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The impact of GSP Preferences on Developing Countries' Exports in the European Union: Bilateral Gravity Modelling at the Product Level¹

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Abstract: Unilateral preferences aim at increasing exports from developing countries via reductions on applied tariffs and the incentives created by the preference margin. After decades of existence of these schemes, an important policy question is whether preferential schemes have been effective in increasing exports. This paper evaluates empirically the impact of the European Union (EU) GSP preferential regimes on exports from developing countries using a bilateral gravity model at the product level. Rather than using dummy variables to proxy each trade regime as in most empirical papers, this paper uses a unique dataset at CN-10 digits that allows us to determine the tariff rate paid by each export to the EU and the preferential regime of entry and address the issue of utilisation and non-utilisation of trade preferences, which can result in wrong attribution of causality between trade regimes and export flows. The most important finding of the paper is the fact that the results critically depend on (i) how the advantage provided by the preferences measure is measured, and (ii) whether the extensive margin of trade is included. Overall the results suggest preferences have a very small impact on trade, and negligible or even negative when we consider the scope for trade diversification. Therefore, it appears that the GSP system has provided a small effect on increasing exports at the intensive margin, but no effect on export diversification.

JEL Classification: C23; F13; F55

Key Words: preferential trade arrangements, GSP, gravity models, preference utilisation

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1. Introduction

Unilateral trade preferences have been a key policy instrument used by developed countries in order to encourage exports from developing countries. The European Union (EU) has long been a champion in this area, granting unilateral preferential access to its market for developing countries since the early 1970s through the Generalised System of Preferences (GSP), the Cotonou Agreement (until 2008), and since 2001 the Everything but Arms (EBA) initiative for Less Developed Countries (LDCs).¹ Unilateral preferences, and especially its most important scheme, the GSP, are a central pillar of the EU's strategy towards developing countries, and in its recent 2011 proposals the EU intends to refocus the GSP scheme so that it helps those developing countries most in need.²

Unilateral preferential access is expected to foster sustainable development via higher levels of exports and imports. This can enable countries to develop more efficient industries via exploiting new relative comparative advantages enhanced by preferential margins, and potentially leading to increases in productivity, competitiveness and diversification. At the same time, it may also encourage more investment.

After 40 years of preferences, a key concern is the extent to which unilateral preferences have had an impact on trade, and through this on development. Evidence on the impact on trade is the central objective of this paper. Specifically, we evaluate whether there is any evidence that GSP/EBA unilateral preferences have had any significant impact on increasing exports from developing countries. The evidence from the existing literature, which typically focuses either on EU preferences or on the US' African Growth and Opportunity Act, suggests that preferences do impact positively on trade flows (see for example, Fraser & Van Biesebroeck, 2010; Agostino et.al 2007; Collier & Venables 2007; Di Rubbo & Canali, 2008; Nilsson, 2007,2009)³. There is comparatively little empirical evidence suggesting the converse (though see Ozden and Reinhardt (2003), and there is also some work suggesting little impact either on diversification (Collier and Venables, 2007), or on encouraging higher value chain activity (Edwards & Lawrence, 2010). There are some important empirical limitations to much of the existing literature and most significantly the use of aggregated data whereas preferences are granted at the product level, the failure to correctly specify preference margins and the frequent use of dummy variables to capture preference regimes.

In this paper we overcome these limitations in evaluating the impact of the EU's GSP trade regimes. We do so by using a unique dataset on imports from the rest of the world to the EU, and on the basis of that data set by estimating a highly disaggregated bilateral gravity model at the 10 digit (Combined Nomenclature CN-10) product level from 2002 to 2008. This dataset allows us to observe the actual tariff rate that each export flow pays

1 Within the GSP system, the EU provides preferential access to the EU market to 176 developing countries in the form of reduced tariffs for their goods. Under EBA, part of the GSP system, 49 LDCs have duty free quota free access to the EU to all products excluding weapons since 2001. In addition to weapons, banana and rice were excluded from EBA between 2006 and 2009, and sugar is being transitioned until 2012 with minimum prices.

² For the complete text of the proposal see <http://trade.ec.europa.eu/doclib/html/147893.htm>. See also Gasiorek & Lopez (2011) for a preliminary assessment of the proposals.

³ In contrast Ozden and Reinhardt (2003) examining the period 1976-2000 find that export performance improves when asymmetric preferences are removed

when entering the EU and the regime of entry (i.e. whether it entered using GSP preferences, the MFN regime or other PTA preferences). As a result, this paper addresses some major limitations in existing approaches analysing the impact of trade agreements on trade, and in so doing contributes to the existing literature in several important aspects. First, it allows us to identify the impact of preferential access by using the actual preference margin at the product line level rather than a dummy index/variable typically applied to much more aggregated trade. This gives a much more accurate measure of the depth of preferential advantage and coverage, especially as the model is estimated at the product line. Second, it allows us to control for the utilisation of preferences as it correctly associates flows with preferential regimes when preferences are actually used. Third, the data enables us to decompose the impact of the preferential margin on exports according to the type of preferential scheme. Concretely, we distinguish between GSP, EBA, GSP+, Cotonou and other PTA regimes.

There are also a number of important methodological issues which we address in this paper and which arise in the context of working with such a rich and detailed dataset. These concern the appropriate specification of the preference margin, the inclusion of zero export flows, the appropriate control for trade costs and the heteroscedastic nature of trade data. Taking this on board, and in line with recent development in the gravity literature, we utilise several state of the art econometric estimations. However we recognise that each has certain limitations, and we therefore undertake extensive robustness checks

Overall, our results suggest that while preferences may well have increased trade, the impact is relatively small. We also find that the impact of preferential regimes on trade critically depends on how the preferential regime is measured and whether we also considered the impact on the extensive margin of trade. Preference margins appear to have a positive effect on increase trade of existing flows (the intensive margin). However, preferential margins measures that consider the tariffs paid by larger competitors tend to reduce the impact of preferences on trade. More importantly, when the effect on all potential trade flows (extensive and intensive margin) is considered, the results suggest a very small and even negative effect of preferences on trade. The results by regime indicate that the GSP scheme tends to be less effective on increasing trade than other regimes.

This paper is organised as follows. Section 2 describes the coverage and use of preferential regimes in the EU. Section 3 describes the data and methodology. Section 4 estimates the impact of trade preferences on the intensive and the extensive margin of trade. Section 5 carries out some robustness tests. The last section concludes.

2. Depth, breadth and utilisation of preferential regimes in the EU

In addition to the GSP scheme, in more recent years the EU has been more active in encouraging LDCs to sign Preferential Trade Agreements (PTAs), and most notably the Economic Partnership Agreements. The EU currently has reciprocal and unilateral preferences with virtually all countries in the American and African continent.⁴

⁴ Excluding the US, Venezuela and Cuba in America and Mauritania in Africa.

Agreements differ in terms of product coverage and the preference margin being offered, which is a function not only of the preferential tariff, but also on the size of the MFN tariff and the potential preference tariff of competitors. Consequently, the correct assessment of the impact of trade preferences on export flows requires identifying the depth and breadth of preferences that each agreement / preference scheme offers. Typically, and primarily due to the lack of available data, gravity models have used dummy variables to measure this impact. This, however, is misleading and potentially incorrect in four dimensions. First because it associates bilateral flows to a preferential regime without considering the preferential lines being offered. Secondly it does not take into consideration the extent of the preference margin. Thirdly it fails to take into account the utilisation of the preferential regimes. In addition, dummy variables give equal weight across preferential regimes, and in the case of overlapping preferences, cannot clearly distinguish between the impacts of each separate agreement.

Table 1 illustrates the extent of these problems. Focusing only on the GSP system, it shows the differences in coverage and depth between the GSP, the EBA and the GSP+ regime across three years in our sample. The first element to highlight is the fact that the number of tariff lines with MFN zero rates and, therefore, no preference margin increased from 16% to 22%. In the case of EBA, the remaining tariffs, with the exception of a few products, such as sugar, rice and banana products, are at zero rates. EBA countries have virtually duty free access in the EU market. The coverage of the GSP regime is less generous, with 8.32% of lines excluded for preferential treatment, and 36.04% with some preference margin but paying a positive duty in 2008. On the other hand, the GSP+ regime is similar to the EBA regime but excludes around 8% of product lines.

Table 1 Coverage of EU Preferential Regimes '02-'08 (share of tariff lines)

	2002			2005			2008		
	GSP	GSP+**	EBA	GSP	GSP+	EBA	GSP	GSP+	EBA
MFN = 0	16.45	16.45	16.45	22.07	22.07	22.07	22.11	22.11	22.11
MFN > 0	12.34	8.12	0.23	11.89	7.78	0.21	8.32	7.64	0.34
Pref. Duty Free	37.11	72.14	83.32	32.57	67.32	77.71	33.53	68.15	77.52
Positive pref. Tariff	34.10	3.29	0.00	33.47	2.84	0.01	36.04	2.11	0.04

Source: CARIS (2010) ** GSP+ in 2002 refers to the special arrangement for drug trafficking prevention

Table 2 Average Tariff by Regime and TDC Sector (2002 and 2008)

TDC	Description	2002				2008			
		MFN	GSP	GSP+	EBA	MFN	GSP	GSP+	EBA
I	Live animals; animal products	20.6	19.1	14.5	0.0	17.3	14.8	10.6	0.0
II	Vegetable products	12.4	10.0	7.4	0.2	9.7	7.7	4.7	0.3
III	Animal or vegetable fats and oils	7.3	4.3	1.4	0.0	8.6	5.3	2.1	0.0
IV	Prepared foodstuffs;	16.1	12.6	2.2	0.3	17.3	11.8	2.5	0.3
V	Mineral products	0.7	0.1	0.1	0.0	0.7	0.0	0.0	0.0
VI	Products of the chem.. & allied inds	5.0	0.9	0.3	0.0	5.1	0.9	0.2	0.0
VII	Plastics and Articles thereof	5.9	1.4	0.0	0.0	5.5	1.1	0.0	0.0
VIII	Raw hides and skins, leather, furskins	2.9	0.8	0.2	0.0	3.0	0.9	0.2	0.0
IX	Wood and articles of wood	2.8	0.9	0.0	0.0	2.4	0.6	0.0	0.0
X	Pulp of wood or other fibrous...	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Xia	Textiles	6.7	5.4	0.0	0.0	6.2	5.0	0.0	0.0
XIb	Textile articles (clothing)	11.5	9.2	0.0	0.0	11.2	9.0	0.0	0.0
XII	Footwear, headgear, umbrellas...	8.3	4.6	0.0	0.0	7.6	4.0	0.0	0.0
XIII	Articles of stone, plaster, cement,...	4.0	1.3	0.0	0.0	4.0	1.3	0.0	0.0
XIV	Pearls, precious,semi-precious stones	0.8	0.0	0.0	0.0	0.7	0.0	0.0	0.0
XV	Base metals and articles of base metal	2.4	0.5	0.1	0.0	2.0	0.5	0.1	0.0
XVI	Machinery and mechanical appliances	2.4	0.4	0.0	0.0	2.3	0.3	0.0	0.0
XVII	Vehicles, aircraft, vessels, transport	5.1	2.1	0.0	0.0	4.6	1.7	0.0	0.0
XVIII	Optical, photographic,... Instruments	2.4	0.2	0.0	0.0	2.3	0.2	0.0	0.0
XIX	Arms and ammunition;	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2
XX	Miscellaneous manufactured articles	2.6	0.1	0.0	0.0	2.5	0.1	0.0	0.0
XXI	Works of Art, collectors' piece...	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: CARIS (2010)

The coverage and depth of trade preferences also varies across product and sectors. Table 2 above shows average tariffs per regime and HS chapter in 2002 and 2008. The larger MFN tariffs are in agricultural products, food processing and textiles. However, these larger tariffs imply larger margins only for the EBA and GSP+ regime, since GSP tariffs are quite large on average for these sectors. In addition, most average MFN tariffs have decreased from 2002 to 2008. Although they represent a small reduction, preference margins have been squeezed further, and for some minerals and manufactured sectors are below 2.5%.

In addition to different coverage across regimes, countries may be eligible for more than one preferential regime. For example, most EBA exporters could until 2008 also enter the EU using the Cotonou Agreement. Similarly those LDCs that have signed an Economic Partnership Agreement with the EU can either use the EPA preferences or the relevant GSP preference scheme. Furthermore, not all product lines have the same relevance for exporting countries, since this depends on each country export basket.

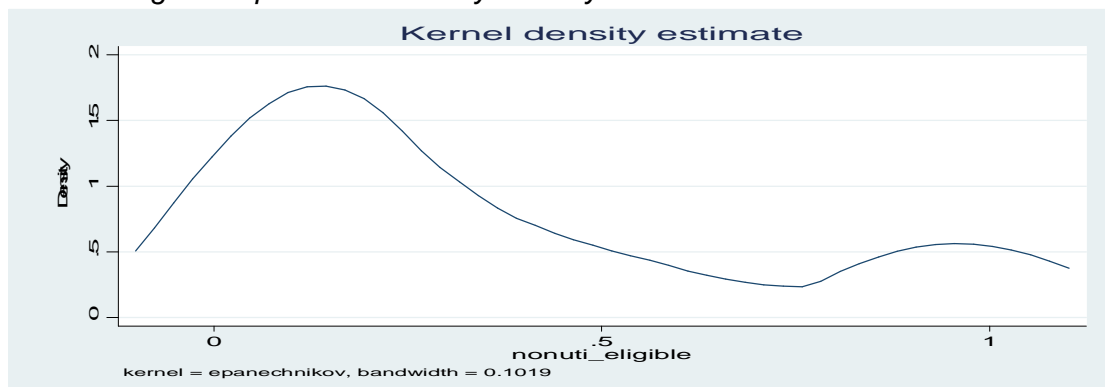
The first two columns in the table in Appendix 1 show the share of existing exports that are only eligible for MFN treatment or enter at zero MFN rates. This indicates the importance of eligible preferences for specific countries. The table indicates striking differences in the importance of eligible preferences. These are very important for countries such as Bangladesh, with only 0.95% of existing exports eligible under MFN=0, Jamaica (2.91%) or Swaziland (3.78%). On the other hand, there are other countries where preference eligibility is less important according to existing exports, and

due to a narrow export basket, most export flows are eligible for the MFN=0 regime; for example Lesotho (98.73%), Liberia (98.84%), East Timor(98.89%), Rwanda (98.94%) or Central African Republic (99.03%).

While the importance of unilateral preferences varies across exporters, it is worth noting that trade under these regimes is of comparatively low importance for the EU. More than 60% of total imports in the EU are in duty free tariff lines. Around 23% of the remaining imports face positive MFN tariffs, either because exporters are not eligible for preferences or because they do not utilize them. The share of imports using preferential regimes is only 15%, and more than half of this utilises other preferential regimes. The *de facto* share of EU imports via GSP/EBA is around 5%.

The table in Appendix 1 also provides information about a very important factor: preference utilisation. Non-utilisation of preferences varies substantially across countries. While most countries utilize most of their preferences, there is small cluster of countries with large preference non-utilisation as Figure 1 shows.

Figure 1 Probability Distribution Function of Preference non-Utilisation Exports as a Share of Eligible Exports in 2007 – by Country

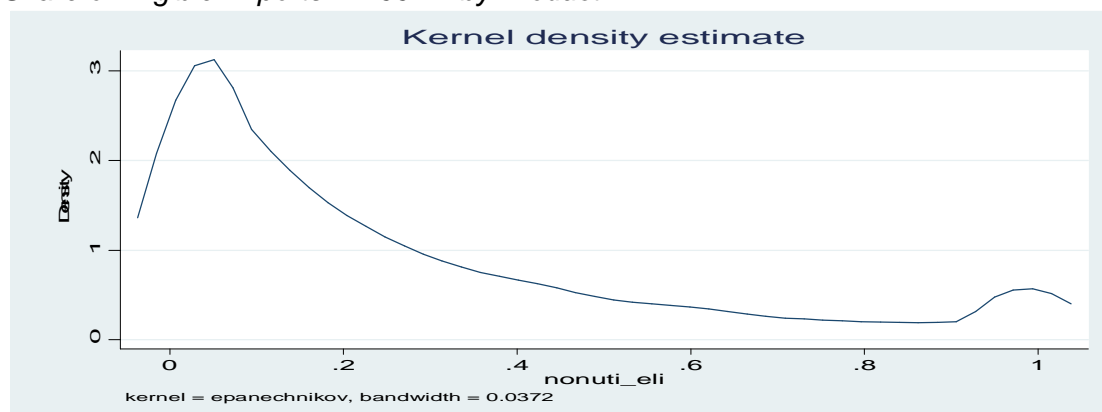


Source: Author's own calculations

This pattern of non-utilisation is also present when looking at utilisation across products. Figure 2 shows the probability distribution function for non-utilisation rates⁵ by product. Its bimodality suggests that while most products cluster around 15% non-utilisation rates, a small cluster of products exhibit very large non-utilisation rates.

⁵ Measured as imports eligible for preferential treatment but entering via MFN as a share of total imports eligible for preferential regime.

Figure 2 Probability Distribution Function of Preference non-Utilisation Exports as a Share of Eligible Exports in 2007 – by Product



Source: Author's own calculations

Summing up, the analysis indicates large differences in preferential margin depth and coverage across preferential regimes, products and countries. In addition, non-utilisation of preferential regimes is significant for a small cluster of products and countries. As a result, identifying the impact of preferential regimes on exports requires adequate control of this level of preference heterogeneity.

3. Data and Methodology

In order to control for the heterogeneity of preferential regimes and their utilisation, we estimate the impact of preferences on exports using a bilateral gravity model at the CN 10-digit product level. Such a fine level of disaggregation allows us to handle different degrees of coverage, depth and utilisation of preferential regimes as described above, and is a major advantage of our dataset. The limitation of this approach, however, is that beyond the 6-digit level, trade classifications across countries are not harmonised. This implies that we can only estimate the bilateral gravity model on exports to the EU, and, therefore, the results need to be interpreted as the impact of the preferential regimes on exports to the EU.

The dataset includes export flows to the EU from 2002 to 2008, disaggregated by exporting country, CN-10 product, tariff regime and year. More than one export flow from the same product, country and year is possible, since exports may enter the EU via different tariff regimes. This gives us a good degree of variation in order to identify the impact of preference margins on export flows. The tariff regimes are: MFN; GSP, GSP+ or EBA; other preferential regimes; tariff suspension, and; MFN under quota or preferential under quota. Although we cannot identify each specific regional trade agreement, we can differentiate between the GSP/EBA regime and Cotonou/other PTAs. For around 80 percent of the observations we only observe one tariff regime in the same year, but in the remaining cases we observe more than one tariff regime (more than two in only 1 percent of observations). Import data is then carefully matched with tariff data from TARIC, which enables us to identify the actual tariffs paid by exporting country, CN-10 product and tariff regime. This lengthy process required conversion to *ad valorem* tariffs for some agricultural products.

Trade data can be noisy due to errors when inputting customs information. In order to detect extreme and unlikely flows, we calculate unit values and search for outliers by applying Hadi's (1992) filter. These extreme values are then removed from the database. In addition, very low value flows, below 500 Euros, are also removed.⁶

The final dataset has around 1.5 million trade flows, including 19,259 different product lines. Some of these product lines disappear at some point during the sample period and some are new additions to the tariff book, mainly representing a split from other product lines due to changes in tariff regimes or other customs controls.

We estimate the following gravity model based on Anderson and van Wincoop (2003) and adjusted for our product level bilateral data.

$$X_{ikrt} = \beta_0 Y_{it}^{\beta_1} D_i e^{\theta_1 d_i + \theta_2 d_j} \quad (1)$$

Each export flow X from country i in product k and tariff regime r in year t depends on a set of size and trade costs parameters. In our model, destination country variables are omitted since in each case the model is based on flows to the EU. Anderson and van Wincoop (2003) emphasise the need for controlling for determinants of bilateral trade costs such as tariffs, distance, colony or other factors, as well as multilateral resistance costs that account for factor that affect the prices of export competing goods.

For estimation purposes, equation (1) is transformed into stochastic log-linear form as follows:

$$\log(X_{ikrt}) = \beta_0 + \beta_1 \log(Y_{it}) + \beta_2 \log(Pop_{it}) + B_3 tariff_{ikrt} + B_4 margin_{ikrt} + \sum_n \alpha T_{it} + e_{ikrt} \quad (2)$$

The logarithm of exports to the EU for each country, product, year and tariff regime depends on exporter's GDP (Y), exporters population (Pop) and a set of trade costs/resistance parameters.

The key question of this paper is to analyze whether preferential access increases the level of exports. The literature typically captures this by applying a dummy variable to identify each preferential regime. However, as suggested above, this fails to capture the heterogeneity of depth and coverage across products and countries, and does not control for preference utilisation. The standard measure of the preferential margin is the difference between the applied tariff that the export flow pays and the MFN tariff that the product would pay without the preference. Concretely, we define the preference margin as the difference between the MFN tariff rate (t^{mf}) and the preferential rate (t^{pref}), divided by the MFN tariff rate (t^{mf}).⁷

⁶ These small flows are likely to be the result of private individuals moving goods rather than firms' trade, and therefore unlikely to be affected by tariffs.

⁷ The margin measure should oscillate between 0 and 1. However due to seasonal tariffs and year averages, for 1% of cases the average MFN tariff can be smaller than the preferential tariff, and therefore the margin be negative.

$$margin_{ikrt} = \frac{\tau^{mfn} - \tau^{pref}}{\tau^{mfn}} \quad (3)$$

However, as Low et al. (2005) suggest this measure should be taken as an upper bound of the preferential advantage, since in reality the margin needs to be adjusted to the tariff paid by the main competitors in each specific product category. For example, if the main world exporters of a particular commodity are developing countries, which receive a preference in the EU market, the preference margin using the MFN tariff as reference will largely overestimate the extent of the preference advantage. In order to include this adjustment in the analysis and better consider the degree of competitive advantage provided by the preference margin, we use three additional alternative margin definitions:

- *margin 2* – uses the same definition than in (3), but instead of the MFN tariff uses the weighted average applied tariff.
- *margin 3* – uses (3) replacing the MFN tariff by the applied tariff on the largest exporter of that specific product line.
- *margin 4* - uses (3) replacing the MFN tariff by the simple average applied tariff.

Margin 2 and *margin 3* are more likely to reflect the degree of competitive advantage as they take into consideration the effective competitors at the product line level. One problem, however, with these measures is the fact that the level of trade and, therefore, the trade weights used to calculate the margin may be affected by the size of the margin. As a result there is some risk of endogeneity using these preference margin measures and of underestimating the size of the preference effect.⁸ In order to complement these measures, we also add *margin 4*, which is calculated with a simple average applied tariff. In general, we should expect that margin 1 constitutes an upper bound for the preferential margin effect, while margin 2 and 3 constitute the lower bound.

While bilateral trade costs can be proxied by distance and geographic and cultural variables, multilateral resistance costs are more difficult to control for. Baier and Bergstrand (2009) suggest a Taylor expansion approximation. Other authors have used price indices to control for these terms. However, price indices tend to be bad quality proxies, since they include information on prices of non-tradable goods. A common approach is to model this multilateral resistance term with country fixed effects. One problem of this approach is the fact that country dummies may not capture time variation of the multilateral resistance terms. In order to control for time variation, this requires the use of interactive country year dummies. In the context of our model, at the product level, this is problematic for certain econometric estimators that use maximum likelihood since it involves estimating a model that includes time, product, country and country*time effects, and this significantly overparametrizes the estimation of equation (2) and makes achieving convergence difficult.

Carrere et al. (2009) based on Baier and Bergstrand (2009) suggest an approximation to the multilateral resistance term for panel data based on the remoteness of the country

⁸ Since our unit of analysis is the export trade flow defined by the regime of entry, it is difficult to instrument the preferential margin to also account for preference utilisation. For example, the use of lagged preference margin values is ruled out since in some cases the same country and product did not use a preferential regime in t-1.

with regards to all countries. This measure is constructed as the weighted average of each country distance to other markets weighted by the share of each market in world's GDP.

$$MRI_{it} = \sum_n \frac{Y_{nt}}{Y_{wt}} \log(D_{in}) \quad (4)$$

In this paper, we use the two alternative specifications to control for unobserved trade costs, and compare the results. The first one shown in equation (5a), the standard gravity equation, includes GDP and population, the MRI_{it} variable in order to control for changes in trade resistance, year dummies (λ_t) to control for changes in EU demand and, when possible, product dummies (λ_k). To control for country specific effects we use distance to the EU, and dummies for common language, contiguity and former colony. The second specification (5b), controls for all trade costs using dummy variables: year dummies (λ_t), product dummies (λ_k) and country-year dummies ($\lambda_t * \lambda_i$). This specification controls for all country level determinants and, therefore, does not allow identifying any of the coefficients of these variables. Also, given the large number of dummies and parameters to estimate, this specification cannot be estimated using maximum likelihood estimators. However, at the same time, OLS estimators of (5b) provide clean estimates from trade costs for the effect of tariffs and preference margins on exports.

$$\begin{aligned} \log(X_{ikrt}) = & \beta_0 + \beta_1 tariff_{ikrt} + \beta_2 margin_{ikrt} + \beta_3 \log(Y_{it}) + \beta_4 \log(Pop_{it}) + \beta_5 \log(Dist_i) + \\ & \beta_6 Lang_i + \beta_7 Col_i + \beta_8 Contig_i + \beta_5 \log(MRI_{it}) + \\ & \beta_6 \lambda_t + \lambda_k + e_{ikrt} \end{aligned} \quad (5a)$$

$$\log(X_{ikrt}) = \beta_0 + \beta_1 tariff_{ikrt} + \beta_2 margin_{ikrt} + \beta_3 \lambda_t + \beta_4 \lambda_k + \beta_5 \lambda_i * \lambda_t + e_{ikrt} \quad (5b)$$

In addition to the impact of the preference margin, the objective of the paper is to decompose the impact of different preferential regimes. In order to analyse the impact of these regimes we add two interactive terms to equation (5a) and (5b), $margin_gsp$ which equals to the margin when the flow entered through the GSP regime and $margin_eba$, which measures the margin when the flow used the EBA regime. In this case the baseline regime is the “other preferences/Cotonou” regime.

Equations (5a) and (5b) estimate the impact of preferences on the intensive margin of trade (i.e. impact on existing positive flows). However, omitting all zero flows between exporters and the EU can result in biased coefficient estimates on the intensive margin. If zero flows and the decision of exporting are correlated with trade costs, then using only positive flows underestimates the “true” impact of trade costs on trade flows. In addition, adding zero flows to the dataset allows us to estimate the impact on total exports, and, therefore, also on the scope for countries to diversify to new exports.

Accommodating zero flows in our dataset is non-trivial since we are looking at product data rather than aggregate flows. An additional complication arises because the dataset has a large number of products that appear and disappear during the years. Filling our dataset with zeros along the year dimension is problematic due to the fact that imports from specific products on a given year may cease because the product line no longer

exists. In order to address this, product lines that are not defined for the entire period of the sample are removed. This ensures that we do not artificially fill with zeros a product that was not defined in the tariff book for a given year.^{9 10} The reduced dataset has around 9,000 product lines. For each product year, all exporters to the EU in that year are potential exporters.¹¹

An additional challenge is to define the preference margin for the zero flows. For each product and year we extrapolate on the basis of the existing defined margins for positive flows. When these are not defined, we construct the margin according to whether the country is EBA or GSP. For EBA countries the potential margin is constructed using a preferential tariff of zero. For GSP eligible products and GSP eligible countries we use the GSP tariff (see Appendix 2 for a more detailed explanation). We also use specific tariffs regarding specific country rates due to FTAs and other specific cases that appear in the tariff book. The main difficulty is for countries eligible for more than one preferential regime, GSP and Cotonou, or from 2008 GSP and EPA. Since we cannot tell what regime these countries would use for these products we use the minimum tariff available, and when both are the same we allocate the flow to the GSP/EBA regime.

The fact that we cannot tell what regime would be utilised for zero flows implies that we need to interpret the coefficients on the margin decomposition with some caution. Linking preferences automatically to the GSP regime when preferential tariffs are the same in another eligible regime implies the risk of a small negative bias on the GSP preferential margin coefficient vis-a-vis Cotonou or other FTAs. Despite this caveat, our methodology appears to be the best approximation to construct potential preference margins, and minimises the risk of including potential positive preference margins for products excluded from PTAs.

There is a growing econometric literature exploring the estimation of the gravity equation with zero flows (see Santos Silva and Tenreyro (2006), Linders and de Groot (2006), Martin and Pham (2008) or Burger et al. (2009)). A key element when dealing with zero flows is whether these are the result of unobservable trade or of exporters' decisions when selecting markets to export (See Helpman et al. 2008). If this is the case, a Heckman selection model might be more appropriate (see for comparison of estimators Linders and de Groot (2006) and Martin and Pham (2008)). One problem of the Heckman selection model, however, is the strong assumption on the joint normality of the error terms, and also the fact that does it not allow controlling for the large heterogeneity of countries and products.

Following Santos Silva and Tenreyro (2006), we use the Poisson Pseudo Maximum Likelihood (PPML) estimator. The main advantage of the PPML estimator, in addition to

⁹ In practical terms we restrict the sample to products with imports in 2002 and 2008, 2003 and 2008 or 2002 and 2007.

¹⁰ While we are aware of the recent literature on the survival of trade flows (Besedes and Prusa, 2006) and the fact that many trade relationships may not survive more than five years, we expect that the number of simultaneous product dropouts for all exporters in the world to the EU in a specific year to be minimal. Therefore, the risk of eliminating products not exported to the EU one specific year is low.

¹¹ The criterion is that a country should have exported at least one product to the EU in the same year. We look at each separately in order to guarantee that Eastern European EU countries enter the sample in the first period as exporters and after joining the EU are considered members and not exporters.

be able to include zero flows in the estimations, is that it allows dealing with heteroscedastic data, which is common in trade data, and also with the panel structure of the dataset and controlling for fixed effects.

In general due to the exceptionally large dataset and computing limitations we face a trade-off when addressing the main econometric issues arising for a gravity panel at the product level; namely heterogeneity, heteroscedasticity and zero flows. Adequate control of heterogeneity at the product level implies specifying the model with thousands of product, country and time dummies, which make convergence in methods that use maximum likelihood estimators unlikely. More importantly, the Heckman selection model does not allow for fixed effects, which constrains even further addressing the issue of heterogeneity. As a result of these issues, we first focus on OLS estimators that allow us to fully control for product and country-year fixed effects, and, therefore, to control for trade costs. Then, in a second stage we compare the results with the PPML estimator proposed by Silva and Tenreyro (2006), which addresses the issue of heteroscedasticity and can handle zero flows.

The next section summarises the results from the main estimates.

4. Results from Aggregate Estimates

4.1 The impact of preferences on the intensive margin of trade

Table 4 shows the results of estimating equation (5a) for positive flows only - the intensive margin of trade. We estimate the model with product fixed effects and year dummies. The table has three panels and within each we run our regression with the four alternative margin definitions discussed earlier. Specifications (1)-(4) show the results with no decomposition between preferential regimes; in (5)-(8) we decompose the margin between the “GSP/EBA” regime vis-a-vis “other FTA + Cotonou”; and finally specifications (9)-(12) show the results when the margin is decomposed for each specific regime vis-a-vis “other FTAs + Cotonou”. The overall R^2 ranges between 0.10 and 0.12 which is quite satisfactory when explaining export dynamics for more than 10,000 different product lines.

As expected, GDP and population increase the level of exports, contiguous countries to the EU tend to export more and countries with larger multilateral resistance indexes tend to export less. Variables such as common language and former colony, contrary to what we should expect, show a negative sign; although these variables are partially correlated with preferential margins via the Cotonou Agreement. In addition, contrary to what is expected, the sign on distance increases exports to the EU for margins 1 and 4, although this variable is also highly correlated with the MRI as index of remoteness.

Regarding the main coefficients of interest, applied tariffs reduce exports to the EU, with coefficients ranging between -0.015 and -0.07. More importantly, preference margins appear to have a positive impact on exports. The results are statistically significant at 99% confidence level and robust across different margin specifications. However, the size of the margin effect depends on how the preference margin is calculated. While the standard preference margin coefficient (i.e. based on the comparison with MFN rates) is close to one, when we adjust the preference margin to take into account the preference in comparison to those actually exporting the same product to the EU (margins 2 and 3),

the coefficient drops to 0.0003 and 0.23. When we consider the margin based on the unweighted average applied tariff, the coefficient is somewhat larger at 0.60. As expected, margin 1 provides an upper bound estimate, while margins 2 and 3 provide a lower bound.

Although we need to interpret the size of the margin 2 and 3 coefficients with caution due to potential endogeneity problems, the results suggest that the way how one defines the competitive advantage created by the margin largely affects the estimated effectiveness of trade preferences. Ignoring the degree and source of competition in the market by using the MFN rate (margin 1) is likely to overestimate the impact of preferences on exports. At the same time, the effect on exports associated to the preference margin in relation to main competitors is low.

In general, the results show a positive but small effect of preference margins on exports. Averaging the preference margin coefficient across margin definitions in specifications (1) to (4) indicate an average effect of around 0.45. This implies that a one unit increase in the preference margin (i.e. giving a zero rate to a product with an MFN or reference tariff of 10%) increases the logarithm of exports (€,000) by 0.45, equivalent to €1,573. This is a small increase when the median preferential export flow is €70,000.

Also interesting is the decomposition of the preference margins by regime. In this case the effectiveness of the trade regimes depends on the preference margin used. The standard preference margin, the one based on exporter's applied tariff and the one using the simple average suggest a lower effect of the GSP/EBA regime vis-a-vis other preferential regimes, while the weighted average tariff margin suggests the opposite although the magnitude is very small. These results are confirmed by the decomposition at the individual regime level. The GSP regime tends to be less effective than "other FTAs" and the EBA regime for two of the margins. On the other hand the GSP+ regime and the Cotonou Agreement are more effective than "other FTAs". In general, the GSP regime appears in most cases less effective than other regimes in increasing exports, reducing the average preference margin effect across margins from 0.53 to 0.21. This is equivalent to an increase of €1,236.24 for a one unit increase in the margin, instead of the average increase of €1,695.62. The Cotonou agreement appears to be more effective increasing exports on average, while the EBA and GSP+ largely depend on how we define the preference margin.

The reasons for this larger preference effect of Cotonou/other FTAs vis-a-vis the GSP schemes are unclear. A potential explanation for this result is the possibility of more stringent rules of origin (RoO) under the GSP system. It is also possible that FTAs, which provide reciprocal preferences and, therefore, are negotiated product by product, offer margins in products which are more attractive for exporters or better match their export basket. Also, it may be the case that FTAs include other provisions which facilitate trade more.

Table 4 Results Gravity model at product level-tariff regime. Panel estimates. Intensive margin

	(1) margin 1 (MFN)	(2) margin 2 (weighted average tariff)	(3) margin 3 (largest exporter tariff)	(4) margin 4 (average tariff)	(5) margin 1 (MFN)	(6) margin 2 (weighted average tariff)	(7) margin 3 (largest exporter tariff)	(8) margin 4 (average tariff)	(9) margin 1 (MFN)	(10) margin 2 (weighted average tariff)	(11) margin 3 (largest exporter tariff)	(12) margin 4 (average tariff)
tariff	-0.0150*** (0.0005)	-0.0682*** (0.0004)	-0.0403*** (0.0005)	-0.0162*** (0.0005)	-0.0123*** (0.0005)	-0.0681*** (0.0004)	-0.0406*** (0.0005)	-0.0150*** (0.0005)	-0.0112*** (0.0005)	-0.0657*** (0.0004)	-0.0399*** (0.0006)	-0.0140*** (0.0005)
margin	0.9830*** (0.0057)	0.0003*** (0.0000)	0.2266*** (0.0045)	0.6042*** (0.0033)	1.1774*** (0.0064)	0.0003*** (0.0000)	0.2497*** (0.0047)	0.7124*** (0.0037)	1.1643*** (0.0065)	0.0003*** (0.0000)	0.2408*** (0.0048)	0.7068*** (0.0038)
margin_gspeba					-0.5664*** (0.0084)	0.0015*** (0.0003)	-0.1477*** (0.0095)	-0.5554*** (0.0081)				
margin_gsp									-0.5775*** (0.0097)	0.0015*** (0.0003)	-0.1160*** (0.0110)	-0.5719*** (0.0094)
margin_eba									-0.2235*** (0.0207)	0.3036*** (0.0204)	0.1530*** (0.0240)	-0.1843*** (0.0205)
margin_cot									0.2094*** (0.0159)	0.3568*** (0.0108)	0.2735*** (0.0202)	0.1827*** (0.0157)
margin_gspg									0.0032 (0.0178)	0.0002 (0.0016)	-0.2490*** (0.0222)	-0.0420* (0.0179)
lgdp	0.5447*** (0.0019)	0.5250*** (0.0019)	0.5486*** (0.0020)	0.5478*** (0.0018)	0.5281*** (0.0019)	0.5250*** (0.0019)	0.5446*** (0.0021)	0.5321*** (0.0019)	0.5372*** (0.0019)	0.5374*** (0.0019)	0.5507*** (0.0021)	0.5403*** (0.0019)
lpop	0.0145*** (0.0016)	0.0298*** (0.0016)	0.0244*** (0.0018)	0.0143*** (0.0016)	0.0366*** (0.0017)	0.0298*** (0.0016)	0.0290*** (0.0018)	0.0325*** (0.0016)	0.0331*** (0.0017)	0.0249*** (0.0016)	0.0252*** (0.0018)	0.0291*** (0.0016)
lmri	-5.4380*** (0.0802)	-4.4748*** (0.0807)	-4.6888*** (0.0896)	-5.3389*** (0.0799)	-5.5117*** (0.0801)	-4.4728*** (0.0807)	-4.6934*** (0.0896)	-5.5590*** (0.0799)	-5.3321*** (0.0813)	-4.2851*** (0.0809)	-4.6663*** (0.0905)	-5.4110*** (0.0809)
ldist	0.0181*** (0.0045)	-0.0722*** (0.0045)	-0.0654*** (0.0049)	0.0135** (0.0044)	0.0760*** (0.0045)	-0.0723*** (0.0045)	-0.0554*** (0.0049)	0.0668*** (0.0045)	0.0638*** (0.0046)	-0.0870*** (0.0045)	-0.0589*** (0.0050)	0.0575*** (0.0046)
comlang_off	-0.1314*** (0.0046)	-0.0927*** (0.0046)	-0.0964*** (0.0050)	-0.1285*** (0.0046)	-0.1361*** (0.0046)	-0.0928*** (0.0046)	-0.0965*** (0.0050)	-0.1265*** (0.0046)	-0.1396*** (0.0046)	-0.1030*** (0.0046)	-0.0985*** (0.0051)	-0.1278*** (0.0046)
colony	-0.2292*** (0.0046)	-0.2249*** (0.0046)	-0.2608*** (0.0050)	-0.2322*** (0.0045)	-0.2357*** (0.0046)	-0.2249*** (0.0046)	-0.2616*** (0.0050)	-0.2359*** (0.0045)	-0.2338*** (0.0046)	-0.2218*** (0.0046)	-0.2582*** (0.0050)	-0.2339*** (0.0045)
contig	0.2407*** (0.0084)	0.2522*** (0.0084)	0.2205*** (0.0092)	0.2420*** (0.0083)	0.2531*** (0.0083)	0.2520*** (0.0084)	0.2246*** (0.0092)	0.2624*** (0.0083)	0.2463*** (0.0084)	0.2415*** (0.0084)	0.2261*** (0.0092)	0.2587*** (0.0084)
Constant	11.6308*** (0.1426)	11.0818*** (0.1438)	11.4056*** (0.1600)	11.7875*** (0.1423)	11.2786*** (0.1425)	11.0787*** (0.1438)	11.3390*** (0.1601)	11.8022*** (0.1421)	11.0088*** (0.1440)	10.7948*** (0.1441)	11.2946*** (0.1612)	11.5661*** (0.1433)
Observations	1481509	1489496	1258187	1489496	1481509	1489496	1258187	1489496	1481509	1489496	1258187	1489496
R-squared	0.1958	0.1790	0.1829	0.1970	0.1983	0.1790	0.1831	0.1995	0.1985	0.1797	0.1834	0.1998
Number of products	18771	19237	19235	19237	18771	19237	19235	19237	18771	19237	19235	19237
R2 within	0.196	0.179	0.183	0.197	0.198	0.179	0.183	0.200	0.199	0.180	0.183	0.200
R2 between	0.00238	0.0234	0.00585	0.00803	0.00168	0.0234	0.00592	0.00759	0.00138	0.0225	0.00569	0.00707
R2 overall	0.111	0.106	0.103	0.119	0.112	0.106	0.104	0.122	0.112	0.106	0.104	0.122

Robust standard errors in parentheses *** p<0.001, ** p<0.01, * p<0.05. Year dummies coefficients omitted from table

Table 5 Results Gravity model at product level-tariff regime. Fixed effects least square dummy variables. Intensive margin

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	margin 1 (MFN)	margin 2 (weighted average tariff)	margin 3 (largest exporter tariff)	margin 4 (average tariff)	margin 1 (MFN)	margin 2 (weighted average tariff)	margin 3 (largest exporter tariff)	margin 4 (average tariff)	margin 1 (MFN)	margin 2 (weighted average tariff)	margin 3 (largest exporter tariff)	margin 4 (average tariff)
tariff	-0.0160*** (0.00049)	-0.0700*** (0.00040)	-0.0423*** (0.00052)	-0.0172*** (0.00048)	-0.0146*** (0.00050)	-0.07*** (0.00040)	-0.0421*** (0.00052)	-0.0163*** (0.00048)	-0.0131*** (0.0005)	-0.0679*** (0.00041)	-0.0415*** (0.00053)	-0.0151*** (0.00048)
margin	1.0351*** (0.00552)	0.0003*** (0.00002)	0.2492*** (0.00428)	0.6363*** (0.00321)	1.1521*** (0.006290)	0.0003*** (0.00002)	0.2399*** (0.00453)	0.7115*** (0.003588)	1.1559*** (0.00645)	0.0003*** (0.00002)	0.2374*** (0.00458)	0.7150*** (0.00367)
margin_gspeba					-0.3424*** (0.008870)	0.0016*** (0.00024)	0.0603*** (0.00969)	-0.3909*** (0.008397)				
margin_gsp									-0.4418*** (0.00993)	0.0014*** (0.00025)	0.019014* (0.0101)	-0.4919*** (0.00937)
margin_eba									-0.0768*** (0.02556)	0.4646*** (0.02541)	0.2797*** (0.02842)	-0.0915*** (0.02537)
margin_cot									0.0811*** (0.0176)	0.2608*** (0.01113)	0.1123*** (0.0212)	0.0165 (0.01744)
margin_gspp									0.4997*** (0.02100)	0.0047*** (0.00152)	0.1392*** (0.024440)	0.4677*** (0.02070)

Robust standard errors in parentheses *** p<0.001, ** p<0.01, * p<0.05. Year dummies coefficients omitted from table

In order to fully control for trade costs we estimate the alternative specification in (5b) using the fixed-effects least square dummy variables (FELSDV) estimator based on the methodology proposed by Andrews et al. (2006), which allows for the estimation of models with three way error terms. Concretely we control for time effects, country*time effects and product effects.¹²

The results confirm the findings in Table 4, a negative effect of applied tariffs on export flows ranging from -0.017 to -0.07. Preference margins increase export flows, and again the size of the coefficient depends on the definition of preference margin, and ranges from 0.0003 to 1.15. As in Table 4, the impact of trade preferences is substantially reduced when we consider the preference advantage using the tariffs of the main competitors in the market.

The relative effectiveness of each preferential regime depends also on the preferential margin definition used. For margin 1 and 4, GSP/EBA preferences are less effective, while for margins 2 and 3 GSP preferences are more effective, although only marginally.

Overall, the results show a positive impact, although small, of preference margins on the intensive margin of trade, and the size of this effect is diminished further as we modify the preference margin to take into account the tariff paid by the main competitors for each product. The effectiveness of the GSP/EBA regime vis-a-vis other regimes, however, depends on how we measure the preference margin. When the GSP regime is separated from the EBA regime and the GSP+, this regime is less effective in two cases and almost as effective as the baseline FTA regime. On the other hand, the GSP+ regime appears to be more effective than the baseline FTA regime.

4.2 The impact on the intensive and extensive margin of trade

The previous section focused on the impact of preference margins on the intensive margin of trade. However, preference margins may also affect the capacity of countries to export new products, the extensive margin. This implies the need for including in the estimations those unobserved export flows and to re-estimate the model using the extended sample that includes zero flows.

As discussed earlier, product lines that are not likely to be defined for the entire period of our sample are removed to avoid artificially filling with zeroes a product that was not defined in the tariff book for a given year, and that otherwise would be considered as not exported rather than not defined. The resultant dataset has around ten million observations and more than 9,000 product lines.

Table 6 shows the estimates of equation (5a) for the different margins using product fixed effects in (1) to (4) and year, product and country year fixed effects in specifications (5) to (8) (equation 5(b)). In order to estimate the model in log form we manipulate the dependent variable and add one euro to all zero flows. The results are statistically different from zero at 1% confidence level, and the overall R^2 has increased to around 0.19. All the coefficients have the expected sign, with the exception of distance, which its negative effect is likely to be captured by the MRI. As expected, larger tariffs reduce the

¹² Due to the computational difficulties and the large number of parameters to estimate we use the STATA command FELSDV developed by Cornelissen (2008).

level of exports.

Interestingly, once we include the extensive margin in the estimations, the coefficients for the preferential margins on exports change to mainly negative, with the exception of the weighted average tariff, which is reduced even further to almost zero. Looking across preference margin specifications also show mirrored results, with margin 1 becoming the lower bound and margin 2 the upper bound. The average preferential margin effect is between -0.54 (specification (1) to (4)) and -0.45 (specification (5) to (8)).

In the earlier regressions the results showed that preferences have a small positive impact on trade in existing products. The expanded dataset captures both the intensive margin (changes in trade in existing products) and the extensive margin (changes in trade in new products). For the regressions in Table 6 we therefore have a very large number of zero trade flows – at the 10-digit level there are a lot of products which many LDCs simply do not export, and the extensive margin effect dominates the intensive margin effect. The results indicate that it is the countries that do not have preferential access or have a lower preferential margin that are more likely to increase trade in new products. In other words, that those being offered unilateral preferential access do not see increases in trade at the extensive margin.

Table 6 Fixed effects estimates –Intensive and Extensive margin – dependent variable $\log(\text{value}+1\text{€})$

	(1) margin 1 (MFN)	(2) margin 2 (weighted average tariff)	(3) margin 3 (largest exporter tariff)	(4) margin 4 (average tariff)	(5) margin 1 (MFN)	(6) margin 2 (weighted average tariff)	(7) margin 3 (largest exporter tariff)	(8) margin 4 (average tariff)
tariff	-0.0334*** (0.0002)	0.0078*** (0.0002)	-0.0050*** (0.0002)	-0.0188*** (0.0002)	-0.0254*** -0.0002	0.0044*** -0.0002	-0.0053*** -0.0002	-0.0157*** -0.0002
Margin	-1.3244*** (0.0036)	0.0001*** (0.0000)	-0.4232*** (0.0024)	-0.4164*** (0.0010)	-1.0489*** -0.0031	0.0001*** 0.0000	-0.3000*** -0.0021	-0.4226*** -0.001
lgdp	0.6999*** (0.0011)	0.7858*** (0.0011)	0.7482*** (0.0011)	0.6511*** (0.0011)				
lpop	0.0797*** (0.0011)	0.0316*** (0.0011)	0.0255*** (0.0011)	0.0948*** (0.0011)				
lmri	-7.5804*** (0.0607)	-8.0767*** (0.0619)	-7.5988*** (0.0637)	-7.1664*** (0.0586)				
ldist	0.3000*** (0.0030)	0.3852*** (0.0031)	0.3616*** (0.0031)	0.2315*** (0.0029)				
Comlang	0.1336*** (0.0036)	0.1281*** (0.0036)	0.1419*** (0.0037)	0.1268*** (0.0035)				
colony	0.1950*** (0.0041)	0.1259*** (0.0041)	0.1004*** (0.0042)	0.2236*** (0.0040)				
contig	3.1072*** (0.0065)	3.1685*** (0.0066)	3.0821*** (0.0067)	3.0125*** (0.0063)				
Constant	0.4262*** (0.1111)	-0.1137 (0.1133)	-0.6574*** (0.1168)	-0.3731*** (0.1072)				
Observations	9811870	9728982	9033227	1.01e+07	12800000	12600000	11700000	13300000
R-squared	0.2160	0.2083	0.2029	0.2106	0.321	0.32	0.314	0.315

Standard errors in parentheses. Year dummy coefficients excluded.*** p<0.001, ** p<0.01, * p<0.05

One problem of the dataset with zero flows is the difficulty to estimate the effectiveness of each preferential regime. As suggested above, we cannot predict preference utilization for zero flows. This means that we need to impose a tariff regime for these zero flows. As an approximation, we associate the margin with the preferential regime that offers a lower tariff, and the GSP regime when preferential tariffs are the same. This implies an overestimation of the number of margins associated to the GSP regime for zero flows, and therefore the need for interpreting the decomposition with caution. The

results are in Table A2.1 in Appendix 2, which shows no significant difference in effectiveness among regimes when the first two margins are used, and lower effectiveness of the GSP/EBA/GSP+ regime vis-a-vis other FTA/Cotonou/EPA when using margins 3 and 4.

While the previous estimates controlled for the heterogeneity of trade costs among countries and products, the results largely depend on the manipulation of zero flows to estimate the specification in log form. Moreover, we need to control for the likely presence of heteroscedasticity in trade data. As proposed by Santos Silva and Tenreyro (2011) we test for heteroscedasticity of a first stage Probit on the probability to export with a RESET test. The results suggest that we cannot accept the null of hypothesis of homoscedasticity, violating the errors assumptions of the Heckman selection model.¹³

In order to include the zero flows in the estimations and address the heteroscedasticity problem, we implement the PPML estimator proposed by Santos Silva and Tenreyro (2006). Table 7 shows the results of the PPML estimates with product fixed effects. In terms of sign the results of the main variables are similar to the FE estimates in Table 6, although the coefficients on distance and the MRI swap signs. Tariffs reduce exports at the intensive and the extensive, but the effect is very small. The size of the coefficients on the margin change significantly, but this is due to the fact that previous estimates use a logarithm form, while here we estimate the impact on the level of flows. The impact of margin 1, 3 and 4 continues negative. On the other hand, the impact of margin 2, using the weighted average tariff, is still positive. In addition, the GSP/GSP+/EBA regime is consistently less effective vis-a-vis other regimes in increasing exports.

Table 7 Poisson Model– Zero flows sample – dependent variable (value of exports)

	(1) margin 1 (MFN)	(2) margin 2 (weighted average tariff)	(3) margin 3 (largest exporter tariff)	(4) margin 4 (average tariff)	(5) margin 1 (MFN)	(6) margin 2 (weighted average tariff)	(7) margin 3 (largest exporter tariff)	(8) margin 4 (average tariff)
tariff	-0.0283*** (0.0000)	-0.0020*** (0.0000)	-0.0250*** (0.0000)	-0.0242*** (0.0000)	-0.0284*** (0.0000)	-0.0014*** (0.0000)	-0.0246*** (0.0000)	-0.0256*** (0.0000)
margin	-0.1569*** (0.0001)	0.1865*** (0.0000)	-0.5080*** (0.0001)	-0.0215*** (0.0000)	-0.1569*** (0.0001)	0.2553*** (0.0000)	-0.4221*** (0.0001)	0.0488*** (0.0000)
margin_gspeba					0.0000*** (0.0000)	-0.1318*** (0.0000)	-0.1851*** (0.0001)	-0.2089*** (0.0000)
lgdp	0.8023*** (0.0000)	0.8133*** (0.0000)	0.8129*** (0.0000)	0.8034*** (0.0000)	0.8023*** (0.0000)	0.8115*** (0.0000)	0.8108*** (0.0000)	0.8052*** (0.0000)
lpop	0.0850*** (0.0000)	0.0816*** (0.0000)	0.0810*** (0.0000)	0.0855*** (0.0000)	0.0850*** (0.0000)	0.0799*** (0.0000)	0.0820*** (0.0000)	0.0653*** (0.0000)
lmri	11.3935*** (0.0007)	11.0413*** (0.0007)	11.6771*** (0.0007)	11.3419*** (0.0007)	11.3933*** (0.0007)	10.8174*** (0.0007)	11.6345*** (0.0007)	10.4422*** (0.0007)
ldist	-0.8411*** (0.0000)	-0.8148*** (0.0000)	-0.8555*** (0.0000)	-0.8402*** (0.0000)	-0.8412*** (0.0000)	-0.8057*** (0.0000)	-0.8521*** (0.0000)	-0.8177*** (0.0000)
comlang_off	-0.3618*** (0.0000)	-0.3687*** (0.0000)	-0.3602*** (0.0000)	-0.3599*** (0.0000)	-0.3618*** (0.0000)	-0.3676*** (0.0000)	-0.3606*** (0.0000)	-0.3516*** (0.0000)
colony	-0.2794*** (0.0000)	-0.2834*** (0.0000)	-0.2980*** (0.0000)	-0.2806*** (0.0000)	-0.2794*** (0.0000)	-0.2784*** (0.0000)	-0.2958*** (0.0000)	-0.2591*** (0.0000)
contig	-0.0490*** (0.0001)	-0.0336*** (0.0001)	-0.0725*** (0.0001)	-0.0467*** (0.0001)	-0.0490*** (0.0001)	-0.0362*** (0.0001)	-0.0783*** (0.0001)	-0.0282*** (0.0001)
Observations	9811870	9728982	9033227	1.01e+07	9811870	9728982	9033227	1.01e+07
Products	8975	9069	9069	9069	8975	9069	9069	9069

Standard errors in parentheses. Year dummy coefficients excluded.*** p<0.001, ** p<0.01, * p<0.05

¹³ Also, an additional problem of the Heckman model is that we cannot control for heterogeneity at the product level in the first stage Probit, since we cannot estimate a fixed effects model.

The results are very interesting. For the preferred PPML estimations, the average effect of preference margins on the value of exports is -0.12. This means that including the extensive margin when considering the effectiveness of preferential regimes yields a different outcome. The coefficients suggest that preferential advantage may lock countries in existing activities and have a negative impact on the potential for export diversification. Furthermore, GSP preferences seem to exacerbate this negative effect. The only exception to this result, however, appears to be the case where we calculate the preference margin in relation to the weighted average tariff.

These findings complement the findings by Aiello and Demaria (2010) and Cipollina and Salvatici (2010) who find a positive impact of preferences in the EU on agricultural products, and the short-run impact of the GSP found in Herz and Wagner (2011). Our results suggest that while preferences may mildly increased trade at the intensive margin, the effect on overall trade and when using alternative measures of the preference advantage may be one of *de facto* constraining export potential.

5. Robustness Checks

5.1 Within observation variance

As suggested above, the main advantage of the dataset used is the fact that flows are disaggregated by the tariff regime paid. This allows us to identify the actual tariffs paid when trading with the EU. One issue is the fact that in a significant number of cases we observe more than one flow corresponding to different tariff regimes.¹⁴ This can be the result of changes in tariffs, preference non-utilisation or preference suspension. In these cases, it is possible that due to the limited supply capacity of exporters, the value exported in each observation for the same country, product and year is consistently smaller than in years when only one flow is recorded.¹⁵ If this is the case, observations within the same year, product and country, should not be treated as independent.

In order to identify whether the presence of more than one flow per observation may be biasing our estimates, we first test for the size of these multiple flows by adding a count index to the regressions. This index accounts for the number of flows for the same country, product and year to see whether they are consistently smaller. Table 8 re-estimates the FELSDV model on the intensive margin controlling for product and partner-year fixed effects as in Table 5 but adding the index for the number of flows for each country/product/year. Surprisingly, the coefficient is positive and statistically significant at 99% confidence level. Therefore, there is no indication that flows in units with more than one observation are consistently lower than units with one flow. The coefficients of interest on tariffs and margins are almost identically to columns (1) – (4) in table 5.

¹⁴ 67% of country, product year observations with positive exports has only one flow. This percentage increases substantially to 97% when we include the extensive margin, since all added observations include one zero flow only.

¹⁵ A country may be exporting X value of a given product in a year using the GSP system. If on the coming year there is a significant amount of preference non-utilisation we would expect to have two flows, one for GSP and another MFN, both likely to be smaller in value than X, since exporters are now split in two regimes.

Table 8 FELSDV estimates for intensive margin with index for the number of flows.

	(1) margin 1 (MFN)	(2) margin 2 (weighted average tariff)	(3) margin 3 (largest exporter tariff)	(4) margin 4 (average tariff)
tariff	-0.0183*** (0.0005)	-0.0711*** (0.0004)	-0.0430*** (0.0005)	-0.0181*** (0.0005)
margin	1.0111*** (0.0055)	0.0003*** (0.0000)	0.2339*** (0.0042)	0.6391*** (0.0032)
Index	0.5898*** (0.0042)	0.6134*** (0.0043)	0.6617*** (0.00480)	0.6183*** (0.0042)

Robust standard errors in parentheses *** p<0.001, ** p<0.01, * p<0.05. Year dummies coefficients omitted from table

In order to check further any potential effect of these multiple flows per unit in the variance of the estimates we re-estimate the FE model in Table 6 using weights that are inversely proportional to the number of observations by product partner year. Appendix 3 shows the results, which confirm the main findings in Table 6.

A final check for the robustness of the results is to re-estimate the model using only one observation by product country year. In order to balance the panel, for units (product/country/year) with multiple flows, we aggregate values and use the weighted average tariff. One problem when balancing the panel is, however, that now the same flow can be associated with more than one preferential and non-preferential regime. In order to be able to decompose the margin impact across trade regimes, each unit is associated with the regime with larger export share.

The results of the estimates are shown in the tables in Appendix 4. Table 9 below summarise the results in relation to the main coefficient of interest, the impact of the preferential margin and our preferred specifications. For the intensive margin, using the aggregated sample implies a significant reduction in the effect of margin 1 and margin 3. Now, trade preferences increase trade in the intensive margin, however, this effect is only significantly large when using the average tariff as reference for the margin. The results still suggests a lower impact of preferences when we consider the main competitors in the market.

In general it is difficult to establish which sample is more appropriate. On the one hand, the reduction in most coefficients when using the aggregated sample may be an indication that including all flows without controlling for the number of flows within the unit may overestimate the impact of preference margins on export flows. On the other hand the aggregated dataset may also underestimate the true impact of preference margins when averaging across flows and regime, and more importantly, there is no indication that multiple flows within units are smaller than single flows. For this reason, while estimations on the normal dataset are preferred, we compare the results with the aggregated dataset for robustness.

The results with the aggregated average sample still predict a positive impact of the preference margin in the intensive margin of trade, although this effect is very small for

all margins except margin 4. Regarding the results when including the extensive margin, the PPML estimator suggests significant changes in the size and sign of the coefficients on the preference margin when including the aggregated dataset. The effect of the preference margin using MFN tariffs as reference is still negative but halved. Now, however, we have a positive effect of margins on both the intensive and extensive margin for the remaining specifications, although very small for margins 3 and 4. These results suggest an almost negligible effect of preferential margins on exports when the extensive margin is considered. This effect is only relatively significant for the margin that uses the weighted average tariff, although this coefficient may have some endogeneity problems and it still very small.

Table 9 Results comparison preference margin impact- full sample vs aggregated sample

	Sample	Dependent variable	margin 1 (MFN)	margin 2 (weighted average tariff)	margin 3 (largest exporter tariff)	margin 4 (average tariff)
Intensive margin						
FELSDV	Full	Log(value)	1.0351***	0.0003***	0.2492***	0.6363***
	Aggregated	Log(value)	0.0056***	0.0012***	0.0000***	0.6074***
Intensive and extensive margin						
FELSDV	Full	Log(value+0.0001)	-1.0489***	0.0001***	-0.3000***	-0.4226***
	Aggregated	Log(value+0.0001)	-0.0788***	0.00004***	-0.000005***	-0.2909***
PPML	Full	Value	-0.1569***	0.1865***	-0.5080***	-0.0215***
	Aggregated	Value	-0.0646***	0.2294***	0.0001***	0.0091***

*** p<0.001, ** p<0.01, * p<0.05.

6. Conclusions

Unilateral preferences have been one of the most important instruments offered by developed to developing countries in the last four decades to foster exports. This paper has provided an evaluation of the impact of trade preferences in the EU, based on a unique dataset that links each flow with the tariff paid and preferential regime of entry. This element is critical to rightly attributing causality between the trade policy regime and the level of export flows.

There are several important findings in this paper. The most important finding is the fact that the results critically depend on (i) how the advantage provided by the preferences measure is measured, and (ii) whether the extensive margin of trade is included.

The way how the preference margin is calculated is critical in determining the size of the preference margin effect. For the intensive margin of trade, we find consistently that preference margins that consider the relevant competitor for each product tend to find lower effect of preferences on trade. Considering the most important competitors, preferences provide comparatively little advantage. On the other hand, when considering the extensive margin of trade, we find that only when the preference margin is calculated in relation to the weighted average tariff, that the preference margins play a role in increasing trade. In most cases, however, the impact of preferential margins on exports

is negligible or even reducing the scope for countries to export through the extensive margin. Preferences appear to do very little for trade diversification and in some cases it may even reduce exports.

The results also decomposed the effects of the preferential margins by preferential regime. Although the relative effect of the preferential regime also depends on the preference margin measure, for most specifications the GSP scheme appears less effective expanding trade at the intensive margin than other preferential regimes.

Overall the results suggest a small positive impact of trade preferences on trade at the intensive margin, and a negligible or possibly even negative impact at the extensive margin, i.e. when we consider the scope for trade diversification.

More work is required in order to understand the diverse impact of different preferential regimes. It is possible that this is due to the different product coverage of each regime, and the possibility that especially FTAs offer preferences in key export products where margins play a more important role. Other potential explanations are the role of RoOs, other non-tariff barriers.

In terms of policy implications, the results indicate that unilateral preferences have played a small role in increasing exports to the EU. Nevertheless, this role has been very limited and null when considering the large scope for export diversification in developing countries. Furthermore, pressure from preference erosion is largely to increase in the future due to the increasing number of FTAs likely to be signed by the EU and future MFN tariff reductions. This implies little scope for increasing the impact of the GSP system.

References

- Aiello, Francesco and Federica Demaria (2010) "Do Trade Preferential Agreements Enhance the Exports Of Developing Countries? Evidence from the EU GSP" Working Papers 201002, Università della Calabria, Dipartimento di Economia e Statistica.
- Agostino, M et.al (2007,) "Analysing the impact of trade preferences in gravity models – does aggregation matter?" *TradeAG working paper, 07/4*.
- Anderson, James E., and van Wincoop, Eric (2003) "Gravity with Gravitas: A Solution to the Border Puzzle." *American Economic Review* 93, no. 1 (March 2003): 170-192.
- Andrews, M.; Schank, T. and Upward, R. (2006) 'Practical fixed-effects estimation methods for the three-way error-components model', *Stata Journal* 6: 461-481
- Baier, Scott L. and Jeffrey H., Bergstrand (2009) "Bonus vetus OLS: A simple method for approximating international trade-cost effects using the gravity equation," *Journal of International Economics*, vol. 77(1), pages 77-85, February.
- Bergstrand, Jeffrey H, (1985) "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence," *The Review of Economics and Statistics*, vol. 67(3), pages 474-81, August.
- Besedes, Tibor and Thomas Prusa (2006) "Ins, outs, and the duration of trade," *Canadian Journal of Economics*, vol. 39(1), pages 266-295
- Brenton, P and Hoppe, M (2006), "The African Growth and Opportunity Act, Exports and Development in Sub-Saharan Africa", *World Bank Policy Research Working Paper no.3996, August*.
- Burger, Martijn; Frank van Oort and Gert-Jan Linders (2009) "On the Specification of the Gravity Model of Trade: Zeros, Excess Zeros and Zero-inflated Estimation," *Spatial Economic Analysis* vol. 4(2), pages 167-190.
- CARIS (2010) "Mid-term Evaluation of the EU's Generalised System of Preferences" Centre for the Analysis of regional integration at the University of Sussex. Report prepared for European Commission.
- Carrere, Celine; Jaime de Melo and John Wilson (2009) "The Distance Effect and the Regionalization of the Trade of Low-Income Countries" *CERDI Working Papers* 200908.
- Cipollina, Maria and Luca Salvatici (2010) "The trade impact of European Union agricultural preferences," *Journal of Economic Policy Reform*, vol. 13(1), pages 87-106.
- Collier P. and Venables, A.J. (2007), "Rethinking Trade Preferences: How Africa can diversify its exports", *The World Economy*, Vo.30, no.8, pp. 1326-1345.
- Cornelissen, T. (2008) 'The Stata command felsdsvreg to fit a linear model with two high-dimensional fixed effects', *Stata Journal* 8: 170-189.
- Di Rubbo, P and Canali, G (2008), "A comparative study of EU and US trade policies for developing countries: the case of agri-food products, 12th Congress of the European Association of Agricultural Economists.

- Frazer, G, and Van Biesebroeck, J (2010), "Trade growth under the African Growth and Opportunity Act", *Review of Economics and Statistics*, Vol.92, No.1 pp.128-144
- Gasiorek, M. et.al. (2010) "Mid-term Evaluation of the EU's Generalized System of Preferences", report for DG-Trade, European Commission, http://trade.ec.europa.eu/doclib/docs/2010/may/tradoc_146196.pdf
- Gasiorek, M & Lopez, J (2011), "A preliminary investigation into the effects of the changes in the EU's GSP", http://www.tradesift.com/Reports/GSP_Report_June2011.pdf
- Hadi, A. S. (1992), 'A New Measure of Overall Potential Influence in Linear Regression', *Computational Statistics and Data Analysis* 14: 1- 27
- Helpman, E., M. Melitz and Y. Rubinstein (2008) "Estimating Trade Flows: Trading Partners and Trading Volumes", *Quarterly Journal of Economics*, 123(2), 441-487
- Herz, Bernhard and Wagner, Marco (2011) "The Dark Side of the Generalized System of Preferences" *Review of International Economics*, Vol. 19, Issue 4, pp. 763-775.
- Linders, Gert-Jan M. and Henri L.F. de Groot (2006) "Estimation of the Gravity Equation in the Presence of Zero Flows," *Tinbergen Institute Discussion Papers* 06-072/3, Tinbergen Institute.
- Low, Patrick, Piermartini, Roberta and Richter, Jürgen (2005) Multilateral Solutions to the Erosion of Non-Reciprocal Preferences in NAMA. *WTO Staff Working Paper* No. ERSD-2005-05.
- Martin, Will and Cong S. Pham (2008) "Estimating the Gravity Model When Zero Trade Flows are Frequent," *Economics Series* 2008_03, Deakin University, Faculty of Business and Law, School of Accounting, Economics and Finance.
- Nilsson, L, (2007), "Comparative effects of EU and US trade policies on developing country exports", European Commission, DG-Trade.
- Nilsson, L, and Matsson, N, (2009), "Truths and myths about the openness of EU trade policies and the use of EU preferences", European Commission, DG-Trade.
- Ozden, C, and Reinhardt, E (2004), "First do no harm: The effect of unilateral trade preferences on developing country exports", CEPR working paper.
- Santos Silva, J. M. C. and Silvana Tenreyro (2006) "The Log of Gravity," *The Review of Economics and Statistics*, vol. 88(4), pages 641-658, 09.
- Santos Silva, J.M.C. and Silvana Tenreyro (2011) "Further simulation evidence on the performance of the Poisson pseudo-maximum likelihood estimator," *Economics Letters*, vol. 112(2), pages 220-222
- Seyoum, B, (2007), "Export performance of developing countries under the Africa Growth and Opportunity Act", *Journal of Economic Studies*, Vol.34, No.6, pp.515-533.

Appendix 1 Regime utilisation by country

Country	Classification	MFN									GSP=0	GSP>0	OTHER PREFEREN CES=0	OTHER PREFEREN CES>0	UNKNOWN
		Eligible for MFN=0	Eligible for MFN>0	No utilisation of preferences or GSP						TOTAL MFN					
				Eligible for GSP=0	Eligible for GSP>0	Eligible for other preferences=0	Eligible for other preferences>0	Eligible for GSP and other preferences=0	Eligible for GSP and other preferences>0						
Afghanistan	EBA	92.45	0.08	-	4.92	-	-	-	0.00	97.46	2.49	-	-	-	0.05
Albania	OTHER	37.92	0.00	-	-	-	9.93	-	-	47.85	-	-	50.80	0.03	1.32
Algeria	GSP	85.39	0.06	-	0.00	-	6.70	-	0.11	92.26	0.02	0.01	6.82	0.00	0.89
American Samoa	GSP	99.28	-	-	0.59	-	-	-	0.12	99.99	0.01	-	-	-	-
Andorra	OTHER	39.42	0.13	-	-	-	38.27	-	-	77.82	-	-	21.51	-	0.67
Angola	EBA	98.15	0.00	-	0.45	-	-	-	0.50	99.10	0.76	-	-	-	0.14
Anguilla	GSP	30.47	-	-	-	-	-	-	64.75	95.22	-	-	-	-	4.78
Antarctica	GSP	70.65	-	-	-	-	20.99	-	8.36	100.00	-	-	-	-	-
Antigua and Barbuda	GSP	61.93	-	-	-	-	0.74	-	32.32	94.99	0.29	1.88	2.84	-	0.00
Argentina	GSP	59.49	14.73	0.00	2.15	-	0.74	-	0.08	77.19	7.13	12.49	-	-	3.20
Armenia	GSP	43.12	0.06	0.08	2.07	-	0.01	-	-	45.34	53.74	0.92	-	-	0.00
Aruba	GSP	56.58	-	-	-	-	0.45	-	8.68	65.71	2.84	-	31.10	-	0.36
Australia	OTHER	77.79	18.00	-	-	-	3.76	-	-	99.55	-	-	-	-	0.45
Azerbaijan	GSP	97.47	0.07	-	0.09	-	0.00	-	2.14	99.77	0.18	0.04	-	-	0.01
Bahamas	GSP	87.85	-	-	-	-	0.02	-	1.21	89.08	0.87	0.03	10.01	-	0.01
Bahrain	GSP	8.40	26.87	0.01	14.89	-	0.00	-	1.33	51.51	31.93	16.48	-	-	0.08
Bangladesh	EBA	0.95	-	0.05	19.02	-	-	-	0.00	20.03	77.42	0.03	-	-	2.53
Barbados	GSP	36.21	-	-	-	-	0.32	-	10.86	47.38	-	0.01	52.61	-	0.00
Belarus	GSP	86.40	7.59	-	-	-	5.66	-	-	99.65	-	-	-	-	0.35
Belize	GSP	18.36	-	-	-	-	0.83	-	0.40	19.59	0.22	0.02	80.11	-	0.06
Benin	EBA	54.81	-	-	1.48	-	-	-	0.07	56.37	2.19	-	-	-	41.44

Bermuda	GSP	77.72	0.22	-	0.47	-	-	-	21.59	100.00	-	-	-	-	0.00
Bhutan	EBA	4.51	-	2.21	56.68	-	-	-	6.31	69.70	30.30	-	-	-	-
Bolivia	GSP+	69.36	2.32	-	1.38	-	-	-	-	73.06	26.75	0.12	-	-	0.07
Bosnia and Herzegovina	OTHER	31.43	0.00	-	-	-	4.67	-	-	36.10	-	-	62.43	0.03	1.44
Botswana	GSP	90.50	-	-	-	-	0.07	-	0.42	90.98	-	0.02	8.99	-	0.00
Bouvet Island	GSP	27.13	-	-	72.87	-	-	-	-	100.00	-	-	-	-	-
Brazil	GSP	70.61	11.16	0.01	3.39	-	0.14	-	0.65	85.95	7.39	5.32	-	-	1.35
Brit. Virgin Is.	OTHER	89.29	-	-	-	-	0.05	-	10.64	99.99	-	-	0.01	-	0.00
British Indian Ocean Terr	OTHER	65.81	-	-	-	-	-	-	5.01	70.82	17.60	4.47	7.11	-	-
Brunei	OTHER	39.90	-	-	56.87	-	-	-	0.46	97.23	0.84	1.91	-	-	0.02
Burkina Faso	EBA	92.34	-	-	0.74	-	-	-	0.00	93.09	5.87	-	-	0.00	1.04
Burundi	EBA	95.59	-	-	-	-	-	-	1.56	97.15	0.34	-	2.34	-	0.17
Cambodia (Kampuchea)	OTHER	0.25	0.00	-	13.88	-	-	-	7.67	21.81	73.86	0.16	-	-	4.17
Cameroon	GSP	82.12	0.01	-	-	-	0.00	-	0.21	82.34	0.01	0.00	17.07	-	0.57
Canada	OTHER	74.01	18.43	-	-	-	6.94	-	-	99.38	-	-	-	-	0.62
Cape Verde	EBA	8.87	-	-	8.74	-	-	-	0.09	17.71	80.91	-	-	-	1.38
Cayman Islands	GSP	92.13	-	-	-	-	0.00	-	7.82	99.95	-	0.04	0.01	-	0.00
Central African Republic	EBA	99.03	-	-	0.45	-	-	-	-	99.48	0.50	-	-	-	0.02
Chad	EBA	91.59	0.03	-	1.53	-	-	-	6.82	99.97	-	-	-	-	0.03
Chile	GSP	70.32	0.02	-	-	0.04	4.33	-	-	74.71	-	-	18.94	6.05	0.31
China	OTHER	46.00	52.26	0.00	0.48	-	0.08	-	0.00	98.83	0.25	0.58	-	-	0.34
Christmas Island	OTHER	57.50	-	-	13.80	-	-	-	-	71.30	-	-	-	-	28.70
Cocos Islands (or Keeling)	OTHER	95.18	-	-	4.82	-	-	-	-	99.99	-	-	-	-	0.01
Colombia	GSP+	64.14	18.19	-	2.06	-	0.00	-	0.00	84.39	12.49	1.36	-	-	1.76
Comoros (excluding Mayott)	OTHER	73.47	-	-	-	-	-	-	1.53	75.00	1.09	-	23.91	-	-
Congo (Republic of)	OTHER	91.28	0.01	-	2.32	-	-	-	2.09	95.70	3.69	0.06	-	-	0.55

Congo Democratic Republic	OTHER	97.48	-	-	0.46	-	-	-	0.00	97.95	1.33	0.00	-	-	0.72
Cook Islands	GSP	83.68	-	-	9.16	-	-	-	-	92.83	1.09	2.16	-	-	3.92
Costa Rica	GSP+	57.82	17.55	-	2.07	-	-	-	0.00	77.44	20.22	0.11	-	-	2.23
Cote d'Ivoire	OTHER	66.53	-	-	-	-	0.04	-	0.58	67.14	0.74	0.03	31.61	-	0.48
Croatia	OTHER	33.60	0.01	-	-	-	6.60	-	-	40.20	-	-	59.28	0.07	0.46
Cuba	GSP	24.44	5.73	-	1.59	-	5.84	-	0.00	37.61	15.75	42.03	-	1.76	2.85
Djibouti	EBA	42.85	-	-	12.51	-	-	-	-	55.36	44.63	-	-	-	0.00
Dominica	GSP	32.42	-	-	-	-	2.51	-	3.83	38.76	0.08	-	61.16	-	-
Dominican Republic	GSP	62.30	-	-	-	0.03	0.41	-	8.31	71.04	0.21	0.06	28.24	-	0.44
East Timor	OTHER	98.89	-	-	0.68	-	-	-	0.11	99.68	-	-	-	-	0.32
Ecuador	GSP+	7.46	33.12	-	0.71	-	0.00	-	0.21	41.51	41.78	15.88	-	-	0.84
Egypt	GSP	53.06	0.04	-	0.03	0.00	0.20	-	9.09	62.42	0.90	0.83	33.42	1.77	0.65
El Salvador	GSP+	47.87	0.03	-	11.33	-	0.61	-	0.01	59.85	38.70	-	-	-	1.46
Equatorial Guinea	EBA	96.29	-	-	0.06	-	-	-	0.02	96.38	2.88	-	-	-	0.75
Eritrea	EBA	40.07	-	-	8.47	-	-	-	-	48.54	42.89	-	-	-	8.57
Ethiopia	EBA	68.30	-	-	1.23	-	-	-	0.06	69.58	25.83	-	-	-	4.59
Falkland Islands	OTHER	12.32	-	-	-	-	0.59	-	0.10	13.01	-	-	86.99	-	-
Faroe Islands	OTHER	9.47	0.48	-	-	0.04	1.61	-	-	11.59	-	-	87.57	0.00	0.84
Fiji	GSP	2.18	-	-	-	-	-	-	0.48	2.66	0.10	0.89	95.55	-	0.81
Former Yugoslav Republic	OTHER	53.49	0.00	-	-	-	2.87	-	-	56.37	-	-	42.89	0.31	0.44
French Polynesia	GSP	28.92	0.04	-	-	-	0.07	-	38.05	67.08	-	-	32.92	-	0.00
French Southern Territories	GSP	54.89	-	-	-	-	-	-	12.80	67.70	-	-	32.30	-	-
Gabon	GSP	89.81	0.02	-	0.47	-	-	-	0.07	90.36	5.50	3.05	-	-	1.09
Gambia	EBA	41.08	-	-	5.52	-	-	-	0.24	46.84	50.40	-	-	-	2.76
Georgia	GSP+	51.03	3.08	-	2.43	-	-	-	12.50	69.04	30.02	-	-	-	0.94
Ghana	GSP	71.53	0.00	-	-	-	0.41	-	0.59	72.53	0.05	0.05	26.77	-	0.60

Gibraltar	GSP	60.67	0.04	-	24.14	-	-	-	8.64	93.49	0.15	-	-	-	6.37
Greenland	GSP	7.17	0.00	-	-	-	0.00	-	2.97	10.14	-	-	89.77	-	0.09
Grenada	GSP	71.22	-	-	-	-	0.00	-	1.54	72.77	-	0.06	27.17	-	-
Guam	GSP	5.44	-	-	93.16	-	-	-	-	98.60	0.59	0.80	-	-	-
Guatemala	GSP+	47.63	3.27	-	2.36	-	0.07	-	4.60	57.93	36.44	5.36	-	-	0.28
Guinea	EBA	99.46	-	-	0.34	-	-	-	0.01	99.81	0.12	-	-	-	0.08
Guinea Bissau	OTHER	86.37	-	-	3.82	-	-	-	-	90.19	7.13	-	-	-	2.68
Guyana	GSP	28.08	-	-	-	0.02	0.78	-	0.14	29.03	-	0.00	70.75	-	0.22
Haiti	EBA	48.85	-	-	-	-	-	-	17.23	66.09	9.17	0.01	20.82	-	3.92
Heard Island and McDonald	GSP	19.67	-	-	80.33	-	-	-	-	100.00	-	-	-	-	-
Honduras	GSP+	64.21	3.65	-	3.74	-	-	-	-	71.61	19.94	7.25	-	-	1.20
Hong Kong	OTHER	52.95	43.91	-	-	-	2.03	-	-	98.89	-	-	-	-	1.11
Iceland	OTHER	9.76	0.07	-	-	-	2.15	-	-	11.98	-	-	82.91	4.71	0.41
India	GSP	32.76	6.33	0.03	8.00	-	0.72	-	0.41	48.25	24.26	26.34	0.34	0.00	0.80
Indonesia	GSP	44.32	6.52	0.01	10.04	-	5.98	-	0.43	67.30	11.25	16.73	-	-	4.72
Iran	OTHER	93.67	0.26	0.00	1.40	-	-	-	0.26	95.58	1.66	2.58	-	-	0.18
Iraq	GSP	99.18	-	-	0.02	-	-	-	0.80	100.00	0.00	0.00	-	-	0.00
Israel	OTHER	47.35	0.96	-	-	0.02	6.36	-	-	54.70	-	-	42.59	1.27	1.45
Jamaica	GSP	2.91	-	-	-	-	1.23	-	0.38	4.52	0.00	0.02	95.45	-	0.00
Japan	OTHER	42.19	54.84	-	-	-	1.77	-	-	98.79	-	-	0.00	-	1.21
Jordan	GSP	53.92	-	-	-	-	0.42	-	13.38	67.72	0.88	0.04	30.33	0.53	0.50
Kazakhstan	GSP	91.03	0.95	0.19	0.46	-	0.00	-	2.50	95.13	3.91	0.95	-	-	0.01
Kenya	GSP	26.54	0.00	-	-	-	0.04	-	1.69	28.27	0.20	0.37	70.18	0.04	0.94
Kiribati	EBA	86.84	-	-	13.16	-	-	-	-	100.00	-	-	-	-	-
Kosovo	OTHER	89.57	-	-	-	-	0.97	-	-	90.53	-	-	9.45	-	0.01
Kuwait	GSP	63.65	0.00	-	1.79	-	-	-	0.30	65.73	31.06	2.46	-	-	0.75
Kyrgyzstan	GSP	45.22	1.08	-	39.34	-	-	-	3.35	88.99	2.56	6.45	-	-	2.00

Laos	OTHER	9.20	-	-	8.16	-	-	-	5.22	22.58	76.26	0.11	-	-	1.04
Lebanon	GSP	47.76	1.61	-	0.00	-	0.07	-	7.27	56.70	0.72	0.03	40.89	0.11	1.54
Lesotho	GSP	98.49	0.24	-	-	-	-	-	0.14	98.87	0.32	-	0.81	-	-
Liberia	EBA	98.84	-	-	1.14	-	-	-	-	99.98	-	-	-	-	0.02
Libya	OTHER	93.07	0.04	-	1.14	-	-	-	3.45	97.71	1.44	0.57	0.15	-	0.12
Liechtenstein	OTHER	25.09	0.43	-	-	-	6.16	-	-	31.68	-	-	68.26	-	0.06
Macao	GSP	13.52	0.07	-	79.64	-	0.02	-	0.03	93.28	0.22	5.32	-	-	1.17
Madagascar	EBA	24.44	-	-	0.00	-	-	-	1.63	26.07	0.87	-	72.94	-	0.13
Malawi	EBA	12.36	-	-	5.17	-	-	-	7.23	24.76	46.92	-	11.38	-	16.94
Malaysia	GSP	63.93	4.60	0.00	9.99	-	1.05	-	0.13	79.69	11.43	6.42	-	-	2.46
Maldives	EBA	0.25	-	-	0.43	-	-	-	1.24	1.91	97.92	-	-	-	0.17
Mali	EBA	89.87	-	-	4.11	-	-	-	0.05	94.03	5.86	-	-	-	0.11
Mauritania	EBA	84.77	-	-	0.74	-	-	-	-	85.51	13.87	-	-	-	0.61
Mauritius	GSP	8.64	0.00	-	-	-	0.26	-	4.29	13.19	0.03	0.25	85.41	0.02	1.11
Mayotte	GSP	23.17	-	-	-	-	51.91	-	7.51	82.59	-	-	17.41	-	0.00
Mexico	GSP	59.19	0.04	-	0.00	-	0.13	0.00	9.82	69.18	0.27	0.23	28.37	0.66	1.30
Micronesia, Federated Sta	OTHER	17.88	-	-	33.28	-	-	-	-	51.16	4.03	44.82	-	-	-
Moldova	OTHER	19.82	0.13	-	1.27	-	5.26	-	0.55	27.03	15.71	0.09	53.60	0.00	3.57
Mongolia	GSP+	81.66	0.79	-	2.46	-	-	-	0.10	85.02	14.96	-	-	-	0.02
Montserrat	GSP	38.48	-	-	-	-	-	-	4.07	42.55	-	-	57.21	-	0.24
Morocco	GSP	12.64	0.10	-	0.12	-	0.31	-	6.58	19.74	0.05	0.92	73.52	5.13	0.64
Mozambique	EBA	5.57	-	-	-	-	-	-	0.28	5.85	1.42	-	87.24	-	5.49
Myanmar	EBA	11.05	88.81	-	-	-	0.03	-	-	99.89	-	-	-	-	0.11
Namibia	GSP	20.10	0.00	-	-	-	1.46	-	2.15	23.70	0.02	0.73	75.46	-	0.09
Nauru	GSP	60.10	-	-	1.99	-	-	-	-	62.08	-	-	-	-	37.92
Nepal	EBA	10.38	0.01	-	6.49	-	-	-	0.96	17.84	75.66	-	0.01	-	6.50
Netherlands Antilles	GSP	59.88	0.00	-	-	-	0.01	-	9.73	69.62	7.21	0.01	23.15	-	0.01

New Caledonia and depende	OTHER	96.41	0.00	-	-	-	0.00	-	1.44	97.85	-	0.01	2.15	-	0.00
New Zealand	OTHER	55.26	43.50	-	-	-	1.06	-	-	99.82	-	-	-	-	0.18
Nicaragua	GSP+	60.89	1.14	-	12.17	-	-	-	-	74.21	7.64	18.10	-	-	0.05
Niger	EBA	12.17	-	-	80.82	-	-	-	0.03	93.03	2.99	-	-	-	3.98
Nigeria	GSP	97.38	0.01	-	0.26	-	-	-	0.09	97.74	1.28	0.59	-	-	0.38
Niue Island	GSP	42.21	-	-	39.51	-	-	-	11.89	93.61	-	-	-	-	6.39
Norfolk Island	GSP	100.00	-	-	-	-	-	-	-	100.00	-	-	-	-	-
North Korea	OTHER	77.10	22.77	-	-	-	0.01	-	-	99.88	-	-	-	-	0.12
Northern Mariana Islands	GSP	0.53	-	-	81.73	-	-	-	17.51	99.77	-	-	-	-	0.23
Norway	OTHER	78.01	0.04	-	-	0.21	4.03	-	-	82.29	-	-	17.30	0.27	0.14
Occupied palestinian Terr	OTHER	26.52	20.32	-	-	-	14.62	-	-	61.46	-	-	32.60	4.18	1.77
Oman	GSP	37.13	0.00	-	18.56	-	0.01	-	0.19	55.90	28.32	15.75	-	-	0.03
Pakistan	GSP	9.25	3.00	0.02	5.35	-	1.70	-	0.07	19.39	10.82	66.93	0.46	-	2.39
Palau	GSP	14.69	-	-	85.31	-	-	-	-	100.00	-	-	-	-	-
Panama	GSP+	64.17	19.50	-	2.56	-	-	-	0.06	86.30	11.04	2.58	-	-	0.09
Papua New Guinea	GSP	35.07	-	-	-	-	0.13	-	0.33	35.52	0.22	0.19	62.50	-	1.57
Paraguay	GSP	90.27	2.79	-	0.52	-	0.11	-	-	93.69	1.60	3.84	-	-	0.87
Peru	GSP+	70.80	2.78	-	0.94	-	-	-	0.00	74.53	23.71	1.39	-	-	0.38
Philippines	GSP	67.72	0.15	0.00	9.29	-	0.90	-	0.64	78.70	9.98	8.53	-	-	2.79
Pitcairn	GSP	21.78	-	-	-	-	-	-	70.92	92.70	-	7.30	-	-	-
Qatar	GSP	87.44	1.00	-	0.51	-	-	-	1.12	90.06	5.65	3.91	-	-	0.37
Rep. of the Marshall Isla	OTHER	99.46	-	-	0.53	-	-	-	-	100.00	0.00	-	-	-	-
Russian Federation	GSP	86.26	2.80	0.03	0.90	-	0.02	-	8.23	98.22	0.93	0.54	0.02	-	0.29
Rwanda	EBA	98.94	-	-	-	-	-	-	0.09	99.04	0.00	-	0.95	-	0.01
Sao Tome and Principe	OTHER	93.01	-	-	1.35	-	-	-	-	94.37	4.51	-	-	-	1.12
Samoa	EBA	22.43	-	-	58.19	-	-	-	-	80.61	19.39	-	-	-	-

San Marino	OTHER	27.91	0.01	-	-	-	67.18	-	-	95.09	-	-	0.99	-	3.92
Saudi Arabia	GSP	82.36	0.02	-	1.43	-	0.00	-	1.05	84.85	7.60	7.02	-	-	0.53
Senegal	EBA	26.84	-	-	1.39	-	-	-	6.93	35.16	58.81	-	-	-	6.03
Serbia	OTHER	37.25	0.00	-	-	0.00	6.77	-	-	44.02	-	-	54.97	0.32	0.70
Seychelles	OTHER	1.21	-	-	-	-	1.87	-	0.62	3.70	0.02	-	96.28	-	-
Sierra Leone	EBA	93.47	-	-	2.65	-	-	-	0.00	96.12	0.27	-	-	-	3.61
Singapore	OTHER	82.99	12.37	-	-	-	2.10	-	-	97.47	-	-	-	-	2.53
Solomon Islands	EBA	1.10	-	-	5.82	-	-	-	-	6.92	67.38	-	-	-	25.70
Somalia	EBA	95.72	-	-	4.27	-	-	-	-	100.00	-	-	-	-	0.00
South Africa	GSP	61.29	1.88	-	0.16	-	1.97	0.00	2.26	67.57	5.92	1.19	20.94	2.99	1.38
South Georgia and South S	OTHER	50.00	-	-	-	-	-	-	50.00	100.00	-	-	-	-	-
South Korea	OTHER	63.13	35.26	-	-	-	0.50	-	-	98.89	-	-	-	-	1.11
Sri Lanka	GSP+	17.42	0.06	0.00	20.23	-	-	-	0.07	37.78	60.06	0.20	-	-	1.95
St Helena and dependencie	OTHER	46.77	-	-	-	-	-	-	34.17	80.94	-	-	18.63	-	0.43
St Kitts and Nevis	GSP	7.55	-	-	-	-	0.00	-	31.74	39.29	0.60	-	60.11	-	-
St Pierre and Miquelon	GSP	0.42	-	-	-	-	-	4.98	6.22	11.61	-	-	85.35	-	3.03
St Vincent and the Grenad	OTHER	95.61	-	-	-	-	0.35	-	0.22	96.18	-	-	3.82	-	0.00
St. Lucia	OTHER	6.54	-	-	-	-	2.83	-	0.50	9.86	-	-	90.14	-	-
Sudan	EBA	84.49	-	-	1.80	-	-	-	0.69	86.98	0.01	-	-	-	13.01
Surinam	OTHER	65.64	-	-	-	0.02	0.66	-	0.36	66.69	0.05	0.03	33.19	-	0.04
Swaziland	GSP	3.78	-	-	-	-	5.21	0.00	3.79	12.78	-	1.05	85.97	-	0.21
Switzerland	OTHER	52.53	0.21	-	-	-	2.18	-	-	54.93	-	-	44.30	0.22	0.55
Syria	OTHER	91.48	0.03	-	0.03	-	0.00	-	4.09	95.64	0.11	0.14	4.04	0.03	0.05
Taiwan	OTHER	57.89	41.11	-	-	-	0.16	-	-	99.16	-	-	-	-	0.84
Tajikistan	GSP	10.56	65.63	-	0.73	-	0.00	-	0.01	76.93	13.45	9.29	-	-	0.33
Tanzania	EBA	37.72	0.00	-	0.00	-	-	-	1.03	38.76	5.10	-	53.95	-	2.20

Thailand	GSP	35.89	18.05	0.02	13.71	-	0.63	-	0.01	68.31	14.12	14.34	-	-	3.24
Togo	EBA	85.87	-	-	0.43	-	-	-	0.09	86.39	11.95	-	-	-	1.66
Tokelau	GSP	73.67	-	-	15.04	-	-	-	0.02	88.73	-	0.98	1.29	-	9.00
Tonga	GSP	11.17	-	-	86.31	-	-	-	-	97.48	0.61	1.90	-	-	-
Trinidad and Tobago	GSP	83.75	-	-	-	-	0.01	-	5.48	89.23	1.97	0.00	8.80	-	0.00
Tunisia	GSP	28.39	0.02	-	0.04	-	0.33	-	3.86	32.64	0.44	0.37	65.55	0.30	0.70
Turkey	OTHER	12.92	0.05	-	-	0.00	62.07	-	-	75.04	-	-	18.32	1.10	5.54
Turkmenistan	GSP	42.89	0.54	-	2.12	-	-	-	46.39	91.95	5.63	2.33	-	-	0.10
Turks and Caicos Islands	GSP	10.66	-	-	-	-	-	-	44.77	55.43	-	27.98	16.58	-	-
Tuvalu	EBA	4.82	-	-	85.48	-	-	-	-	90.31	-	-	-	-	9.69
Uganda	EBA	62.84	-	-	-	-	-	-	1.17	64.00	0.66	-	34.44	-	0.90
Ukraine	GSP	69.48	4.24	0.00	2.81	-	0.30	-	4.96	81.80	9.07	8.43	-	-	0.70
United Arab Emirates	GSP	48.02	5.72	-	11.87	-	0.33	-	0.90	66.85	22.73	6.84	-	-	3.58
United States Minor outly	OTHER	66.88	-	-	29.90	-	-	-	1.95	98.73	-	-	-	-	1.27
United States of America	OTHER	59.84	30.62	-	-	-	8.60	-	-	99.06	-	-	0.00	0.00	0.94
Uruguay	GSP	43.45	39.80	0.06	2.58	-	-	-	0.00	85.89	3.70	10.02	-	-	0.39
Uzbekistan	GSP	41.33	5.88	-	2.27	-	-	-	21.68	71.16	7.48	19.84	-	-	1.52
Vanuatu	EBA	10.29	-	-	2.00	-	-	-	0.17	12.46	80.86	-	-	-	6.68
Vatican City State	OTHER	42.20	57.80	-	-	-	-	-	-	100.00	-	-	-	-	-
Venezuela	GSP+	87.50	0.54	-	1.10	-	-	-	0.01	89.16	10.20	0.61	-	-	0.03
Vietnam	GSP	30.22	0.20	0.00	19.74	-	0.17	-	0.01	50.34	9.70	34.56	-	-	5.40
Virgin IslandsU.S.	OTHER	94.14	0.00	-	1.72	-	-	-	0.00	95.86	4.14	0.00	-	-	0.00
Wallis and Futuna Islands	OTHER	99.31	-	-	-	-	-	-	0.69	100.00	-	-	-	-	-
Yemen	EBA	14.08	0.00	-	5.52	-	-	-	1.13	20.73	74.57	-	-	-	4.70
Zambia	EBA	75.78	-	-	2.05	-	-	-	0.81	78.65	14.14	-	2.29	-	4.92
Zimbabwe	GSP	33.17	0.00	-	-	-	1.64	-	1.95	36.76	1.36	0.16	61.62	-	0.10

Appendix 2. Methodology for calculating zero flows dataset

The main challenges when calculating the zero flows dataset are:

- i) differentiating products that disappear due to changes in classification
- ii) inferring tariffs for trade flows that do not occur

Selecting products that occur all the period

We select only those product lines that are exported most of the period. This implies selecting those exported in 2002 and 2008, those in 2003 and 2008, and those exported in 2002 and 2007. In total we select 9068 (over 19259 products defined in some year) product lines that represent 73.31% of value and 71.50% of flows.

Inference of tariffs for no flows

For all the zero flows, we use the following procedure. We use the complete tariff book and paste tariffs in the following order.

1. First we attach country specific duties, which are the result of FTAs or specific situations
2. We set tariffs to 0, when MFN rates are 0.
3. We use zero tariffs for all EBA countries
4. We use GSP plus tariffs for GSP+ countries
5. With countries with double membership GSP and Cotonou, and in 2008 GSP and EPA, we use the minimum tariff. When both are the same we group the country with the GSP regime.
6. Remaining tariffs are set to MFN rates

We create a dummy variable which indicates whether the tariff applied belongs to the GSP/EBA regime. Since in the case of multiple preferential regimes we do not know what regime would be utilised for zero flows, the results of the coefficient on the margin decomposition needs to be interpreted with caution.

Table A2.1 Fixed effects estimates –Intensive and Extensive margin – dependent variable $\log(\text{value}+1\text{€})$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	margin 1 (MFN)	margin 2 (weighted average tariff)	margin 3 (largest exporter tariff)	margin 4 (average tariff)	margin 1 (MFN)	margin 2 (weighted average tariff)	margin 3 (largest exporter tariff)	margin 4 (average tariff)
tariff	-0.0334*** (0.0002)	0.0078*** (0.0002)	-0.0049*** (0.0002)	-0.0321*** (0.0002)	-0.0254*** -0.0002	0.0044*** -0.0002	-0.0053*** -0.0002	-0.0266*** -0.0002
Margin	-1.3245*** (0.0036)	0.0001*** (0.0000)	-0.2967*** (0.0037)	-0.0354*** (0.0012)	-1.0489*** -0.0031	0.0001*** 0.0000	-0.1982*** -0.0033	0.0148*** -0.0013
margin_gspeba	-0.0000 (0.0000)	-0.0000 (0.0000)	-0.1830*** (0.0040)	-1.3292*** (0.0024)	0.0000 0.0000	-0.0001*** 0.0000	-0.1468*** -0.0036	-1.3929*** -0.0024
lgdp	0.6999*** (0.0011)	0.7858*** (0.0011)	0.7420*** (0.0011)	0.5394*** (0.0011)				
lpop	0.0797*** (0.0011)	0.0316*** (0.0011)	0.0336*** (0.0011)	0.1790*** (0.0011)				
lmri	-7.5803*** (0.0607)	-8.0768*** (0.0619)	-7.6531*** (0.0637)	-9.3133*** (0.0579)				
ldist	0.3000*** (0.0030)	0.3852*** (0.0031)	0.3691*** (0.0031)	0.3355*** (0.0029)				
Comlang	0.1336*** (0.0036)	0.1281*** (0.0036)	0.1333*** (0.0037)	0.2332*** (0.0035)				
colony	0.1950*** (0.0041)	0.1259*** (0.0041)	0.0987*** (0.0042)	0.3313*** (0.0039)				
contig	3.1072*** (0.0065)	3.1686*** (0.0066)	3.0575*** (0.0067)	3.0184*** (0.0062)				
Constant	0.4261*** (0.1111)	-0.1134 (0.1133)	-0.6095*** (0.1168)	3.0831*** (0.1058)				
Observations	9811870	9728982	9033227	1.01e+07	12800000	12600000	11700000	13300000
R-squared	0.2160	0.2083	0.2031	0.2334	0.321	0.32	0.314	0.331

Robust standard errors in parentheses *** p<0.001, ** p<0.01, * p<0.05 Year dummy coefficients omitted

Appendix 3 FE estimations– Intensive and extensive margin

Table A3.1 Fixed effects estimation with weights - Intensive and extensive margin –log (value+1)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	FE -margin1	FE -margin1	FE -margin2	FE -margin2	FE -margin3	FE -margin3	FE -margin4	FE -margin4
tariff	-0.0334*** (0.0075)	-0.0334*** (0.0075)	0.0076*** (0.0017)	0.0076*** (0.0017)	-0.0050 (0.0032)	-0.0050 (0.0033)	-0.0189*** (0.0015)	-0.0321*** (0.0024)
margin	-1.3205*** (0.2438)	-1.3205*** (0.2439)	0.0001*** (0.0000)	0.0001** (0.0000)	-0.4224*** (0.0992)	-0.2933*** (0.0692)	-0.4153*** (0.0112)	-0.0354*** (0.0057)
margin_gspeba		-0.0000 (0.0000)		-0.0000 (0.0000)		-0.1867*** (0.0552)		-1.3269*** (0.0259)
lgdp	0.6968*** (0.0144)	0.6968*** (0.0144)	0.7825*** (0.0069)	0.7825*** (0.0069)	0.7451*** (0.0080)	0.7389*** (0.0093)	0.6481*** (0.0065)	0.5366*** (0.0067)
lpop	0.0802*** (0.0096)	0.0802*** (0.0096)	0.0322*** (0.0042)	0.0322*** (0.0042)	0.0261*** (0.0049)	0.0344*** (0.0067)	0.0952*** (0.0043)	0.1793*** (0.0048)
lmri	-7.6985*** (0.1699)	-7.6985*** (0.1699)	-8.1973*** (0.1607)	-8.1975*** (0.1607)	-7.6954*** (0.1622)	-7.7509*** (0.1610)	-7.2802*** (0.1512)	-9.4190*** (0.1504)
ldist	0.3101*** (0.0166)	0.3101*** (0.0166)	0.3953*** (0.0098)	0.3953*** (0.0098)	0.3693*** (0.0103)	0.3770*** (0.0098)	0.2413*** (0.0096)	0.3448*** (0.0091)
comlang_off	0.1290*** (0.0120)	0.1290*** (0.0120)	0.1235*** (0.0125)	0.1235*** (0.0125)	0.1392*** (0.0123)	0.1305*** (0.0123)	0.1223*** (0.0118)	0.2287*** (0.0114)
colony	0.1911*** (0.0163)	0.1911*** (0.0163)	0.1221*** (0.0123)	0.1221*** (0.0123)	0.0977*** (0.0128)	0.0960*** (0.0127)	0.2198*** (0.0123)	0.3275*** (0.0127)
contig	3.1213*** (0.0308)	3.1214*** (0.0308)	3.1832*** (0.0311)	3.1832*** (0.0311)	3.0944*** (0.0310)	3.0692*** (0.0318)	3.0262*** (0.0297)	3.0314*** (0.0299)
Constant	0.5634 (0.3164)	0.5633 (0.3164)	0.0302 (0.2954)	0.0305 (0.2954)	-0.5396 (0.2983)	-0.4906 (0.3001)	-0.2399 (0.2754)	3.2042*** (0.2732)
Observations	9811870	9811870	9728982	9728982	9033227	9033227	1.01e+07	1.01e+07
R-squared	0.2962	0.2962	0.2884	0.2884	0.2801	0.2803	0.2931	0.3135

Robust standard errors in parentheses *** p<0.001, ** p<0.01, * p<0.05 Year dummy coefficients omitted

Appendix 4 Estimations using a balanced dataset with weighted average tariffs

Table A4.1 Fixed effects least square dummy variables. Intensive margin only –weighted dataset –log(value+1)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	margin 1	margin 2	margin 3	margin 4	margin 1	margin 2	margin 3	margin 4	margin 1	margin 2	margin 3	margin 4
	(MFN)	(weighted average tariff)	(largest exporter tariff)	(average tariff)	(MFN)	(weighted average tariff)	(largest exporter tariff)	(average tariff)	(MFN)	(weighted average tariff)	(largest exporter tariff)	(average tariff)
tariff	-0.0779*** (0.0005)	-0.0770*** (0.0005)	-0.0761*** (0.0005)	-0.0272*** (0.0006)	-0.0695*** (0.0005)	-0.0770*** (0.0005)	-0.0761*** (0.0005)	-0.0272*** (0.0006)	-0.0650*** (0.0006)	-0.0761*** (0.0005)	-0.0761*** (0.0005)	-0.0267*** (0.0006)
margin	0.0056*** (0.0005)	0.0012*** (0.0000)	0.0000*** (0.0000)	0.6074*** (0.0037)	0.0047*** (0.0005)	0.0012*** (0.0000)	0.0000*** (0.0000)	0.6593*** (0.0040)	0.0044*** (0.0005)	0.0012*** (0.0000)	0.0000*** (0.0000)	0.6653*** (0.0041)
margin_gspeba					0.6289*** (0.0097)	0.0005*** (0.0002)	0.0000*** (0.0000)	-0.3030*** (0.0095)				
margin_gsp									0.6413*** (0.0112)	0.0004*** (0.0003)	0.0000*** (0.0000)	-0.3871*** (0.0107)
margin_eba									0.7055*** (0.0307)	0.2834*** (0.0260)	-0.0018*** (0.0008)	-0.0844*** (0.0307)
margin_cot									0.7258*** (0.0194)	0.0771*** (0.0092)	-0.0005*** (0.0002)	-0.1008*** (0.0193)
margin_gspp									0.1634*** (0.0241)	0.0032*** (0.0015)	0.0000*** (0.0001)	0.3441*** (0.0236)

Robust standard errors in parentheses *** p<0.001, ** p<0.01, * p<0.05 product and country-year fixed effects

Table A4.2. Fixed effects estimation - Intensive and extensive margin – Weighted dataset –log (value+1)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	margin 1 (MFN)	margin 1 (MFN)	margin 2 (weighted average tariff)	margin 2 (weighted average tariff)	margin 3 (largest exporter tariff)	margin 3 (largest exporter tariff)	margin 4 (average tariff)	margin 4 (average tariff)
tariff	-0.0438*** (0.0002)	-0.0421*** (0.0002)	-0.0008*** (0.0002)	-0.0008*** (0.0002)	0.0006** (0.0002)	0.0006** (0.0002)	-0.0220*** (0.0002)	-0.0230*** (0.0002)
margin	-1.8089*** (0.0040)	-1.0133*** (0.0050)	0.0001*** (0.0000)	0.0001*** (0.0000)	-0.0000*** (0.0000)	-0.0000*** (0.0000)	-0.3390*** (0.0010)	-0.3181*** (0.0012)
margin_gspeba		-1.2066*** (0.0045)		0.0000 (0.0000)		0.0001*** (0.0000)		-0.0959*** (0.0030)
lgdp	0.5913*** (0.0011)	0.5100*** (0.0011)	0.7470*** (0.0011)	0.7470*** (0.0011)	0.7472*** (0.0011)	0.7472*** (0.0011)	0.6280*** (0.0011)	0.6193*** (0.0011)
lpop	0.0865*** (0.0011)	0.1823*** (0.0011)	0.0015 (0.0011)	0.0015 (0.0011)	-0.0028* (0.0011)	-0.0028** (0.0011)	0.0578*** (0.0010)	0.0665*** (0.0011)
lmri	-7.7024*** (0.0573)	-8.2883*** (0.0572)	-8.8320*** (0.0602)	-8.8320*** (0.0602)	-8.6521*** (0.0608)	-8.6498*** (0.0608)	-7.9191*** (0.0571)	-8.0665*** (0.0573)
ldist	0.2438*** (0.0029)	0.3387*** (0.0029)	0.4163*** (0.0030)	0.4163*** (0.0030)	0.4157*** (0.0030)	0.4156*** (0.0030)	0.2731*** (0.0029)	0.2836*** (0.0029)
comlang_off	0.2335*** (0.0035)	0.1072*** (0.0035)	0.2313*** (0.0036)	0.2312*** (0.0036)	0.2340*** (0.0036)	0.2337*** (0.0036)	0.2278*** (0.0035)	0.2326*** (0.0035)
colony	0.0412*** (0.0039)	0.0317*** (0.0039)	-0.0982*** (0.0040)	-0.0982*** (0.0040)	-0.1079*** (0.0040)	-0.1082*** (0.0040)	0.0005 (0.0039)	0.0089* (0.0039)
contig	2.3660*** (0.0062)	2.0896*** (0.0062)	2.4666*** (0.0064)	2.4666*** (0.0064)	2.4597*** (0.0065)	2.4592*** (0.0065)	2.3612*** (0.0061)	2.3638*** (0.0061)
Constant	1.6840*** (0.1049)	2.1416*** (0.1046)	1.1748*** (0.1104)	1.1748*** (0.1104)	0.8537*** (0.1115)	0.8504*** (0.1115)	0.7737*** (0.1045)	0.9839*** (0.1047)
Observations	9906076	9906076	9632317	9632317	9468395	9468395	1.00e+07	1.00e+07
R-squared	0.1884	0.1942	0.1801	0.1801	0.1792	0.1792	0.1794	0.1795
R2 within	0.188	0.194	0.180	0.180	0.179	0.179	0.179	0.180
R2 between	0.0119	0.0127	0.0347	0.0347	0.0381	0.0379	0.0249	0.0241
R2 overall	0.164	0.169	0.168	0.168	0.167	0.167	0.167	0.167
Number of product	9006	9006	9069	9069	9069	9069	9069	9069

Robust standard errors in parentheses *** p<0.001, ** p<0.01, * p<0.05 product and country-year fixed effects

Table A4.3 Fixed effects least square dummy variables–weighted dataset Intensive and extensive margin – weighted dataset

	(1) margin 1 (MFN)	(2) margin 2 (weighted average tariff)	(3) margin 3 (largest exporter tariff)	(4) margin 4 (average tariff)
tariff	-0.0045*** (0.0001)	-0.0027*** (0.0001)	-0.0020*** (0.0002)	-0.0160*** (0.0001)
margin	-0.0788*** (0.0007)	0.000047*** (0.000004)	-0.000005*** (0.000001)	-0.2909*** (0.0009)

Robust standard errors in parentheses *** p<0.001, ** p<0.01, * p<0.05 Year dummy coefficients omitted

Table A4.4 PPML FE Model– Intensive and extensive margin – weighted dataset-value

	(1) margin 1 (MFN)	(2) margin 1 (MFN)	(3) margin 2 (weighted average tariff)	(4) margin 2 (weighted average tariff)	(5) margin 3 (largest exporter tariff)	(6) margin 3 (largest exporter tariff)	(7) margin 4 (average tariff)	(8) margin 4 (average tariff)
tariff	-0.0414*** (0.0000)	-0.0279*** (0.0000)	-0.0106*** (0.0000)	-0.0100*** (0.0000)	-0.0343*** (0.0000)	-0.0339*** (0.0000)	-0.0371*** (0.0000)	-0.0392*** (0.0000)
margin	-0.0646*** (0.0000)	0.5155*** (0.0001)	0.2294*** (0.0000)	0.3105*** (0.0000)	0.0001*** (0.0000)	0.0001*** (0.0000)	0.0091*** (0.0000)	0.0412*** (0.0000)
margin_gspeba		-1.2557*** (0.0001)		-0.2092*** (0.0000)		0.0011*** (0.0000)		-0.2807*** (0.0000)
lgdp	0.8053*** (0.0000)	0.7616*** (0.0000)	0.8221*** (0.0000)	0.8151*** (0.0000)	0.8089*** (0.0000)	0.8086*** (0.0000)	0.8082*** (0.0000)	0.7977*** (0.0000)
lpop	0.1048*** (0.0000)	0.1406*** (0.0000)	0.0983*** (0.0000)	0.1006*** (0.0000)	0.1026*** (0.0000)	0.1035*** (0.0000)	0.1032*** (0.0000)	0.1038*** (0.0000)
lmri	13.6220*** (0.0007)	13.1990*** (0.0007)	12.9816*** (0.0007)	12.5563*** (0.0007)	13.5884*** (0.0007)	13.6651*** (0.0007)	13.5172*** (0.0007)	12.8823*** (0.0007)
ldist	-0.8565*** (0.0000)	-0.7780*** (0.0000)	-0.8039*** (0.0000)	-0.7778*** (0.0000)	-0.8504*** (0.0000)	-0.8524*** (0.0000)	-0.8498*** (0.0000)	-0.8243*** (0.0000)
comlang_off	-0.2290*** (0.0000)	-0.2565*** (0.0000)	-0.2498*** (0.0000)	-0.2518*** (0.0000)	-0.2278*** (0.0000)	-0.2290*** (0.0000)	-0.2259*** (0.0000)	-0.2224*** (0.0000)
colony	-0.3591*** (0.0000)	-0.3455*** (0.0000)	-0.3574*** (0.0000)	-0.3502*** (0.0000)	-0.3645*** (0.0000)	-0.3652*** (0.0000)	-0.3629*** (0.0000)	-0.3573*** (0.0000)
contig	-0.0399*** (0.0001)	-0.0850*** (0.0001)	-0.0064*** (0.0001)	0.0040*** (0.0001)	-0.0350*** (0.0001)	-0.0397*** (0.0001)	-0.0306*** (0.0001)	-0.0198*** (0.0001)
Observations	9905908	9905908	9632317	9632317	9468395	9468395	1.00e+07	1.00e+07
Number of product	9004	9004	9069	9069	9069	9069	9069	9069

Robust standard errors in parentheses *** p<0.001, ** p<0.01, * p<0.05 Year dummy coefficients omitted