Do Preferential Trade Policies (Actually) Increase Exports? A comparison between EU and US trade policies

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Do Preferential Trade Policies (Actually) Increase Exports? A comparison between EU and US trade policies

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 use a continuous variable to measure the preference margin adopting a definition that takes into account the duties paid by each exporting country to the EU market. Our results show that trade elasticity estimates are very sensitive to the preference margin definition adopted. 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.
JEL codes: F13, Q17, F14

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 derive a theoretical grounded gravity equation including different goods.

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). Since trade policies are defined and implemented at a very detailed level, it is crucial to use disaggregated data and this is one of the strength of the present analysis since we use data at the 8-digit tariff line level distinguishing preferential and MFN trade flows. That is, we make use of all the available information about the preference utilization even if we data do not allow to pin down each trade flow to a specific preferential scheme.[1]

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

[1] In point of fact, the information about the utilization rate of different schemes is available in the case of the United States but not for the European Union.

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).

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).

In order to provide an accurate assessment of trade preference impact we compute an explicit measure of the preferential margins at the most detailed level. Computing the intensity of the preference margin associated with different trade flows is a significant departure from most of the literature estimating the impact of preferential agreements through a dummy 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 and cannot provide an accurate assessment of policies that (by definition) often discriminate among products.

In the most recent but rapidly growing literature using explicit an explicit measure of the margin several definitions have been used (De Benedictis and Salvatici, 2011). We compute the preference margins in relative rather than absolute terms, as the ratio between the trade weighted average duty and the AVE of the applied rates faced by each exporter (Cipollina and Salvatici, 2011).

With respect to the margin definition used in Cipollina and Salvatici (2011), we introduce a major change in terms of the computation of the ‘reference tariff’, that is the duty paid by the countries competing with the one benefitting from the preference. In order to avoid potential overestimation, we need to emphasize the competitive advantage with respect to other exporters/competitors taking into account the ‘multilateral nature’ of preferential policies. The intensity of the preferential treatment depends both on the highest paid rate and on the share of exporters paying that rate. The basic intuition underlying ‘multilateral trade resistance’ in gravity models suggests that trade is influenced by the trade policies towards all the partners, this means that bilateral trade depends on the whole structure of applied tariffs preferences as well as the country-pair specific margins. This implies using applied bilateral duties rather than multilateral (Most Favoured Nation, MFN) ones. Moreover, since we need a single reference tariff for each product, the exporter-specific duties need to be averaged across exporters. We compare the estimates obtained using this definition with those resulting from a more 'traditional' choice as a reference, such as the MFN applied duty.[2]

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). Most of the trade preferences that the EU and US have for developing countries cover much more than trade issues, such as aid and political cooperation, but in this paper 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.

I. TRADE EFFECTS OF EU AND US PREFERENTIAL POLICIES

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) and, more recently, Cipollina and Pietrovito (2011).

[2] Using the applied rather than bound tariff we avoid the risk of including some 'water' (i.e. the binding overhang) into the preference margin.

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), Emlinger *et 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. In terms of different schemes, there is some evidence that EBA[3] has not been 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,

[3] As a matter of fact, the EBA program implemented in 2001 has led to very minor changes in terms of applied protection faced by LDCs for which the previous GSP program was already close to a duty-free regime.

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.

II. Methodology

Our set-up is similar to in Lai and Trefler (2002) and Lai and Zhu (2004). Consumers have Cobb-Douglas preferences over sectors and CES preferences over goods within each sector. With Cobb-Douglas preferences we can look at one sector at a time: fix the sector and suppress the sectors index. Let *k* index goods within each sector. Let *j* and *i* index user countries and producer countries, respectively.

In the first stage a representative consumer in country *j* allocates the budget to different sectors. In the second stage the representative consumer maximizes the CES subutility function subject to the expenditure constraint M_j. We consider that each variety k imported from country *i* is associated to a quality μ_i^k. Therefore, the utility provided by the consumption of q_{ij}^k physical units is im_{ij}^k. We assume that

$$im_{ij}^k = q_{ij}^k \times \mu_i^k \quad (1)$$

It is straightforward to derive country *j*'s demand for variety *k* produced in country *i* as:

$$im_{ij}^k = \alpha_{ij}^k M_j^k \frac{\left(PIM_{ij}^k\right)^{-\sigma}}{\left(PM_j^k\right)^{(1-\sigma)}} \quad (2)$$

where σ is the elasticity of substitution between varieties (σ > 1), α_{ij}^k is the consumer preference parameter, M_j^k is the expenditure on import *k* in market *j*, PM_j^k is the product *k* import price index computed across all exporters *i*, and PIM_{ij}^k is the domestic price of quality normalized imported good *k* from country *i*.

Prices differ between locations due to trade costs and tariffs. The domestic price of a physical unit is given by $PEX_i^k c_{ij}^k \left(1 + t_{ij}^k\right)$ where $c_{ij}^k > 1$ captures the transport costs defined as

$$c_{ij}^k = \beta_{ij} \times \gamma^k \quad (3).$$

Transport costs differ by product (γ^k) and by exporter-importer (β_{ij}), and t_{ij}^k is the ad valorem equivalent (AVE) bilateral tariff. PEX_i^k is the FOB export price fixed competitively of a physical unit. Based on previous assumptions, it is straightforward to get the relation between the prices of the quality adjusted and physical units:

$$PIM_{ij}^k = \frac{PEX_i^k}{\mu_i^k}\beta_{ij}\,\gamma^k\left(1+t_{ij}^k\right) \quad (4).$$

We assume that to produce a quality μ_i^k, exporters face a marginal cost $(\mu_i^k)^{\varepsilon}$, where ε is the cost elasticity to quality. Therefore the unit value of exports is given by

$$PEX_i^k = (\mu_i^k)^{\varepsilon} \quad (5).$$

The α_{ij}^k parameters are chosen so that import quantities are scaled in order to make all the CIF prices (i.e., including transport costs) equal to 1. Accordingly, the price index can be written as

$$PM_j^{k\,(1-\sigma)} = \sum_i \alpha_{ij}^k\left(PEX_i^{k\,\left(1-\frac{1}{\varepsilon}\right)}\beta_{ij}\,\gamma^k\left(1+t_{ij}^k\right)\right)^{(1-\sigma)} = \left(1+T_j^k\right)^{(1-\sigma)} \quad (6)$$

then, T_j^k is a weighted average tariff applied on product *k* by country *j*, where the weights are consistent with the price of the (assumed) CES import demand function[4].

Given our focus on exporter-specific preferences, in a cross section analysis we cannot identify the α_{ij}^k parameters. So we impose symmetric preferences:

$$\alpha_{ij}^k = \alpha_{nj}^k = \bar{\alpha}_j^k \forall n \quad (7).$$

We are interested in the import share bilateral imports evaluated at domestic prices (IM_{ij}^k):

$$\frac{PIM_{ij}^k q_{ij}^k}{M_j^k} = IM_{ij}^k = \bar{\alpha}_j^k \frac{\left(PEX_i^{k\,\left(\frac{\varepsilon-1}{\varepsilon}\right)}\beta_{ij}\,\gamma^k\left(1+t_{ij}^k\right)\right)^{(1-\sigma)}}{\left(1+T_j^k\right)^{(1-\sigma)}} \quad (8).$$

Using the previous equations and taking the log we get:

$$\ln IM_{ij}^k = ln\bar{\alpha}_j^k + \frac{(\varepsilon-1)(1-\sigma)}{\epsilon}ln(PEX_i^k) - (\sigma-1)ln\beta_{ij} - (\sigma-1)ln\gamma^k + \\ -(\sigma-1)ln\left(1+t_{ij}^k\right) + (\sigma-1)ln\left(1+T_j^k\right) \quad (9).$$

The previous expression is the gravity equation we are going to estimate:

- $log\bar{\alpha}_j^k$ is the consumer preference parameter for the good *k*;
- $\log IM_{ij}^k$ is the market share of exporter *i*.
- $\frac{(\varepsilon-1)(1-\sigma)}{\epsilon}log(PEX_i^k)$ denotes the exporter's supply price impact $(1-\sigma)ln(PEX_i^k)$ as well as the quality effect's impact $\frac{\epsilon-1}{\epsilon}ln(PEX_i^k)$ on demand for commodity *k*: notice that such a coefficient can be either positive or negative;
- $(\sigma-1)log\beta_{ij} + (\sigma-1)log\gamma^k$ trade cost component;
- $(\sigma-1)log\left(1+t_{ij}^k\right)$ is the power of applied tariff;

[4] In our approach we assume elasticitiy values of 1.1, 2 and 4.

- $(\sigma - 1)log\left(1 + T_j^k\right)$ is the overall price of imports and it is common for all exporters.

The preferential margins ($pref_{ij}^k$) are given by:

$$pref_{ij}^k = \frac{\left(1 + T_j^k\right)}{\left(1 + t_{ij}^k\right)} \quad (10).$$

The critical issue is the measurement of T_i^k. The preference margin based on the applied MFN duty leads to an obvious overestimation of the competitive advantages enjoyed by exporting countries, since bilateral trade depends on the whole structure of the tariff preferences as well as the country-pair specific margins. This is very much in line with the basic intuition underlying ‘multilateral trade resistance’ in gravity models, since trade is influenced by the trade policies *vis à vis* all the partners in the same way it is influence by relative rather than absolute transport cost. Accordingly, not only the applied tariff but also the reference tariff we use to compute the margin enjoyed by exporter *i* on product *k* is exporter-specific and computed as a (CES) trade-weighted average of the duties paid for the given product by each exporter (equation (6)).[5]

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.

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.

[5] Our reference tariff turns out to be a weighted average of duties paid by actual exporters. This is a shortcoming of the CES functional form that does not take into account the potential competition coming from exporters facing prohibitive tariffs. In this respect our preference margins may be understated and this would lead to an overestimation of the preference impact.

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* (λ), between the regressors. However, 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[6].

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, a way 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

[6]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.

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 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 ρ_{ijk} and step 2 with probability (1-ρ_{ijk}). Step 1 generates only zero counts, whereas step 2, $\Phi(m_{ijk} | X_{ijk})$, where X_{ijk} is the set of observed variables in equation (9), generates counts from a Poisson model. The probability of $\{M_{ijk}=m_{ijk} | X_{ijk}\}$ is

$$P(M_{ijk}=m_{ijk} \mid X_{ijk}, z_{ijk}) = \begin{cases} \rho(z'_{ijk}\gamma) + \{1-\rho(z'_{ijk}\gamma)\}\Phi(0 \mid \beta_{ij}\gamma^k, PEX_i^{k(1-1/\varepsilon)}, t_{ij}^k, T_j^k) & \text{if } m_{ijk}=0 \\ \{1-\rho(z'_{ijk}\gamma)\}\Phi(m_{ijk} \mid \beta_{ij}\gamma^k, PEX_i^{k(1-1/\varepsilon)}, t_{ij}^k, T_j^k) & \text{if } m_{ijk}>0 \end{cases} \quad (11).$$

When the probability ρ_{ijk} depends on the characteristics of observation ijk , ρ_{ijk} is written as a function of $z'_{ijk}\gamma$, where z'_{ijk} is the vector of zero-inflated covariates and γ 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 ρ_{ijk} is called the zero-inflated link function.

Then, we estimate the following specification: EMBED Equation.3

(12)

with v as standard error. 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 the trade cost components are proxied by fixed effects defined for importer, exporter and product, whereas the exporter's supply price impact, as well as the quality effect's impact, is proxied by the unit value by exporter.

III. DATA

All data – i.e., tariffs and trade – refer to 2004. EU trade flows are from the Eurostat database Comext[7], data are Cost-Insurance-Freight (CIF) values. While US trade flows are from the United States International Trade Commission.

[7] 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.

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. For the treatment of the TRQs we follow Raimondi et al. (2010), thus if imports are no greater than the quota, the tariff equivalent is the in-quota tariff; alternatively it is the weighted average of the two tariffs.

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 dataset.

Something more than 50% of total EU imports enter duty-free under MFN arrangements, the residual 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 around half of products enter under an MFN duty-free regime, a share of 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[8].

The Table 4 presents the bilateral applied and MFN tariffs as well as the ‘CES tariffs’ computed assuming different elasticities (1.1,[9] 2 and 4). Overall, the EU market appears to be more protected than the US one. The most protected EU sectors are the agricultural ones (IV, II, III), while this is not the case for the US where the bilateral applied tariffs are very low for the most sectors, and higher protection emerges only for raw hides and footwear (VIII, XII). Comparing the MFN tariff with the CES applied tariffs, the former is always much higher and this leads to inflated preference margins.

IV. RESULTS

Tables 5 report estimates regarding the preferences by commodity groups. Using different preference margins the econometric results quantify the extent to which trade preferences have increased the volume of trade. The Table reports the results for four models: *Model 1* is based on the definition of preference margin using as reference tariff (i.e., the tariff with respect to whom the preference margins are computed) the CES weighted average tariff assuming a substitution elasticity equal to 2; *Model 2* is based on a preference margin computed using the applied MFN duty; *Model 3* and *4* provide a sensitivity assessment of Model 1 results assuming lower (1.1) or higher (4) elasticity values. We highlight the rows referring to statistically significant estimates, while all other estimates are omitted for brevity.[10] Finally, Table 6 presents computations of the percentage change in total imports due to the hypothetical elimination of existing preferences according to equation (13); it includes results only for those sectors with a statistically significant estimated preference impact.

For each model we estimate two coefficients, the first explaining the impact of US preferences (column *a*), the second showing how much the impact of the EU preferences differs (column *b*). The statistically significant coefficients show the positive effects of preferences in increasing the amount of exports.

As far as the US are concerned, preferences have a positive impact only in the case of animals and food products (sections I, II, III and IV), chemicals (VI), textiles (XI and XII) and other manufactured (XX). The magnitude of the estimates is related to the first stage results, as in the case of Sections II and III, or it is explained by the height of the relative preference margins, as in the case of Section IV.

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[8] We exclude from the sample a few sectors where there are no preferences (Sections X and XXI), or only trivial preferential trade flows (Section XIX).

[9] We use 1.1 just for the sake of simplification, since the CES price index ($1/(1-\sigma)$) is not defined for $\sigma = 1$.

[10] Results are available from the authors upon request.

As for the US, the EU preferences have a positive impact on the intensive margin for the animals and food products (sections I, II and IV) but a lower elasticity. Conversely the impact of the EU preference is very large for plastics (VII),woods (IX), footwear (XII) and metals (XV).

Elasticities of substitution across sections and countries ($\hat{\sigma}_S = \hat{\beta}_S + 1$)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.

Model 2 shows that the standard definition of preference margin tend to get higher and more significant results for almost all sections.

Model 3 and 4 show that our preferred measure, the CES weighted tariff, leads to estimates that are quite robust.

V. 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, even if it is very differentiated across sectors in terms of magnitude of the estimated coefficients.

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TABLEs

TABLE 1. Commodity Classification

SECTORS ACCORDING TO THE HARMONIZED COMMODITY DESCRIPTION AND CODING SYSTEM
SECTIONS
I: Live Animals; Animal Products (Chapters 1-5)
II: Vegetable Products (Chapters 6-14)
III: Animal or Vegetable Fats and Oils and Their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes (Chapter 15)
IV: Prepared Foodstuffs; Beverages, Spirits, and Vinegar; Tobacco and Manufactured Tobacco Substitutes (Chapters 16-24)
V: Mineral Products (Chapters 25-27)
VI: Products of the Chemical or Allied Industries (Chapters 28-38)
VII: Plastics and Articles Thereof; Rubber and Articles Thereof (Chapters 39-40)
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)
IX: 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)
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)
XI: Textiles and Textile Articles (Chapters 50-63)
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)
XIII: Articles of Stone, Plaster, Cement, Asbestos, Mica or Similar Materials; Ceramic Products; Glass and Glassware (Chapters 68-70)
XIV: Natural or Cultured Pearls, Precious or Semiprecious Stones, Precious Metals, Metals Clad with Precious Metal, and Articles Thereof; Imitation Jewellery; Coin (Chapter 71)
XV: Base Metals and Articles of Base Metal (Chapters 72-83)
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)
XVII: Vehicles, Aircraft, Vessels and Associated Transport Equipment (Chapters 86-89)
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)
XIX: Arms and Ammunition; Parts and Accessories Thereof (Chapter 93)
XX: Miscellaneous Manufactured Articles (Chapters 94-96)
XXI: Works of Art, Collectors' Pieces and Antiques (Chapter 97)

TABLE 2. Preferential schemes in 2004

US PREFERENTIAL PROGRAMS IN 2004 *Generalized System of Preferences (GSP)*	EU PREFERENTIAL PROGRAMS IN 2004 *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 national currency)	SHARE IN TOTAL IMPORTS (%)
			PANEL A: EU25 *(intra EU trade excluded)*		
Overall	54	32	14	880,000	100.0
I	9	57	34	16,930	1.9
II	36	45	19	28,160	3.2
III	12	64	24	2,871	0.3
IV	24	56	20	35,810	4.1
V	98	1	1	156,740	17.8
VI	52	39	9	72,370	8.2
VII	12	63	25	24,260	2.8
VIII	16	71	13	9,260	1.1
IX	73	14	13	10,680	1.2
X	100			12,500	1.4
XI	3	56	41	66,690	7.6
XII	0	64	36	12,307	1.4
XIII	14	54	32	6,864	0.8
XIV	87	8	5	27,760	3.2
XV	49	29	21	55,600	6.3
XVI	60	30	10	222,200	25.3
XVII	30	54	16	54,500	6.2
XVIII	58	31	11	37,550	4.3
XIX	16	69	16	236	0.0
XX	40	48	12	25,090	2.9
XXI	100			2,330	0.3
			PANEL B: US		
Overall	47	33	20	1,426,000	100.0
I	65	22	13	18,460	1.3
II	40	19	41	18,180	1.3
III	28	45	27	2,351	0.2
IV	42	33	25	31,500	2.2
V	32	32	36	171,800	12.0
VI	60	33	6	104,690	7.3
VII	13	50	37	43,130	3.0
VIII	4	88	8	11,028	0.8
IX	69	14	16	25,180	1.8
X	100			25,200	1.8
XI	4	74	23	95,730	6.7
XII	7	91	2	22,700	1.6
XIII	26	53	22	16,860	1.2
XIV	73	14	13	33,680	2.4
XV	59	24	17	81,600	5.7
XVI	69	20	11	389,900	27.3
XVII	13	48	40	214,500	15.0
XVIII	64	28	8	47,540	3.3
XIX	56	37	7	1,383	0.1
XX	77	19	5	64,610	4.5
XXI	100	0	0	5,320	0.4

TABLE 4. Tariffs (%) for commodity groups with preferential trade flows

SECTIONS	BILATERAL APPLIED TARIFF (STANDARD DEVIATION)		CES APPLIED TARIFF (σ =2)		MFN TARIFF		CES APPLIED TARIFF (σ =1.1)		CES APPLIED TARIFF (σ =4)	
	EU	*US*	*EU*	*US*	*EU*	*US*	*EU*	*US*	*EU*	*US*
Overall	1.5 (0.08)	0.1 (0.01)	5.3	4.3	7.8	6.4	5.2	4.2	5.5	4.3
I	1.7 (0.08)	0.0 (0.00)	7.4	2.5	14.6	5.6	7.2	2.5	7.7	2.6
II	2.6 (0.05)	0.1 (0.01)	7.2	1.1	10.9	4.8	7.1	1.1	7.5	1.1
III	2.3 (0.05)	0.0 (0.00)	7.1	1.9	10.5	4.4	7.0	1.9	7.2	2.0
IV	7.1 (0.27)	0.1 (0.01)	18.9	2.4	26.2	7.4	18.3	2.4	20.0	2.6
V	0.0 (0.00)	0.0 (0.00)	1.3	0.9	2.2	2.7	1.3	0.9	1.4	0.9
VI	0.3 (0.02)	0.0 (0.00)	3.6	2.8	5.6	4.6	3.5	2.8	3.6	2.9
VII	0.3 (0.01)	0.1 (0.00)	3.7	2.8	5.7	4.5	3.7	2.7	3.7	2.8
VIII	0.3 (0.01)	0.4 (0.02)	3.7	4.9	4.6	6.0	3.7	4.9	3.7	4.9
IX	0.4 (0.01)	0.0 (0.00)	2.2	2.7	4.7	4.8	2.2	2.7	2.3	2.7
XI	2.3 (0.04)	0.0 (0.00)	6.4	10.2	9.5	13.0	6.3	10.0	6.6	10.4
XII	1.1 (0.03)	0.3 (0.02)	5.7	10.2	7.6	11.3	5.6	10.1	5.8	10.3
XIII	0.7 (0.02)	0.1 (0.01)	3.3	4.5	4.9	6.4	3.2	4.5	3.3	4.6
XIV	0.0 (0.00)	0.1 (0.01)	2.0	4.0	3.2	6.3	2.0	3.9	2.0	4.0
XV	0.2 (0.01)	0.0 (0.00)	2.5	2.8	3.8	4.0	2.5	2.8	2.5	2.9
XVI	0.1 (0.01)	0.0 (0.00)	2.1	2.3	2.8	3.2	2.1	2.3	2.1	2.3
XVII	0.5 (0.02)	0.0 (0.00)	3.4	1.8	5.1	3.4	3.3	1.8	3.4	1.8
XVIII	0.2 (0.01)	0.0 (0.00)	2.6	2.7	3.3	3.3	2.6	2.7	2.6	2.7
XX	0.1 (0.00)	0.1 (0.01)	2.6	4.3	3.5	5.8	2.6	4.2	2.7	4.3

Note: Sample of positive preferential trade flows (simple averages).

TABLE 5. Results for commodity groups – intensive margin.

SECTIONS	MODEL 1 (REFERENCE: CES TARIFF WITH σ =2)		MODEL 2 (REFERENCE: MFN TARIFF)		MODEL 3 (REFERENCE: CES TARIFF WITH σ =1.1)		MODEL 4 (REFERENCE: CES TARIFF WITH σ =4)	
	a	*b*	*a*	*b*	*a*	*b*	*a*	*b*
I	8.78***	-5.66**	13.22***	-6.93***	8.76***	-5.74**	8.49	-5.22
II	12.52***	-7.73**	16.76***	-10.68***	13.01***	-8.02**	12.73***	-8.00**
III	17.18**	-6.32	22.06***	-19.35***	13.63*	-2.53	16.33**	-5.28
IV	8.56***	-7.04***	2.66***	-0.66**	8.35***	-6.86***	8.26*	-6.71
V	-6.46	43.00	9.77	23.68	-6.55	44.13	-6.17	41.61
VI	17.38***	0.81	26.78**	3.23	18.03***	-0.02	18.36***	-0.44
VII	15.43**	10.83*	23.13***	11.06***	12.19***	17.78***	15.58***	10.80*
VIII	-2.72	10.14	6.43***	6.48	-3.01	10.45	-2.58	10.04
IX	3.74	30.40**	11.67***	21.34***	3.62	30.72***	4.22	29.39***
XI	6.44*	6.11	8.54	5.58	6.44	6.07	6.44	6.17
XII	4.75*	8.21*	6.40***	8.79	4.68**	8.50*	4.97**	7.99*
XIII	-1.05	18.31	4.40*	17.10	-1.48	20.04***	-0.77	17.94
XIV	-0.56	15.78	7.45	1.22	-0.53	11.48	-0.33	12.89
XV	4.23	15.66	15.35	9.98	4.50	15.78	4.63	15.81
XVI	-1.53	17.81**	13.06***	7.32**	2.38	11.89***	-1.27	17.50
XVII	5.27	5.21	13.52***	3.53	2.50	8.54	5.70	5.29
XVIII	-3.98	17.78	5.29	25.86***	-6.12	23.45**	-5.73	23.12
XX	8.76*	11.14	12.04***	19.54***	9.22*	9.35	8.82*	11.27

Note: ZIP estimator. Dependent variable: $quote_{ijk}$; a: ln(preference margin)*dummy pref trade; b: ln(preference margin)*dummy pref trade* dummy EU; Product(HS6), Importer and Exporter Fixed Effects (not reported); Intercept not reported; Coefficients for unit values not reported in Model 2; (*) significant at 10 level; (**) significant at 5 level; (***) significant at 1 level.