, the first explaining the impact of US preferences (column 2), the second showing how much the impact of the EU preferences differs (column 3). US preferences significantly increase the probability of exporting in almost all cases: the only exception being mineral products (Section V). Indeed for this section, the trade pattern is mainly defined by the endowments of exporters in natural resources. For the EU, the situation is simpler since there is nearly no preferential margins for such products with most of the lines under a 0% MFN tariff. The EU strong negative impacts concern three sections (VIII – hide and skins – IX – wood – and XII – footwear, headgear, umbrellas –), where the set of exported goods is smaller than it would be the case without preferences. Both in the EU and US cases, preferences on raw products/inputs are scarce (low MFN) and the import probability is not affected by them.

By and large, though, preferences have a positive impact, and the increase in the probability of registering a positive trade flow as a consequence of preference treatment varies between 7% and 28% for the US, and between 3% and 23% for the EU. This flies in the face of the common idea that because of preferential policies, exporting countries are specialized on a small number of products possibly not coinciding with their true comparative advantages. Even we are not allowed to draw conclusions about eventual welfare impacts, these results show that the number of products exported by a given number of countries, or the number of countries exporting a given number of products, are likely to increase as a consequence of the preferential policies.

For most of the section, the US preferences appear to be more effective than the EU ones to expand trade. For instance, even if they may have been expected to have a larger impact in the case of food products (sections II, III and IV) with larger MFN tariffs and stronger preference factors (see table 4), their effectiveness is strongly limited (see table 5, column 2 for the EU marginal effect, and column 5 for the net effect). The role of Sanitary and Phyto-sanitary measures appears to be quite important. This result is consistent with existing literature showing that these regulations affect negatively the North-South trade (Fontagne *et al.*, 2008). At the opposite the EU preferences are more effective in two sections XVI (machinery and electronics) and XVIII (optical, photographic, watches) in which both developed (non EU European countries included in the EEA) and emerging Asian countries, included in the GSP, enjoy preferences.

In the sections with the largest impact – III and XIII in US; and VII in US and EU, respectively –, a 10% increase in the relative preference factor increases the probability of exporting by more

than 20%. Noticeably, these sectors are not the ones featuring the largest share of preferential imports, and they are also characterized by less concentrated preference patterns.

The sign on the exporter unit value is negative as expected for most primary/homogenous products (e.g. animals, vegetables, minerals, woods) for which price competition dominates, insignificant for heterogeneous products (machinery, electronics) and even small but positive for wearing apparel and shoes where high cost producers may use quality differentiation to sell their products.

Table 6 shows the preference impact on the intensive margin of trade. Also in this case, we estimate two coefficients, the first explaining the impact of US preferences (column 2), the second showing how much the impact of the EU preferences differs (column 3), the fourth column shows the impact of the US price/quality competition, while the coefficient of the interaction with the dummy EU shows how the price/quality effect differs (column 5). Also in this case, fixed effects estimates are omitted for brevity. The statistically significant coefficients, highlighted in the table, shows the positive effects of preferences in increasing the amount of exports.

As far as the US are concerned, preferences do not have a significant impact in sections V, IX and XIV. In the case of section XIV, the estimates confirm the first stage results, while preferences have a positive impact only on the extensive margin for Section IX where most imports are duty-free on a MFN basis, and a negative impact on the extensive margin in section V where the set of goods to be exported is heavily influenced by the endowments of natural resources.

In all the other cases the impact is positive. The magnitude of the estimates is related to the first stage results, as in the case of Sections III and VII, or it is explained by the height of the relative preference margins, as in the case of Section XI.

The two sections (XIV and XVII) not influenced by EU preferences coincide with those that were not affected by the preferences in the first stage as well, while for sections XII and XV the EU preferences have a negative impact only on the extensive margin. Conversely to the first stage, though, in most cases EU preferences turn out to be more effective than US ones: the largest impact is registered in Sections VII, XIII and XVIII. If we look at estimated coefficients of the unit values (columns 4 and 5) we can see that the price effect/differentiation is by and large consistent with the US one since we get different signs in two cases only (sections II and VIII).

The preference effect seems to be larger in sections where the price competition dominates. Then, when the price elasticity is higher, the impact of preferences is larger (with the exception of section VII): this is the case of sections I, III and XIII. The price elasticity of EU imports is higher than that of US imports, and this may explain why the EU preferences have a larger impact than US ones (see sections I and XIII). Looking at sections where the quality competition dominates we can

note that the preference impacts are larger where the positive, and statistically significant, coefficient of the unit value is larger (sections IV, VI and XX; with the exception of section XI).

Elasticities of substitution across sections and countries ($\hat{\sigma}_S = \hat{\beta}_S + 1$) are presented in columns 7 and 8. All the significant estimates are within the range of the values obtained in the literature (Baier and Bergstrand, 2001; Eaton and Kortum, 2002; Lai and Trefler, 2004; Olper and Raimondi, 2008), but it is worth noting that our results are likely to underestimate the preference impact. Indeed, exporters usually incur some additional costs (e.g., due to rules of origin compliance) in order to benefit from preferences. This implies that the "true" (i.e., net of compliance costs) preference margin generating the observed trade flows is lower than the one associated with our estimates. Indeed, this appears to be the most likely explanation for the cases where preferences have a lower impact than it may have been expected.

In Table 7, we compute the percentage change in total imports due to the hypothetical elimination of existing preferences according to equation (12), presenting the results only for sectors with a statistically significant estimated preference impact. In the US case, as it could have been expected the Section with the largest preference margin (XI, XII) has the largest impact on trade flows both in relative and absolute terms. Indeed, if preferences were removed more than 90% of present trade flows would not take place. The only other section with a significant impact are III and XX, while in all the other cases the trade flows involved are hardly significant and the value of the preferences seem to be mostly due to the rent earned on exports that would take place even without the preferences.

As far as the EU is concerned, the most relevant sections are related to the agricultural sector (I, II, III and VI). Also in this case, the volumes of trade involved are rather trivial as a share of total flows, and they are likely to take place even without the preferential schemes.

## 6. Conclusion

This work compares the impact on trade of EU and US preferences. From a methodological point of view, we assess the impact of trade preferences on the intensive and the extensive margins of trade by modeling bilateral imports at a very detailed level (8-digit). We quantify the intensity of the preference margins, rather than relying on a simple dummy. The preferential margins are computed in relative terms as the ratio between the "applied" MFN duty and the AVE of the applied rates faced by each exporter. Finally, we take into account the actual preference utilization since we distinguish preferential and MFN trade flows.

Our results confirm that preferential schemes have a significant and positive impact on the intensive margin of trade, while the impact on the extensive margin is very differentiated across

sectors both in terms of sign and magnitude of the estimated coefficients. A positive impact on the extensive margin means that preferences help to reach product diversification, while a negative sign would confirm the traditional criticism that preferences lead to excessive export specialization.

The comparison between US and EU preferences shows that US schemes are most effective on the extensive margins, whereas the EU ones are most effective on the intensive margins. US preferences significantly increase the probability of exporting in almost all cases: the only exception being mineral products (Section V). For the EU, results show a strong negative impact in three sections (VIII – hide and skins – IX – wood – and XII – footwear, headgear, umbrellas –), implying that due to preferential policies countries specialize in a smaller number of exported products than it would be the case otherwise. By and large, though, preferences have a positive impact, and the increase in the probability of registering a positive trade flow and this flies in the face of the common idea that because of preferential policies, exporting countries are specialized on a small number of products possibly not coinciding with their true comparative advantages.

We find evidence of strong preference effects on intensive margins. As far as the US are concerned, preferences do not have a significant impact in sections V, IX and XIV. In all the other cases the impact is positive. The EU preferences do not affect the volume of trade in sections XII, XIV, XV and XVII, but in most cases EU preferences turn out to be more effective on intensive margin of trade than US ones: the largest impact is registered in Sections VII, XIII and XVIII.

However, the (hypothetical) removal of actual policies would not affect the vast majority of current preferential flows. As a consequence, the value of the preferences seem to be mostly due to the rent earned on exports that would take place even without the preferences.

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**TABLEs**

**Table 1: Commodity Classification**

| **Sectors according to the Harmonized Commodity Description And Coding System** |
|---|
| **Section I:** Live Animals; Animal Products (Chapters 1-5) |
| **Section II:** Vegetable Products (Chapters 6-14) |
| **Section III:** Animal or Vegetable Fats and Oils and Their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes (Chapter 15) |
| **Section IV:** Prepared Foodstuffs; Beverages, Spirits, and Vinegar; Tobacco and Manufactured Tobacco Substitutes (Chapters 16-24) |
| **Section V:** Mineral Products (Chapters 25-27) |
| **Section VI:** Products of the Chemical or Allied Industries (Chapters 28-38) |
| **Section VII:** Plastics and Articles Thereof; Rubber and Articles Thereof (Chapters 39-40) |
| **Section VIII:** Raw Hides and Skins, Leather, Furskins and Articles Thereof; Saddlery and Harness; Travel Goods, Handbags, and Similar Containers; Articles of Animal Gut (Other Than Silkworm Gut) (Chapters 41-43) |
| **Section XIX:** Wood and Articles of Wood; Wood Charcoal; Cork and Articles of Cork; Manufactures of Straw, of Esparto or of Other Plaiting Materials; Basketware and Wickerwork (Chapters 44-46) |
| **Section XX:** Pulp of Wood or of other Fibrous Cellulosic Material; Waste and Scrap of Paper or Paperboard; Paper and Paperboard and Articles Thereof (Chapters 47-49) |
| **Section XI:** Textiles and Textile Articles (Chapters 50-63) |
| **Section XII:** Footwear, Headgear, Umbrellas, Sun Umbrellas, Walking-Sticks, Seat-Sticks, Whips, Riding-Crops and Parts Thereof; Prepared Feathers and Articles Made Therewith; Artificial Flowers; Articles of Human Hair (Chapters 64-67) |
| **Section XIII:** Articles of Stone, Plaster, Cement, Asbestos, Mica or Similar Materials; Ceramic Products; Glass and Glassware (Chapters 68-70) |
| **Section XIV:** Natural or Cultured Pearls, Precious or Semiprecious Stones, Precious Metals, Metals Clad with Precious Metal, and Articles Thereof; Imitation Jewellery; Coin (Chapter 71) |
| **Section XV:** Base Metals and Articles of Base Metal (Chapters 72-83) |
| **Section XVI:** Machinery and Mechanical Appliances; Electrical Equipment; Parts Thereof; Sound Recorders and Reproducers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles (Chapters 84-85) |
| **Section XVII:** Vehicles, Aircraft, Vessels and Associated Transport Equipment (Chapters 86-89) |
| **Section XVIII:** Optical, Photographic, Cinematographic, Measuring, Checking, Precision, Medical or Surgical Instruments and Apparatus; Clocks and Watches; Musical Instruments; Parts and Accessories Thereof (Chapters 90-92) |
| **Section XIX:** Arms and Ammunition; Parts and Accessories Thereof (Chapter 93) |
| **Section XX:** Miscellaneous Manufactured Articles (Chapters 94-96) |
| **Section XXI:** Works of Art, Collectors' Pieces and Antiques (Chapter 97) |

**Table 2.** Preferential schemes in 2004

| **US preferential programs in 2004**<br>*Generalized System of Preferences (GSP)* | **EU Preferential programs in 2004**<br>*Generalized System of Preferences (GSP), including Everything But Arms (EBA), GSP-Drugs, GSP-Labor Rights schemes* |
|---|---|
| African Growth Opportunity Act (AGOA) | Cotonou Agreement |
| Andean Trade Promotion and Drug Eradication Act (ATPDEA) | EU-Chile Association Agreement |
| Caribbean Basin Initiative (CBI) | EU-Mexico Free Trade Agreement |
| Caribbean Basin Trade Partnership Act (CBTPA) | Euro-Mediterranean partnership |
| Chile Freet Trade Agreement | European Economic Area (EEA) Agreement |
| Israel Free Trade Agreement | EU-Turkey Custom Union |
| Jordan Free Trade Agreement | Trade, Development and Co-operation Agreement (TDCA) [South Africa] |
| North America Free Trade Association (NAFTA) | |
| Singapore Free Trade Agreement | |

**Table 3.** Share of imports by type of tariff regime (period 2004)

| Sections | % of MFN duty-free | % of MFN duty (no preference) | % of Preferential duty | Total trade (Ml of €) | Share in total imports (%) |
|---|---|---|---|---|---|
| **PANEL A:** EU25 *(intra EU trade excluded)* | | | | | |
| *Overall* | 57 | 29 | 14 | 841,392 | 100.0 |
| I | 12 | 45 | 43 | 12,600 | 1.5 |
| II | 49 | 28 | 23 | 20,600 | 2.4 |
| III | 12 | 62 | 25 | 2,680 | 0.3 |
| IV | 38 | 36 | 26 | 21,800 | 2.6 |
| V | 98 | 1 | 1 | 157,000 | 18.7 |
| VI | 53 | 37 | 10 | 71,000 | 8.4 |
| VII | 12 | 62 | 26 | 23,400 | 2.8 |
| VIII | 17 | 70 | 13 | 9,000 | 1.1 |
| IX | 73 | 14 | 13 | 10,600 | 1.3 |
| X | 100 | 0 | 0 | 12,500 | 1.5 |
| XI | 3 | 54 | 43 | 62,700 | 7.5 |
| XII | 0 | 63 | 37 | 11,500 | 1.4 |
| XIII | 14 | 53 | 33 | 6,650 | 0.8 |
| XIV | 87 | 8 | 5 | 27,700 | 3.3 |
| XV | 50 | 29 | 21 | 55,000 | 6.5 |
| XVI | 60 | 29 | 10 | 220,000 | 26.1 |
| XVII | 31 | 53 | 16 | 52,300 | 6.2 |
| XVIII | 59 | 30 | 11 | 37,100 | 4.4 |
| XIX | 16 | 68 | 16 | 232 | 0.0 |
| XX | 41 | 47 | 12 | 24,700 | 2.9 |
| XXI | 100 | 0 | 0 | 2,330 | 0.3 |
| **PANEL B:** US | | | | | |
| *Overall* | 50 | 30 | 20 | 1,394,480 | 100.0 |
| I | 80 | 5 | 15 | 14,800 | 1.1 |
| II | 47 | 13 | 40 | 18,000 | 1.3 |
| III | 29 | 43 | 27 | 2,290 | 0.2 |
| IV | 50 | 31 | 19 | 25,100 | 1.8 |
| V | 32 | 32 | 36 | 172,000 | 12.3 |
| VI | 79 | 14 | 6 | 104,000 | 7.5 |
| VII | 14 | 48 | 38 | 42,200 | 3.0 |
| VIII | 5 | 86 | 9 | 10,100 | 0.7 |
| IX | 70 | 13 | 16 | 25,000 | 1.8 |
| X | 100 | 0 | 0 | 25,200 | 1.8 |
| XI | 4 | 71 | 25 | 87,100 | 6.2 |
| XII | 7 | 90 | 2 | 20,800 | 1.5 |
| XIII | 27 | 51 | 22 | 16,300 | 1.2 |
| XIV | 74 | 12 | 14 | 33,400 | 2.4 |
| XV | 60 | 23 | 17 | 80,300 | 5.8 |
| XVI | 70 | 19 | 11 | 388,000 | 27.8 |
| XVII | 13 | 47 | 40 | 212,000 | 15.2 |
| XVIII | 65 | 27 | 8 | 47,200 | 3.4 |
| XIX | 57 | 36 | 7 | 1,370 | 0.1 |
| XX | 78 | 18 | 5 | 64,000 | 4.6 |
| XXI | 100 | 0 | 0 | 5,320 | 0.4 |

**Table 4.** Value and preference margins for commodity groups with preferential trade flows

| Sections | Bilateral applied tariff [a], % (Standard Deviation) | | MFN tariff [a], % | | Preference factor [a], % | |
|---|---|---|---|---|---|---|
| | *EU* | *US* | *EU* | *US* | *EU* | *US* |
| ***Overall*** | 1.4 (0.08) | 0.6 (0.01) | 7.7 | 6.2 | 1.06 | 1.06 |
| **I** | 1.4 (0.03) | 0.0 (0.00) | 13.5 | 3.9 | 1.12 | 1.04 |
| **II** | 2.4 (0.05) | 0.1 (0.01) | 10.1 | 4.8 | 1.08 | 1.05 |
| **III** | 2.3 (0.05) | 0.0 (0.00) | 10.5 | 3.6 | 1.08 | 1.04 |
| **IV** | 7.1 (0.27) | 0.1 (0.01) | 25.4 | 6.0 | 1.18 | 1.06 |
| **V** | 0.0 (0.01) | 0.0 (0.00) | 4.7 | 4.8 | 1.02 | 1.03 |
| **VI** | 0.3 (0.00) | 0.0 (0.00) | 2.2 | 2.7 | 1.05 | 1.05 |
| **VII** | 0.3 (0.02) | 0.1 (0.00) | 5.6 | 4.6 | 1.05 | 1.04 |
| **VIII** | 0.3 (0.01) | 0.4 (0.00) | 5.7 | 4.5 | 1.04 | 1.06 |
| **IX** | 0.4 (0.01) | 0.0 (0.02) | 4.6 | 6.0 | 1.04 | 1.05 |
| **XI** | 2.3 (0.04) | 0.0 (0.00) | 9.5 | 13.0 | 1.07 | 1.13 |
| **XII** | 1.1 (0.03) | 0.3 (0.02) | 7.6 | 11.3 | 1.06 | 1.11 |
| **XIII** | 0.7 (0.02) | 0.1 (0.01) | 4.9 | 6.4 | 1.04 | 1.06 |
| **XIV** | 0.0 (0.00) | 0.1 (0.01) | 3.2 | 6.3 | 1.03 | 1.06 |
| **XV** | 0.2 (0.00) | 0.0 (0.00) | 2.8 | 4.3 | 1.04 | 1.04 |
| **XVI** | 0.1 (0.01) | 0.0 (0.00) | 3.8 | 4.0 | 1.03 | 1.03 |
| **XVII** | 0.5 (0.01) | 0.0 (0.00) | 2.8 | 3.2 | 1.04 | 1.03 |
| **XVIII** | 0.2 (0.02) | 0.0 (0.00) | 5.1 | 3.4 | 1.03 | 1.03 |
| **XIX** | 0.0 (0.01) | 0.0 (0.00) | 3.3 | 3.3 | 1.03 | 1.04 |
| **XX** | 0.1 (0.00) | 0.1 (0.01) | 3.5 | 5.7 | 1.03 | 1.06 |

[a]Sample of positive preferential trade flows (simple average).

**Table 5.**Results for commodity groups – extensive margin

| **Probit regression, marginal effects** / **Independent variables** / **Section** | ln(preference margin) | ln(preference margin)* dummy EU | ln(unit value) | ln(unit value)* dummy EU | N. of obs. *Pseudo* $R^2$ | Coefficient for EU preference marginal effect |
|---|---|---|---|---|---|---|
| I | 0.15** | 0.00 | -0.06** | -0.05** | 94,168 | 0.00 |
| | (0.07) | (0.07) | (0.02) | (0.02) | *0.30* | |
| II | 0.19*** | -0.12*** | 0.00 | -0.03*** | 85,748 | 0.07 |
| | (0.02) | (0.02) | (0.01) | (0.01) | *0.27* | |
| III | 0.28*** | -0.25** | 0.04 | -0.08 | 13,585 | 0.03 |
| | (0.10) | (0.10) | (0.06) | (0.06) | *0.23* | |
| IV | 0.17*** | -0.12*** | 0.06*** | -0.11*** | 146,093 | 0.05 |
| | (0.02) | (0.02) | (0.02) | (0.02) | *0.30* | |
| V | -0.24*** | 0.11 | -0.01 | -0.07*** | 22,334 | -0.24 |
| | (0.09) | (0.10) | (0.01) | (0.02) | *0.30* | |
| VI | 0.15*** | -0.14*** | -0.03*** | 0.01 | 182,624 | 0.01 |
| | (0.02) | (0.02) | (0.01) | (0.01) | *0.41* | |
| VII | 0.19*** | 0.04* | -0.01 | -0.02 | 79,583 | 0.23 |
| | (0.02) | (0.02) | (0.02) | (0.02) | *0.47* | |
| VIII | 0.05 | -0.34*** | 0.10*** | 0.12*** | 26,048 | -0.34 |
| | (0.06) | (0.06) | (0.02) | (0.02) | *0.34* | |
| IX | 0.09** | -0.37*** | -0.01 | -0.05*** | 31,802 | -0.28 |
| | (0.05) | (0.05) | (0.02) | (0.02) | *0.34* | |
| XI | 0.15*** | -0.11*** | -0.01 | 0.04*** | 239,324 | 0.04 |
| | (0.01) | (0.01) | (0.01) | (0.01) | *0.40* | |
| XII | 0.16*** | -0.27*** | 0.03 | -0.01 | 24,067 | -0.11 |
| | (0.04) | (0.04) | (0.03) | (0.03) | *0.45* | |
| XIII | 0.19*** | -0.16*** | 0.05*** | -0.08*** | 48,535 | 0.03 |
| | (0.03) | (0.03) | (0.02) | (0.02) | *0.43* | |
| XIV | 0.00 | 0.03 | 0.02 | -0.01 | 5,286 | 0.00 |
| | (0.09) | (0.11) | (0.02) | (0.02) | *0.40* | |
| XV | 0.07*** | -0.09*** | -0.04*** | 0.01 | 159,507 | -0.02 |
| | (0.02) | (0.02) | (0.01) | (0.01) | *0.43* | |
| XVI | 0.07*** | 0.08*** | 0.01 | -0.01 | 346,440 | 0.15 |
| | (0.02) | (0.02) | (0.01) | (0.00) | *0.44* | |
| XVII | 0.11** | -0.08 | 0.06*** | -0.08*** | 58,790 | 0.11 |
| | (0.05) | (0.05) | (0.02) | (0.02) | *0.41* | |
| XVIII | 0.05 | 0.11*** | 0.02 | -0.02 | 60,453 | 0.11 |
| | (0.04) | (0.04) | (0.01) | (0.01) | *0.40* | |
| XX | 0.05 | -0.03 | 0.03 | -0.02 | 46,032 | 0.00 |
| | (0.04) | (0.04) | (0.02) | (0.02) | *0.44* | |

Note: Dependent variable: Pr ($quote_{ijk}$> 0); Product(HS6), Importer and Exporter Fixed Effects (not reported); Intercept (not reported); Standard errors in parentheses; (*) significant at 10% level; (**) significant at 5% level; (***) significant at 1% level.

**Table 6.** Results for commodity groups – intensive margin.

| **Independent variables** / **Section** | ln(preference margin)* dummy pref trade | ln(preference margin)* dummy pref trade* dummy EU | ln(unit value) | ln(unit value)* dummy EU | N. of non zero obs. | Elasticity of substitution, $\sigma_{US}$ | Elasticity of substitution, $\sigma_{EU}$ |
|---|---|---|---|---|---|---|---|
| I | 0.08*** | 0.15*** | -0.13*** | -0.16*** | 6,641 | 1.08 | 1.23 |
| | (0.03) | (0.03) | (0.01) | (0.01) | | | |
| II | 0.25*** | 0.03*** | 0.04*** | -0.09*** | 12,488 | 1.25 | 1.28 |
| | (0.01) | (0.01) | (0.01) | (0.01) | | | |
| III | 0.62*** | -0.22*** | -0.23*** | 0.07** | 1,411 | 1.62 | 1.40 |
| | (0.04) | (0.04) | (0.04) | (0.04) | | | |
| IV | 0.16*** | 0.13*** | 0.03*** | 0.06*** | 15,648 | 1.16 | 1.29 |
| | (0.01) | (0.01) | (0.01) | (0.01) | | | |
| V | -0.03 | 0.34*** | -0.17*** | 0.01 | 3,976 | 0.00 | 1.34 |
| | (0.04) | (0.05) | (0.01) | (0.01) | | | |
| VI | 0.39*** | -0.05*** | 0.06*** | 0.04*** | 24,958 | 1.39 | 1.34 |
| | (0.01) | (0.01) | (0.00) | (0.00) | | | |
| VII | 0.53*** | 0.08*** | -0.14*** | 0.13*** | 14,603 | 1.53 | 1.61 |
| | (0.01) | (0.02) | (0.01) | (0.01) | | | |
| VIII | 0.06* | -0.19*** | -0.12*** | 0.15*** | 6,253 | 1.06 | 0.87 |
| | (0.04) | (0.04) | (0.02) | (0.02) | | | |
| IX | -0.04 | 0.60*** | -0.07*** | 0.02 | 6,189 | 0.00 | 1.60 |
| | (0.03) | (0.03) | (0.02) | (0.02) | | | |
| XI | 0.56*** | -0.28*** | 0.07*** | 0.04*** | 56,866 | 1.56 | 1.28 |
| | (0.01) | (0.01) | (0.01) | (0.01) | | | |
| XII | 0.28*** | 0.03 | 0.12*** | 0.23*** | 6,688 | 1.28 | 0.00 |
| | (0.04) | (0.04) | (0.02) | (0.02) | | | |
| XIII | 0.29*** | 0.21*** | -0.10*** | -0.05*** | 10,526 | 1.29 | 1.50 |
| | (0.02) | (0.02) | (0.01) | (0.01) | | | |
| XIV | 0.03 | 0.08 | -0.03** | 0.05*** | 2,345 | 0.00 | 0.00 |
| | (0.06) | (0.07) | (0.01) | (0.01) | | | |
| XV | 0.20*** | 0.01 | -0.05*** | 0.00 | 30,801 | 1.20 | 0.00 |
| | (0.01) | (0.01) | (0.00) | (0.00) | | | |
| XVI | 0.03** | 0.40*** | 0.08*** | -0.01 | 64,900 | 1.03 | 1.43 |
| | (0.01) | (0.01) | (0.00) | (0.00) | | | |
| XVII | 0.40*** | 0.03 | 0.02** | 0.09*** | 8,559 | 1.40 | 0.00 |
| | (0.02) | (0.02) | (0.01) | (0.01) | | | |
| XVIII | -0.30*** | 0.83*** | -0.02** | -0.01 | 15,730 | 0.7 | 1.53 |
| | (0.03) | (0.04) | (0.01) | (0.01) | | | |
| XX | 0.64*** | -0.29*** | 0.26*** | -0.13*** | 12,544 | 1.64 | 1.35 |
| | (0.03) | (0.03) | (0.02) | (0.02) | | | |

Note: Dependent variable: $quote_{ijk}$; Product(HS6), Importer and Exporter Fixed Effects (not reported); Intercept (not reported); Standard errors in parentheses; (*) significant at 10% level; (**) significant at 5% level; (***) significant at 1% level.

**Table 7.** The estimated preference effect – Results for commodity groups

| Sectors | Preference effect (%) | | Trade volume | | % of Preferential trade | |
|---|---|---|---|---|---|---|
| | US | EU25 | US | EU25 | US | EU25 |

| | | | | | | |
|---|---|---|---|---|---|---|
| I | 7.6 | 20.5 | 1,123 | 2,587 | 51 | 48 |
| II | 28.8 | 11.7 | 5,184 | 2,418 | 72 | 51 |
| III | 22.1 | 12.6 | 507 | 339 | 82 | 51 |
| IV | 12.1 | 16.8 | 3,045 | 3,669 | 64 | 65 |
| V | 0 | 0.2 | 0 | 251 | 0 | 16 |
| VI | 1.0 | 1.2 | 1,050 | 863 | 17 | 12 |
| VII | 6.7 | 8.7 | 2,819 | 2,045 | 18 | 34 |
| VIII | 1.1 | 2.6 | 109 | 234 | 12 | 20 |
| IX | 0 | 7.9 | 0 | 846 | 0 | 61 |
| XI | 24.4 | 21.2 | 21,261 | 13,292 | 98 | 49 |
| XII | 1.9 | 0 | 401 | 0 | 97 | 0 |
| XIII | 0.1 | 0.1 | 7 | 4 | 0 | 0 |
| XV | 0.3 | 0 | 217 | 0 | 2 | 0 |
| XVI | 3.0 | 2.1 | 11,679 | 4,686 | 27 | 21 |
| XVII | 3.3 | 0 | 6,954 | 0 | 8 | 0 |
| XVIII | 2.6 | 5.5 | 1,208 | 2,033 | 32 | 50 |
| XX | 4.6 | 3.9 | 2,918 | 981 | 91 | 33 |