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## Trade impact of EU preferences

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## Trade impact of European Union preferences\*

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**Abstract** This chapter assesses the impact on trade of European Union (EU) trade policies, using a gravity model based on disaggregated trade flows from 169 developing countries (DC) to 25 EU member countries. It uses a sample selection framework to account for potential selection bias in positive trade flows and provides an explicit measure for relative preference margins. The results serve to debunk some of the most widespread criticisms of preferential policies: EU preferences matter, and have a positive impact on developing countries' exports at the intensive margin, and an ambiguous impact at the extensive margin with significant differences across sectors.

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## 1 Introduction

This chapter analyses the impact of European Union (EU) preferences on trade flows, including traditional non-reciprocal agreements and preferential access granted to developing countries (DC) under bilateral reciprocal arrangements. Following Anderson and van Wincoop (2003, 2004), we derive a theoretically grounded gravity equation in which the trade cost factor depends on bilateral distances, tariffs and preferential margins. From a policy perspective, we provide an assessment of the effectiveness of EU preferential trade policies in generating trade from DC.

Our analysis provides a micro-level assessment of the impact of trade preferences on the intensive and extensive margins of trade. We estimate this impact by modelling bilateral EU imports at the 6-digit level Harmonized System (HS), allowing for heterogeneous trade costs and substitution elasticities across industries. Using disaggregated data raises two problems: (i) the impossibility in relation to some variables to obtain information at the level of detail at which tariff lines are specified; (ii) a large percentage of “zero trade flows”, which introduces obvious problems in the log-linear form of the gravity equation. In terms of (i), in order to control for unobservable country and product heterogeneity, we introduce exporter, importer, and product-specific fixed effects. We address the issue of zero flows by adopting the Heckman (1979) sample selection model. This approach allows us to assess the impact of preferences on number of bilateral trade flows (*extensive margin*) and volumes traded (*intensive margin*).

We estimate cross-sectional models for data on imports at the 6-digit level to the EU (25 countries) for year 2004, and run separate regressions for several commodity groups (Table 1) defined according to the World Trade Organization (WTO) Multilateral Trade Negotiations categories, focusing on the network of preferential trade relations between the EU and other countries or regional groupings, in the period under analysis.

We are not interested in the impact on trade of specific preferential schemes, dealt with in other chapters in this book; accordingly, the computed preference margin does not refer to a specific treatment, and we ignore the issue of overlapping preferences. Although we do not know the utilization rates of different schemes, the available information on actual preferential trade flows allows us to provide improved estimates of the impact of trade preferences on EU imports from DC by accounting for the share of preferential flows on total imports.

We are interested in the impact on trade of preferences. We use an explicit measure of the intensity of preference margins at the 6-digit tariff line level. Preference margins are measured in relative terms and our definitions focus on actual preferences with respect to possible competitors, rather than theoretical margins with respect to bound most favoured nation (MFN) tariffs – i.e., the ceiling set by WTO commitments.

**Table 1 Commodity classification.**

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Sectors according to the Harmonized Commodity Description and Coding System

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Section I: Live Animals; Animal Products (Chapters 1-5)

Section II: Vegetable Products (Chapters 6-14)

Section III: Animal or Vegetable Fats and Oils and Their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes (Chapter 15)

Section IV: Prepared Foodstuffs; Beverages, Spirits, and Vinegar; Tobacco and Manufactured Tobacco Substitutes (Chapters 16-24)

Section V: Mineral Products (Chapters 25-27)

Section VI: Products of the Chemical or Allied Industries (Chapters 28-38)

Section VII: Plastics and Articles Thereof; Rubber and Articles Thereof (Chapters 39-40)

Section VIII: Raw Hides and Skins, Leather, Furskins and Articles Thereof; Saddlery and Harness; Travel Goods, Handbags, and Similar Containers; Articles of Animal Gut (Other Than Silkworm Gut) (Chapters 41-43)

Section IX: Wood and Articles of Wood; Wood Charcoal; Cork and Articles of Cork; Manufactures of Straw, of Esparto or of Other Plaiting Materials; Basketware and Wickerwork (Chapters 44-46)

Section X: Pulp of Wood or of other Fibrous Cellulosic Material; Waste and Scrap of Paper or Paperboard; Paper and Paperboard and Articles Thereof (Chapters 47-49)

Section XI: Textiles and Textile Articles (Chapters 50-63)

Section XII: Footwear, Headgear, Umbrellas, Sun Umbrellas, Walking-Sticks, Seat-Sticks, Whips, Riding-Crops and Parts Thereof; Prepared Feathers and Articles Made Therewith; Artificial Flowers; Articles of Human Hair (Chapters 64-67)

Section XIII: Articles of Stone, Plaster, Cement, Asbestos, Mica or Similar Materials; Ceramic Products; Glass and Glassware (Chapters 68-70)

Section XIV: Natural or Cultured Pearls, Precious or Semiprecious Stones, Precious Metals, Metals Clad with Precious Metal, and Articles Thereof; Imitation Jewellery; Coin (Chapter 71)

Section XV: Base Metals and Articles of Base Metal (Chapters 72-83)

Section XVI: Machinery and Mechanical Appliances; Electrical Equipment; Parts Thereof; Sound Recorders and Reproducers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles (Chapters 84-85)

Section XVII: Vehicles, Aircraft, Vessels and Associated Transport Equipment (Chapters 86-89)

Section XVIII: Optical, Photographic, Cinematographic, Measuring, Checking, Precision, Medical or Surgical Instruments and Apparatus; Clocks and Watches; Musical Instruments; Parts and Accessories Thereof (Chapters 90-92)

Section XIX: Arms and Ammunition; Parts and Accessories Thereof (Chapter 93)

Section XX: Miscellaneous Manufactured Articles (Chapters 94-96)

Section XXI: Works of Art, Collectors' Pieces and Antiques (Chapter 97)

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This avoids possible overestimation of the competitive advantages enjoyed by exporting countries, although the impact of prohibitive tariffs is underestimated since we consider only actual not potential exporters (Cipollina and Salvatici 2010). Our findings point to a significant, but heterogeneous impact of EU trade policy on DC exports. The preferential regimes have a positive impact on both the extensive and intensive margins, although the increased probability of trade is

modest, and increases in the intensity of trade vary widely across sectors. The impact on the probability of trade (i.e., the extensive margin) is positive in only one sector, which confirms that preferential policies lead exporting countries to specialize in a smaller set of products.

## 2 Econometric model

### 2.1 Specification

We start from a standard constant elasticity of substitution (CES), monopolistic competition model following Lai and Trefler (2002) and Lai and Zhu (2004). A trade separable model, where allocation of the value of production and expenditure in country  $j$  for product class  $k$ , is separable from the bilateral allocation of trade across countries (Armington assumption), allows us to determine bilateral trade in a conditional general equilibrium setting, where the product markets for each good produced in each country are conditional on the observed output structure and expenditure allocations.

Following Anderson and van Wincoop (2003, 2004) we derive our gravity equation including many commodity classes of goods (denoted by  $k$  where  $k=1, 2, \dots, K$ ) flowing between each country  $i$  and  $j$ :

$$m_{ijk} = \frac{Y_{ik} E_{jk}}{Y_{wk}} \left( \frac{T_{ijk}}{P_{ik} P_{jk}} \right)^{1-\sigma_k} \quad (1)$$

where  $m_{ijk}$  is the nominal demand for commodity  $k$  from country  $i$  by country  $j$ ;  $Y_{ik}$  is the production of commodity  $k$  for country  $i$ ;  $E_{jk}$  is country  $j$ 's expenditure on product  $k$ ;  $Y_{wk}$  is world production of product  $k$ ;  $T_{ijk}$  is the trade cost;  $P_{ik}$  and  $P_{jk}$  are multilateral price indexes, and  $\sigma_k > 1$  is the elasticity of substitution among all varieties from different exporters.

The trade cost factor,  $T_{ijk}$ , reflects the impact of transport costs, proxied by distance ( $d_{ij}$ ), common language ( $L_{ij}$ ) and colonial links ( $C_{ij}$ ), and trade policies, proxied by the *ad valorem* equivalent tariff factor imposed by country  $j$  on imports of commodity  $k$  from country  $i$  ( $t_{ijk} = 1 + \tau_{ijk}$ ):

$$T_{ijk} = t_{ijk} d_{ij}^\rho e^{\delta_1 L_{ij} - \sigma_k + \delta_2 C_{ij}} \quad (2)$$

where  $L_{ij} = 1$  if countries  $i$  and  $j$  share a common language; and  $C_{ij} = 1$  if countries  $i$  and  $j$  were linked in the past by colonial ties.

Trade preferences reduce border costs as a consequence of tariff reduction. In the case of preferential imports, then, the trade cost is a function of the preference: higher preferences decrease trade cost and, thus, reduce the negative trade impact of the bilateral tariffs.

Using (2) and rewriting equation (1) in logarithmic form, we get:

$$\ln m_{ijk} = \alpha - \ln Y_{wk} + \ln Y_{ik} + \ln E_{jk} + \rho(1 - \sigma_k) \ln d_{ij} + \delta_1(1 - \sigma_k) L_{ij} + \delta_2(1 - \sigma_k) C_{ij} + \underbrace{(\sigma_k - 1) [\ln(1 + \tau_{jk}^{max}) - \ln(1 + \tau_{ijk})]}_{(1 + pref_{ijk})} + (\sigma_k - 1) \ln P_{ik} + (\sigma_k - 1) \ln P_{jk} + \varepsilon_{ijk} \quad (3)$$

where  $(1 + pref_{ijk})$  is the real preferential margin defined in relative terms as the ratio of the power of the maximum tariff levied by the EU across all actual exporters  $(1 + \tau_{jk}^{max})$  of product  $k$ , and the power of bilateral tariff  $(1 + \tau_{ijk})$  incurred by a specific exporter  $i$ . Apparently, the margin intensity is conditional on the choice of the benchmark tariff; in this chapter we focus on the actual preferences with respect to possible competitors:

$$(1 + pref_{ijk}) = \frac{(1 + \tau_{jk}^{max})}{(1 + \tau_{ijk})} \quad (4)$$

Accordingly, the preference can increase, either because the exporter  $i$  benefits from a lower tariff, or because a higher duty is imposed on other exporters. It should be emphasized that in the case of overlapping preference schemes, the applied preferential rate considered is the lowest available to each exporter: this may lead to overestimation of the preferential margins, since Bureau et al. (2007) show that some preferential regimes are systematically preferred to others.

In order to distinguish imports by tariff regimes in our estimation the preference variable  $(1 + pref_{ijk})$  is associated with the dummy  $P_{RE}$ , which is equal to 1 in the case of preferential trade flows, and to zero if imports enter without claiming any preferences. All variables that do not vary across exporters, importers and products are proxied by fixed effects. Fixed effects are applied since they are widely used in the literature to account for the multilateral resistance term in cross section analysis.

## 2.2 Estimation

The large percentage of zero trade flows associated with the use of highly disaggregated data creates obvious problems in the log-linear form of the gravity equation. We address the issue of zero flows by adopting the Heckman (1979) two-step procedure.

The Heckman two-step approach not only corrects for possible biases, it also allows us to distinguish the impact of preferences on both the extensive and the intensive margins. An increased probability of registering a positive trade flow, signals the existence of a larger set of bilateral trade flows (extensive margin), and can reflect either a larger variety of goods traded or a larger number of exporters of the same good. On the other hand, in the second stage a positive coefficient associated with the preference margin implies larger trade flows than would have been the case without the preference (intensive margin).

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

$$\rho_{ijk} = \Pr(m_{ijk}^* > 0 | d_{ij}, pref_{ijk}, L_{ij}, C_{ij}, \text{product and country - specific FE}) \quad (5)$$

The existence of positive trade flows should be affected by fixed rather than variable trade costs: Helpman et al. (2008), for instance, include the variable *common religion* in the first-stage regression, although they acknowledge that a *common language* would be just as useful. Indeed, cultural factors, and especially a common language, are well-known determinants of trade. We posit that the additional complexity inherent in an intermediated relationship, the potential for costly errors, and the increased cost may be large enough to prevent some transactions. Accordingly, the dummy  $L_{ij}$  for common language, provides the required identifying restriction: in the second stage we estimate a modified version of equation (3) dropping the language dummy and adding the inverse Mills ratio estimated in the first stage.

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

$$\text{Preference effect} = \frac{\sum_{ijk} (E[m_{ijk} | pref_{ijk} > 0] - E[m_{ijk} | pref_{ijk} = 0])}{\sum_{ijk} E[m_{ijk} | pref_{ijk} > 0]} \quad (6)$$

In calculating these results, we estimate the counterfactual change in the dependent variable, total EU imports, which would follow from the removal of the preferential advantage. This could be considered a “trade creation” effect, since the trade flow would not take place in the absence of preferences. However, such an effect cannot be interpreted in welfare terms, since additional trade flows may be the result of the diversion of previously existing export flows from exports

from other countries (Borchert 2009). Moreover, this calculation may overestimate the total sum of the foregone exports, since indirect effects are not captured via changes in world prices.

### 3 Data

Data on trade at the HS6 level of detail are taken from the Eurostat Comext database (<http://fd.comext.eurostat.cec.eu.int/xtweb/>); data on tariffs are from the MAcMapHS6-V2 database (<http://www.cepii.fr/>). MAcMap provides a consistent worldwide assessment of protection, including *ad valorem* equivalent rates of specific duties and tariff rate quotas (TRQ), including those introduced at the end of the Uruguay Round for 2004, at the HS6 level (Boumelassa et al. 2009). Data for the remaining explanatory variables are from the Cepii dataset, which includes distances between countries and two sets of dummies for common language and former colonial links.

The choice of a single, specific year (2004) is strictly dictated by the data provided by the MAcMap database. Compared to other tariff databases, MAcMap allows a consistent picture of border protection, while accounting exhaustively for preferential trade agreements and the presence of TRQ (Bouët et al. 2004).

From the data on imports presented in Table 2, we observe that half of imports to the EU market enter duty-free under MFN arrangements, and that among the imports that incur MFN duty, only 16% enter using under a preferential scheme. The large share of MFN duty-free imports is not surprising in the case of raw materials, such as the Mineral products under Section V, and the lack of protection leaves little room for preferential trade. In the case of the second largest share imports, the Machinery sector (Section XVI), the share of preferential imports is only 10%, but in the case of the third largest sector, Textiles (Section XI), more than 40% of trade is preferential. In the remaining sectors, the shares of preferential imports range from around 10% for Instruments (Section XVIII) and Miscellaneous manufactures (Section XX), to around 55% in the case of the animal products under Section I.

We estimate cross-sectional models, covering imports of 4,941 commodities from 169 DC to 25 EU member countries. The number of observations used (2,190,239) is much lower than the number of potential bilateral trade flows (25 importers\*169 exporters\*4,941 products), for two reasons.

First, we exclude binding TRQ from our dataset since they may introduce a limited dependent variable estimation problem. We also exclude from the sample a few sectors where there are no preferences (Sections X and XXI), or only trivial preferential trade flows in either absolute (Section XIX) or relative terms (Section V).

More importantly, countries do not produce all possible goods, neither do they all have an effective demand for all available goods. Accordingly, we distinguish between two different kinds of zero-valued trade flows: products that are never traded and products that are not traded, but (potentially, at least) could be traded. Hence, we can distinguish between flows with exactly zero probability of positive trade, flows with a non-zero probability of trade that still happen to be zero, and positive flows. Since preferential policies cannot influence the first group, in our sample for each exporter we retain only products that present at least one bilateral export flow at the HS6 level, assuming that the excluded commodities are not produced. Similarly, we exclude products that are not imported at all in the EU. This avoids the inclusion of irrelevant information that could bias the estimates, and also reduces the dimensions of the dataset.

**Table 2. Share of imports by type of tariff regime (period 2004).**

Sections	% of MFN duty-free	% of MFN duty (no preference)	% of Preferential duty	Total trade (millions of Euros)	Preferential trade (millions of Euros)
Overall	50.7	33.4	15.8	450,179	71,300
I	9.5	35.6	55.0	6,950	3,820
II	55.1	20.3	24.6	15,100	3,720
III	0.5	77.4	22.1	3,130	693
IV	43.7	28.0	28.3	16,000	4,530
V	97.4	1.6	1.0	116,000	1,180
VI	31.3	45.1	23.6	15,900	3,750
VII	16.2	59.6	24.2	10,300	2,490
VIII	2.3	88.1	9.6	5,710	549
IX	44.1	43.7	12.2	7,780	953
X	100.0	0	0	3,490	0
XI	1.7	56.0	42.3	52,300	22,100
XII	0.2	64.6	35.3	9,730	3,430
XIII	7.2	56.5	36.3	4,080	1,480
XIV	83.3	9.2	7.5	15,000	1,120
XV	56.5	32.0	11.4	33,800	3,870
XVI	49.1	40.7	10.2	89,400	9,080
XVII	0.4	67.3	32.3	19,300	6,230
XVIII	22.1	68.4	9.5	7,640	723
XIX	0	0	24.4	49	12
XX	38.4	53.0	8.5	18,400	1,570
XXI	100.0	0	0	120	0

The Comext database provides no information on take up of the preference schemes. However, it distinguishes between preferential and non-preferential (MFN) trade. Using the information on preferential trade flows, the level of duty ( $\tau_{ijk}$ ) used to compute the preference margins is equal to the MFN (applied) tariff if the preference is not used, and to the preferential (bilateral) tariff otherwise. Accordingly, our estimation takes account of the volume of trade benefiting from the preferences, and avoids overestimation of the preference impact that can arise from an association between a positive preference and a trade flow that does not exploit it.

Table 3 presents the share of preferential tariff lines, the bilateral applied tariff and the preference: in the last two cases, we report simple averages implying the same weight for each tariff line regardless of the importance of the product for which preference and protection is granted, and standard deviations in order to provide some information about tariff structure dispersion. The relative preferences (Table 3) show that the overall simple average is 1.05 with large differences across sectors. In addition to agricultural products (Sections I and IV), with respective relative preferences equal to 1.16 and 1.08, the next most preferred sectors are textiles and footwear (Sections XI and XII). However, it appears that despite the preferences these are the most protected EU sectors. On the other hand, they are also the sectors showing the largest shares of actually used preferential tariff lines.

**Table 3 Value and preference margins for commodity groups with preferential trade flows.**

Sections	Bilateral applied tariff (%) $\tau_{ijk}$		Share of preferential tariff lines		Relative preference ( $1+pref_{ijk}$ )		Value of preference (millions of Euros)
	Mean	(Std. dev.)	Potential	Used	Mean	(Std. dev.)	
Overall	1.93	(0.04)	76	37	1.05	(0.07)	4,580
I	2.48	(0.07)	69	59	1.07	(0.06)	321
II	2.61	(0.07)	60	48	1.06	(0.21)	199
III	4.19	(0.11)	71	50	1.06	(0.10)	22
IV	7.54	(0.10)	73	54	1.09	(0.11)	602
VI	0.65	(0.03)	62	34	1.04	(0.02)	157
VII	0.28	(0.01)	84	36	1.05	(0.02)	108
VIII	0.38	(0.01)	74	43	1.04	(0.02)	21
IX	0.54	(0.01)	65	31	1.03	(0.01)	33
XI	3.27	(0.04)	85	47	1.06	(0.05)	1,870
XII	2.25	(0.04)	74	46	1.06	(0.05)	167
XIII	1.24	(0.03)	80	45	1.04	(0.03)	66
XIV	0.00	(0.00)	64	38	1.03	(0.01)	32
XV	0.30	(0.01)	64	40	1.03	(0.01)	147
XVI	0.14	(0.01)	79	22	1.02	(0.02)	330
XVII	0.92	(0.02)	96	31	1.04	(0.02)	421
XVIII	0.25	(0.01)	78	18	1.02	(0.01)	16
XX	0.08	(0.00)	65	40	1.03	(0.01)	50

The share of “potential” preferential tariff lines is computed as the percentage of observations with a positive preference margin, whereas the share of “used” preferential tariff lines gives some information about the degree of utilization of preferences and is calculated as the percentage of preferential tariff lines that enter the EU under a preferential scheme. The low level of utilization of preferences, only 38% of preferential tariff lines, is likely due to the costs associated with preference utilization and the presence of non-tariff barriers (such as quotas or sanitary and phytosanitary regulations).

Table 3 provides evidence on preference values, based on Candau and Jean (2005). Under simplifying assumptions, such as constant world prices, the value of the preference rent for any sectors can be computed as follows:

$$V_s = \sum_k (\tau_{jk}^{\max} - \tau_{ijk}) PI_{ik} \quad (7)$$

where  $PI_{ik}$  refers to EU preferential imports of product  $k$  from partner  $i$ . The calculation of Equation (7) is likely to provide an upper bound estimate, since the assumption is that none of the rent is

included in the export price. The value of EU preferences is more than 4 billion Euros. This is a crude approximation (Candau and Jean 2005). First, the (implicit) assumption that there are no supply constraints is rather simplistic since a change in the EU trade policy regime would likely exert upward pressure on world prices, which would tend, to some extent, to counterbalance the decrease in prices due to preference margins. Moreover, the extent of rent extraction by an exporter is likely to depend on the exporter's bargaining power vis-à-vis the importer. The rent for Textiles (Section XI) alone amounts to roughly half of the overall value, which is not surprising given the importance of this sector in trade terms.

#### 4 Results

Tables 4-5 report the estimates related to preferences. In the first stage we estimate the impact of preferential policies on the extensive margin, i.e., the share of positive trade flows over total number of possible bilateral trade flows (Table 4); in the second stage we quantify the extent to which trade preferences increase the volume of trade (Table 5).

Table 4 presents the results of the impact of preferences on the extensive margin of trade, by commodity groups. In the first stage, all control variable estimates have the expected signs. Overall, the results show that the preference margin has a slightly positive, and statistically significant, impact on the probability of registering a positive trade flow. The estimated coefficient of 0.08 reflects the average impact among sectors of preferential policies on the extensive margin.

**Table 4 Results for commodity groups – extensive margin.**

Probit regression, marginal effects	Independent variables				N. of obs.
	$\ln d_{ij}$	$\ln(1+pref_{ijk})$	$C_{ijk}$	$L_{ijk}$	Pseudo $R^2$
Overall	-0.22*** (0.01)	0.08*** (0.01)	0.14*** (0.00)	0.07*** (0.00)	2,175,611 0.25
I	-0.32*** (0.01)	0.14** (0.06)	0.16*** (0.02)	0.06*** (0.01)	30,488 0.26
II	-0.21*** (0.00)	0.09*** (0.02)	0.15*** (0.01)	0.11*** (0.01)	99,079 0.25
III	-0.27*** (0.02)	0.25*** (0.09)	0.13*** (0.03)	0.10*** (0.03)	7,647 0.22
IV	-0.19*** (0.00)	0.11*** (0.02)	0.18*** (0.01)	0.11*** (0.01)	82,829 0.23
VI	-0.26*** (0.00)	-0.03 (0.07)	0.14*** (0.01)	0.04** (0.01)	135,480 0.23
VII	-0.29***	0.40***	0.15***	0.05***	84,269

	(0.01)	(0.13)	(0.01)	(0.01)	0.33
VIII	-0.24 <sup>***</sup>	-0.09	0.14 <sup>***</sup>	0.09 <sup>***</sup>	31,961
	(0.01)	(0.21)	(0.02)	(0.02)	0.39
IX	-0.24 <sup>***</sup>	-0.09	0.14 <sup>**</sup>	0.09 <sup>***</sup>	51,004
	(0.01)	(0.20)	(0.01)	(0.01)	0.31
XI	-0.22 <sup>***</sup>	-0.04	0.11 <sup>***</sup>	0.09 <sup>***</sup>	430,277
	(0.00)	(0.04)	(0.00)	(0.00)	0.32
XII	-0.27 <sup>***</sup>	-0.94 <sup>***</sup>	0.15 <sup>***</sup>	0.08 <sup>***</sup>	40,814
	(0.01)	(0.09)	(0.02)	(0.01)	0.40
XIII	-0.28 <sup>***</sup>	-0.82 <sup>**</sup>	0.17 <sup>**</sup>	0.04	69,026
	(0.01)	(0.11)	(0.01)	(0.01)	0.36
XIV	-0.15 <sup>***</sup>	-1.24 <sup>**</sup>	0.15 <sup>***</sup>	0.10 <sup>**</sup>	22,867
	(0.01)	(0.54)	(0.02)	(0.02)	0.37
XV	-0.25 <sup>***</sup>	-0.95 <sup>***</sup>	0.15 <sup>***</sup>	0.05 <sup>***</sup>	196,034
	(0.01)	(0.11)	(0.01)	(0.01)	0.31
XVI	-0.18 <sup>***</sup>	-0.83 <sup>***</sup>	0.14 <sup>***</sup>	0.06 <sup>***</sup>	491,423
	(0.00)	(0.07)	(0.00)	(0.00)	0.37
XVII	-0.21 <sup>***</sup>	0.55 <sup>***</sup>	0.18 <sup>**</sup>	0.10 <sup>**</sup>	61,443
	(0.00)	(0.09)	(0.01)	(0.01)	0.34
XVIII	-0.13 <sup>***</sup>	-0.27 <sup>**</sup>	0.12 <sup>**</sup>	0.06 <sup>**</sup>	144,421
	(0.00)	(0.12)	(0.01)	(0.01)	0.36
XX	-0.24 <sup>***</sup>	-0.24 <sup>**</sup>	0.16 <sup>***</sup>	0.09 <sup>***</sup>	104,426
	(0.01)	(0.10)	(0.01)	(0.01)	0.38

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

In terms of results by commodity group, estimates for the preference margin are statistically significant for 12 out of 16 cases. Sectors where the preference impact on the extensive margin is not significant – sections VI, VIII, IX and XI – are characterized by very low numbers of preferential tariff lines with positive trade (Sections VIII and IX), a high level of preference concentration (Section VI) or very high applied tariffs (Section XI). Preferential access leads to an expansion in the number of traded products in the case of agricultural products, namely Animals, Vegetables and Foodstuffs, Fats and oils, Beverages, spirits and tobacco (Sections I, II, III and IV): the highest estimated coefficient (0.25), for Fats and oils, implies that a 10% increase in the relative preference – roughly corresponding to an average reduction of 10 percentage points in the bilateral applied tariffs at the estimation point – increases the probability of registering a positive trade flow (i.e., the extensive margin) by 25%. Indeed, the standard deviations of the preference (Table 3), show that Section III is where preferences are least concentrated. Even if the coefficients of two non-agricultural sectors, Sections VII (Plastics) and XVII (Vehicles), present the largest positive

impact on the extensive margin, in the remaining sectors, the estimated coefficients are negative, implying that preferential policies mean that DC specialize in a smaller number of exported products than would otherwise be the case. The negative impact ranges between 0.24 in the case of Manufactured Articles (Section XX) and 1.24 in the case of Precious stones. By and large, then, preferences discourage export diversification of industrial goods, but promote it in the case of agriculture. This issue is of relevance, but we cannot draw conclusions about the eventual welfare impact: it will be positive if the number of exported goods increases as a result of trade creation. However, the reverse will be true if preferences favour products with no comparative advantages - and, also, discouraging export diversification might raise concerns.

In the second stage (Table 5), the positive and significant coefficient of the Mills ratio confirms that correcting for sample selection bias is justified. The coefficients of bilateral distance and colonial links show the expected signs. There are large differences for the negative impact of distance, our proxy for transport costs: these results support our decision to run separate rather than a pooled regression, since the latter would have implied unwarranted restrictions on the trade cost coefficients.

Concerning our variable of interest, Table 5 shows the impact of preferences on the intensive trade margin. The estimated coefficients are related to the elasticity of substitution across sections and countries by the identity  $\hat{\sigma}_s = \hat{\beta}_s + 1$ . The estimate of average elasticity of substitution across sections is statistically significant and equal to 10.4, but note that this is likely to underestimate the preference impact.

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

Heckman regression	Independent variables				N. of non-zero obs.	Elasticity of substitution, $\sigma_{EU}$
	$\ln d_{ij}$	$\ln(1+pref_{ijk})$ * <i>PRE</i>	$C_{ijk}$	Mills ratio		
Overall	-2.25*** (0.04)	9.42*** (0.13)	1.16*** (0.03)	2.71*** (0.06)	476,433	10.42
I	-2.47*** (0.42)	9.05*** (0.75)	0.96*** (0.21)	2.15*** (0.43)	6,891	10.05
II	-1.62*** (0.17)	1.97*** (0.33)	0.93*** (0.13)	1.59*** (0.23)	20,681	2.97
III	-2.36*** (0.78)	4.25*** (1.40)	0.29 (0.44)	1.64* (0.87)	1,586	5.25
IV	-1.64*** (0.16)	6.63*** (0.33)	1.16*** (0.15)	1.84*** (0.25)	17,143	7.73
VI	-2.94*** (0.23)	18.08*** (0.84)	1.30*** (0.13)	3.26*** (0.28)	29,497	19.08
VII	-3.65*** (0.19)	23.22*** (0.81)	1.48*** (0.12)	3.81*** (0.23)	20,614	24.22
VIII	-2.14***	15.86***	1.16***	2.18***	8,065	16.86

IX	(0.15) -3.03***	(1.38) 14.50***	(0.12) 1.56***	(0.18) 2.99***	11,452	15.50
XI	(0.22) -1.78***	(1.89) 10.10***	(0.16) 0.83***	(0.28) 2.14***	107,862	11.10
XII	(0.05) -2.27***	(0.22) 10.62***	(0.04) 1.15***	(0.07) 2.08***	10,920	11.62
XIII	(0.13) -2.76***	(0.65) 18.59***	(0.11) 1.20***	(0.13) 2.76***	16,614	19.59
XIV	(0.13) -1.59***	(0.84) 21.75***	(0.10) 1.46***	(0.15) 2.81***	5,266	22.75
XV	(0.22) -3.15***	(2.69) 27.27***	(0.20) 1.53***	(0.29) 3.46***	41,816	28.27
XVI	(0.12) -2.59***	(0.86) 25.06***	(0.08) 1.66***	(0.14) 2.91***	94,614	26.06
XVII	(0.05) -1.78***	(0.81) 24.03***	(0.05) 1.11***	(0.07) 1.75***	12,774	25.03
XVIII	(0.16) -1.44***	(1.10) 10.67***	(0.15) 0.91***	(0.22) 1.70***	26,061	11.67
XX	(0.07) -2.24***	(1.49) 25.75***	(0.07) 1.24***	(0.09) 2.52***	25,522	26.75
	(0.09)	(1.06)	(0.08)	(0.10)		

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

In order to benefit from preferences, most exporters will incur some additional costs (e.g., due to rules of origin compliance as detailed in Chapter 10). This implies that the “true” (i.e., net of compliance costs) preference margin generating the observed trade flows is lower than the margin associated with our estimates.

The sectoral results show that the estimates for elasticity of substitution are always significant. Therefore, the choice to run separate regressions, which is fairly common in the literature (Baldwin et al. 2005; Lai and Trefler 2002), seems appropriate, since we find evidence of significant differences in elasticity of substitution across industries. The estimated coefficients range between 3 (Vegetables Section II) and 28 (Metal products Section XV), and are largely consistent with those obtained in other studies (Baier and Bergstrand 2001; Eaton and Kortum, 2002; Lai and Trefler 2004; Olper and Raimondi 2008). Some values are quite high, but such a degree of substitutability is not inconceivable given the level of disaggregation of our data (Cipollina and Salvatici 2010). What is more surprising perhaps, is the lower substitutability of the primary sectors compared to the secondary ones. In this respect, our results suggest that DC agricultural exports to the EU are more heterogeneous than their industrial exports. The effectiveness of the preferences appears to be inversely related to the height of the applied duties: large impacts are associated to sections with low duties (e.g., Sections VII, XV, XVI, XVII and XX) and large margins are less effective in the

presence of high bilateral duties, as in the case of agricultural products (Sections I to IV) and Textiles (Sections XI).

**Table 6 The estimated preference effect – Results for commodity groups.**

Sectors	Preference effect (%)	Trade volume (millions of Euros)	% of Preferential trade
Overall	0.96	4,315	6.1
I	2.40	167	4.4
II	0.11	17	0.5
III	0.25	8	1.1
IV	1.84	294	6.5
VI	0.94	149	4.0
VII	1.96	202	8.1
VIII	1.39	79	14.4
IX	0.60	47	4.9
XI	1.65	863	3.9
XII	1.53	149	4.3
XIII	1.81	74	5.0
XIV	0.30	45	4.0
XV	1.81	612	15.8
XVI	0.89	796	8.8
XVII	2.96	571	9.2
XVIII	0.15	11	1.6
XX	1.50	276	17.5

Table 6 presents the results for the percentage change in total imports due to the hypothetical elimination of all existing preferences according to equation (6). The average preference impact is around 1%, which means that the absence of preferences would reduce bilateral trade volumes between DC and the 25 EU member countries by 4,315 million Euros. The impact of EU preferences is negligible in the case of Vegetables and Fats and oils (Sections II and III), and this may be explained by the large number of TRQ. The effect for Precious stones (Section XIV), Wood and wood articles (Section IX), is small, which would be expected since the set of goods to be exported is heavily influenced by the endowments of natural resources, and in the case of the Instruments sector (Section XVIII) is characterized by the lowest elasticity value. The largest impacts, at least in relative terms, are for Animal products and Foodstuffs, and Vehicles (Sections I and XVII), both of which have large shares of preferential imports (Table 2).

Table 6 shows that most of the preference value is represented by the rent earned on exports, which would exist anyway since only 6% of preferential trade would be affected by preference

elimination. However, in some cases (Sections VII, XV, and XX) trade volume reductions would reach double digits: it is in these sectors that the preference erosion would be more damaging.

## 5 Conclusions

In this chapter, we investigated whether EU trade preferences are effective at stimulating additional exports through preferential duties. This is a contentious issue and is widely debated in the literature. We present robust estimates controlling for possible biases in three dimensions: measurement of the intensity of the preference margins; impact on the extensive and intensive margins of trade; and distinction between preferential and MFN trade flows.

Methodologically, our study confirms that there is little support for the use of aggregated data and that estimations should be at sector level. Working at the most detailed level allowed by the data increases the problem of zero trade flows. In line with the recent literature, we deal with this problem by applying a Heckman correction procedure in order to control for selection bias due to the presence of zeros.

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

From a policy perspective, this paper provides new evidence that preferential schemes do impact on trade, but that there are large differences across sectors. First, preferences influence the extensive margins of trade and, overall, there is a slight increase in the probability of registering a positive trade flow. However, the overall positive impact is due to the agricultural preferences (Sections I, II, III and IV), since in all other cases the only significant impacts are negative. This implies that countries benefiting from preferential schemes export a larger set of agricultural goods, and this contradicts the received wisdom that due to preferential policies, exporting countries specialize in a smaller number of products. On the other hand, countries benefiting from preferential schemes export a smaller set of manufactures and, even when they coincide with their true comparative advantages, this may be bad news since some studies point to the contribution of export variety to growth (Broda and Weinstein 2006).

In terms of the impact on trade volumes, we find that EU imports increased by more than 4 billion Euros as a result of preference margins. This is not a trivial amount, and is larger than the value of the preference rent itself (see Table 3). On the other hand, it is only a small share (around 6%) of the value of preferential exports to the EU. This means, hypothetically, that the removal of preferences would not affect the vast majority of current flows.

Although decisions about whether and how much to trade does not depend only on a simple substitution elasticity, our results suggest the following implications. Agricultural sectors, namely Sections I and IV, present the largest share of preferential trade, and preferences have been effective in increasing trade at both margins, although the impact on rents is larger than the impact on trade volumes.

The most important sectors in terms of preferential trade flows are manufactures, namely Textiles (Section XI) and Machinery (Section XVI). In both cases, there is a positive impact of preferences on the intensive margins, while exporters tend to specialize in a smaller set of products. Since a significant share of imports still faces positive MFN duties (Table 2), DC may look for an enlargement of preferences in these sectors. The same holds for Vehicles (Section XVII), but in this case DC may be worried also about preference erosion since almost 10% of preferential exports hinges on the existence of a preference margin.

To conclude, DC may be concerned about the consequences of preference erosion, in terms of either the negative impact on trade – as in the case of Vehicles – or loss of rents – as in the case of Textiles. On the other hand, there is certainly room to extend current schemes, given that a significant share of EU imports from DC still incurs positive duties. From this perspective, negotiations to increase preference margins are likely to be most effective in such sectors as Plastics which feature a high elasticity of substitution and a large share of imports subject to positive MFN duties.

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