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ROMA TRE UNIVERSITÀ DEGLI STUDI

Do trade preferential agreements enhance the exports of developing countries? Evidence from the EU GSP•

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Abstract The EU grants preferential access to its imports from developing countries under several trade agreements. The widest arrangement, in terms of country and product coverage, is the Generalised System of Preferences (GSP) through which, since 1971, virtually all developing countries have received preferential treatment when exporting to world markets. This paper evaluates the impact of GSP in enhancing developing countries' exports to EU markets. It is based on the estimation of a gravity model for a sample of 769 products exported from 169 countries to EU over the period 2001-2004. While, from an econometric point of view, the estimation methods take into account unobservable country heterogeneity as well as the potential selection bias which zero-trade values pose, the empirical setting considers an explicit measure of trade preferences, the margin of preferences. The analysis offers new empirical evidence that the impact of GSP on developing countries' agricultural exports to the EU is positive.

Keywords: Trade Preferences, Developing Countries, Agricultural Trade
JEL Codes: Q17, O19, F13, C23

I. Introduction

The EU plays a crucial role in promoting sustainable growth in developing countries (DCs) because it is one of the most important actors in international trade (accounting for about one fifth of all world trade). Its trade policy may influence DCs' economic growth in many ways, eg. by enhancing production and export earnings and encouraging diversification in their economies. One of the classical instruments for achieving these objectives is to offer preferential trade terms

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in favour of DC exports, through which the EU provides incentives to traders to import products from preferred DCs and, thus, help them to compete in international markets.

An important preferential trade agreement (PTA) adopted by the EU is the Generalised System of Preferences (GSP), which is a set of unilateral trade concessions exclusively granted to DCs. It is a multiregional PTA covering numerous criteria of eligibility and a certain differentiation among developing countries in the application of preferential treatment. The EU GSP dates back to 1968 when the United Nations Conference on Trade and Development (UNCTAD) recommended the creation of a 'Generalised System of Tariff Preferences' under which developed countries would grant trade preferences to all DCs. It was adopted by the EU in 1971 for a period of ten years and has been renewed several times, with revisions involving product coverage, quotas, ceilings and their administration, as well as the lists of beneficiaries and of tariff cuts for agricultural products.

The impact of the EU GSP has been analysed in some detail and much research has been conducted using the gravity model. This approach posits that export flows are positively influenced by the economic masses of trading countries, negatively influenced by the distance between them (Tinbergen, 1962) and, within this analytical framework, that preferential treatment extended to exporters will increase their exports to the preference-giving countries. This is because countries which benefit from GSP tariff reductions face more favourable access to EU markets than do exporters who are not eligible for GSP support. Looking at the gravity empirics, the main outcome is that the EU GSP does not achieve its objectives in terms of enhancing the export flows of beneficiaries towards EU markets (see, Agostino et al., 2008; Cardamone 2009; Cipollina and Salvatici, 2007; Nilsson, 2002; Persson, 2005; Persson and Wilhelmsonn, 2007; Pishbahar and Huchet-Bourdon, 2009; Subramanian and Wei, 2007; Verdeja, 2006). This is mainly due to the size of the trade preferences, to the high administrative costs, the restrictive Rules of Origin (RoO) and other conditions that undermine the full potential of the preferential treatment.[1]

While the EU GSP has received a great deal of attention, research has focused on the impact on total trade mainly by using the dummy variable approach to measure the effect of the preferential treatment. In other words, assessment of the trade effects induced by the GSP has rarely been made by referring to sectoral data and by exploiting data on tariffs which would allow precise gauging of the margin of preferences enjoyed by DCs.

[1] The GSP is governed by strict RoO to ensure that benefits only go to the GSP countries. In fact, products originate in a country if they were wholly obtained in the country or sufficiently worked upon or processed within it. However, cumulation rules enable production processes to take place in certain other countries without affecting the exporter's entitlement to GSP benefits.

This paper attempts to fill this gap in the literature by providing new empirical evidence of the impact of the EU GSP, the evaluation of which is based on the estimation of a gravity model using trade data at a very high level of disaggregation. With respect to the related literature on the impact of the EU GSP, the distinguishing features of the study are threefold.

Firstly, as far as the measure of preferential trade treatment is concerned, instead of considering a dummy variable, we use an explicit measure of the preferential treatment granted by the EU to the exports of DCs involved in a trade agreements (GSP, Cotonou Agreement, European Mediterranean Agreements). This measure is defined as the ratio between the margin of preference and the Most-Favoured Nation (MFN) duty, where the margin of preference is the difference between the MFN tariff and the preferential tariff to be applied, under a given trade agreement, to any specific trade flow.

Secondly, we shall focus on agricultural exports using disaggregated data at HS6-digit level.[2] To be more precise, we shall analyse the export flows towards EU markets of 763 products at HS6-digit level related to twelve groups of agricultural products[3] over the period 2001-2004. This choice is due to the fact that trade preferences granted to DCs are substantial for agricultural exports, whereas the trade restrictions applied by the EU to its non-agricultural imports are modest. Furthermore, by using the sectoral data, we intend to limit the aggregation bias which characterises, for instance, the indicators meant to reveal the trade protection of all imports (Anderson and Neary, 2005; Cipollina and Salvatici, 2008). Finally, GSP trade preferences, like those of any other trade agreement, are conceived of as being applied at product level and are extremely heterogonous across products. Therefore, it seems reasonable to evaluate their impact at disaggregated level. The econometric analysis is carried out by pooling the data for all HS6-digit agricultural products and by running a regression, using data at HS6-digit level, for each of the twelve agricultural sectors covered by the study (*cfr* footnote 3).

Thirdly, the methods used in the estimations deal with several issues which are common when considering a gravity equation to analyse trade flows. Indeed, we shall use a fixed effect model to check for country non-observable heterogeneity. Again, following the method adopted by many authors (Burger *et al*., 2009; Helpman *et al*., 2007; Linders and de Groot, 2006; Martin and Pham, 2008; Santos Silva and Tenreyro, 2006), we shall apply a Poisson family model and

[2] The Harmonized System (HS) is an internationally standardised nomenclature for the description, classification and coding of goods. It consists of around 1,200 4-digit headings and 5,000 6-digit subheadings, which are organised into 21 Sections and 97 Chapters. The HS covers all goods in international trade.

[3] The twelve HS2-digit agricultural products included in the analysis are the following: live animals, fisheries, fruits, lacs and gums, oils and fats, products of animal origin, sugar, vegetables, beverages and spirits, tobacco, tropical fruits and residues of the food industry.

its extensions, Zero Inflated Poissoin (ZIP) and Negative Binomial Regression (NBR), in order to overcome the problems posed by zero-trade flows, the frequency of which is severe when a study is based on disaggregated data. These procedures consider the non-multiplicative form of the gravity equation and lead to more reliable results than do estimations based on the log-linear specification of the model carried out using the standard methods (i.e., OLS or Fixed Effect Models). This is because Poisson, ZIP and NRB estimators take into account zero-trade flows and, therefore, can shed light on why countries do not trade with each other.

The samples on which the econometric section of the present study is based consist of 169 countries and 763 agricultural product lines at HS6-digit level. The period under consideration is 2001- 2004. This choice is brought about by the fact that data on tariffs for such a large number of commodities are easily available only from DBTAR (2006).

The paper is divided into nine sections. The second section describes the GSP scheme; the third summarises the literature on the effectiveness of the EU GSP scheme. The fourth section presents a descriptive analysis of DC agricultural exports to the EU market, while the fifth paragraph gives a breakdown of the preferential tariffs implemented through the EU GSP. The sixth section focuses on the gravity equation, whereas section seven deals with the econometric methods used to estimate the gravity model, the results of which are discussed in section eight. Section nine concludes.

II. The EU GSP scheme

Since 1971, when the GSP was initially adopted by the EU, almost all DCs have enjoyed non-reciprocal preferential trading terms for exporting to the EU market. The first GSP was in force for a period of ten years. The 1981 GSP revision involved product coverage, quotas, ceilings and their administration, as well as the list of beneficiaries and the tariff cuts for agricultural products. From 1981 to 1995, there were no substantial changes in the operating rules of the EU GSP, whereas in January 1995 a new 10-year EU GSP scheme was introduced, providing five types of arrangement. The ordinary GSP, where about 7,000 products were classified in four groups according to the tariff cuts they received, was still the main component of the arrangement.[4] Besides the ordinary GSP, the EU implemented a specific arrangement providing incentives for the protection of labour rights and another specific agreement to promote

[4] There were 3,000 non-sensitive products entering the EU market duty free, whereas the duty applicable was 85% of the MFN rate for 3,700 products classified as “very sensitive”. Another group of products comprised a sub set of sensitive products which had an applicable duty of 70% of the MFN rate and, finally, there was a group of semi-sensitive products, which had an applicable duty of 35% of the MFN rate.

environmental protection in DCs. Finally, there were the GSP-Drug and the EBA initiatives. The GSP-Drug initiative is a special agreement granting preferential treatment to the exports of Pakistan and all Central and South American countries belonging to the Andean Community with the aim of combatting drug production and its trafficking by enhancing export diversification in favour of GSP products,[5] The Everything But Arms (EBA) initiative allowed the world's 49 poorest countries free access for all products except for arms and ammunition.[6]

Another GSP revision was made on June 2001. This new GSP regulated the preferential treatment granted to DCs over the years 2002-2004 and it both simplified and harmonised the previous arrangements by, among other things, reducing the number of product categories from 4 to 2. Duty-free access was maintained for all non sensitive products, while all other goods were now classified as sensitive products and benefited from a flat rate reduction of 3.5 percentage points of the MFN duty. With the 2006 GSP revision, the EU maintained the ordinary GSP and the EBA initiative and launched the GSP-Plus, which was designed to sustain the exports of the poorest and most vulnerable countries. To benefit from GSP-Plus, countries must meet a number of criteria and must effectively adopt the recommendations of 27 international conventions on human and labour rights, environmental protection, good governance and the fight against drugs (in this regards it is useful to remember that the GSP-Plus incorporates GSP Drug: from now on we will use these two names as synonymous).

The EBA has remained unchanged. It provides duty-free and quota-free treatment for all products originating in LDCs, except for arms and ammunition.

The most important feature of the new GSP regulations is the graduation mechanism according to which preferential tariffs may be either suspended (and then re-established) when each country's exports to EU markets exceed (fall below) a certain threshold over a three-year period.[7] Finally, a general rule, which has been applied since 1971, regards the possibility of

[5] The eligible countries for the EU GSP-Drug scheme are Armenia, Azerbaijan, Bolivia, Colombia, Costa Rica, Ecuador, El Salvador, Georgia, Guatemala, Honduras, Mongolia, Nicaragua, Paraguay, Peru, Sri Lanka, Venezuela.

[6] Tariff duties on bananas were reduced by 20% annually as of 1st January, 2002 and they have been completely suspended since 1st January, 2009. Tariff duties on rice were reduced by 20% on 1st September, 2006, by 50% on 1st September, 2007 and have been completely suspended since 1st September, 2009. Finally tariff duties on sugar were reduced by 20% on 1st July, 2006, by 50% on 1st July, 2007 and by 80% on 1st July, 2008, and have been completely suspended since 1st July, 2009.

[7] For example, as a result of the graduation mechanism applied to trade statistics covering the years 2004-2006, GSP preferences will be re-established for Algeria (Mineral products), India (Jewellery, pearls, precious metals and stones), Indonesia (Wood and articles of wood), Russia (products of the chemical or allied industries and base metals), South Africa (transport equipment) and Thailand (Transport equipment), and will be suspended for Vietnam (Footwear, headgear, umbrellas, parasols, artificial flowers).

removing a country from the scheme. This removal occurs when a country becomes competitive in its exporting of a particular product or range of products, when a country is classified as a high-income country by the World Bank for three consecutive years, or when exports of the five major GSP products account for less than 75 % of total GSP-covered exports to the EU market.

The current operating rules of GSP were established by regulation 732/2008 which will apply until 31st December, 2011. In order to guarantee stability, predictability and transparency within the operation of the scheme, the new GSP has not changed the structure or the substance of the old scheme and has renewed the ordinary GSP, the GSP-Drug and the EBA initiatives for a period of three years.

As is summarised in table 1, in 2009, the ordinary GSP extended trade preferences to 6,244 products divided into one group of 3,200 non sensitive products and another group of 3,044 sensitive products. The first group has duty free access, whereas the sensitive products receive, when an *ad valorem* duty is applied, a tariff cut of 3.5 percentage points with respect to the MFN tariff rate (the tariff cut is 20 percentage points for textiles and clothing, 15% for ethyl alcohol and 30% when specific duties are applied). The GSP-Drug essentially offers duty free access to 6,336 products (table 1) in order to help vulnerable countries in their ratification and implementation of relevant international conventions, whereas the EBA initiative provides duty-free and quota-free access to all products (except for arms and ammunitions) exported by the 49 LDCs to EU markets. Within each scheme there are 2,405 products which do not enjoy any preferential treatment, because the MFN tariffs are already zero. Again within each scheme there are products entering the EU at MFN rates (these goods are 919 in the case of the ordinary GSP, 827 for the GSP-Drug and 23 in the case of EBA) (Table 1).

Table 1: Products Covered by GSP schemes in 2009

	Ordinary GSP scheme	GSP-Drug	EBA
Products Covered	6244	6336	7140
Products with MFN=0	2405	2405	2405
Products with MFN>0	919	827	23

Source: EU Commission (2009)

III. The Literature on the Impact of the EU GSP: a brief review

There is substantial literature analysing the role of preferential trade agreements (for a review see, Nielsen, 2003; Cardamone, 2008) and some of it has specifically evaluated the impact of the EU GSP scheme. In reviewing these studies, we have mainly focussed on those papers which use the gravitational approach (Agostino et al. 2008; Cardamone 2009; Cipollina and Salvatici 2007;

Nilsson 2002; Oguledo and MacPhee 1994; Persson 2005; Persson and Wilhelmsson 2007; Pishbahar and Huchet-Bourdon 2009; Sapir 1981; Subramanian and Wei 2007; Verdeja 2006). These studies do not converge towards a common result with regards the effectiveness of the scheme. However, Sapir (1981), Oguledo and MacPhee (1994), Nilsson (2002), Verdeja, (2006) and Agostino et al. (2008) show that the GSP scheme has a positive effect, albeit smaller than that of other preferential schemes.

To be more precise, Sapir (1981) uses yearly cross-sectional OLS regressions of a gravity model for the period 1967-1978 to estimate the effect of the GSP scheme on manufactured products. He finds that the scheme had a significant and positive effect in 1973 and 1974. Oguledo and MacPhee (1994) use a similar method to estimate the effects of the GSP, Lomé, EFTA and Mediterranean agreements for 1976. The authors model the preferential treatment of the various schemes by using dummy variables which capture the trade diversion effect of preferences and import tariffs which gauge the trade creation effect of lower tariffs. Results show that GSP preferences have a significant effect on DC exports. Verdeja (2006) analyses whether trade preferences granted by the EU through the GSP, the Cotonou Agreement and the Euro-Med agreements have been beneficial to Least Developed Countries (LDCs). He considers the period 1972-2000 and finds that the GSP positively affected the exports of LDCs, although its impact was lower than that revealed for the trade preferences granted by the EU to the African, Caribbean and Pacific countries (ACPs) which signed the Cotonou agreement. Similar results are provided by Nilsson (2002), while Subramanian and Wei (2007) find a significant and positive impact of the EU GSP on total trade, albeit the effect is negative for the agro-food sector. In a recent paper, Cardamone (2009) restricts the evaluation to four products included in the fruit and vegetable sector (oranges, mandarins, apples and fresh grapes) by using monthly data at HS8 level. She shows that the impact of trade preferences differs according to the commodity under scrutiny. In particular, the GSP has a positive impact in increasing exports of apples and mandarins to the EU, while ACPs preferences are successful in enhancing EU imports of fresh grapes and mandarins. Furthermore, RTAs seem to achieve the goal of improving EU imports of all fruits but oranges. Agostino et al. (2008) find a positive impact of the EU GSP on the total exports of DCs, although the significance of the estimated parameter is very low. Moreover, when using 2-digit agricultural data, they reveal that the ordinary GSP only has a positive effect in the meat sector and that its impact is negative and significant in the livestock and sugar sectors and not significant in other agricultural sectors. Finally, they find that, for LDCs, only the GSP has a positive impact in the fruit and vegetable sector. Persson and Wilhelmsson (2007) find that ACPs preferences had the largest effects over the period 1960-2002, while eligible countries for GSP did not gain any advantage from the scheme. The same result can be found for the year

2004 in Cipollina and Salavatici (2007). As far as the EU GSP-Drug is concerned, Persson and Wilhelmsson (2007) find a negative impact for this scheme on the exports of beneficiaries. Finally, considering LDCs and the period 1991-1999, Persson (2005) finds that trade preferences enjoyed by LDCs had a negative influence on their exports. Further evidence of the negative impact of the EBA preferences is provided by Pishbahar and Huchet-Bourdon (2009), who also show that EU agricultural imports from EBA countries decreased over the period 2000-2004.

These mixed results regarding the actual effectiveness of the EU GSP may be better understood if we briefly refer to the conclusions obtained by other authors who have studied the structure and utilisation of GSP preferences.

When dealing with the structure of the GSP trade preferences, some authors (Brenton, 2003; Hoekman et al., 2001; Stevens and Kennan, 2000; Tangermann, 2002) observe that the preferential treatment of GSP is only generous with regards to a few products. Indeed, not every product benefits from trade preferences, and many goods receive a preference only within tight quotas. For instance, the MFN tariffs applied to EU imports of many tropical products are zero (*cfr* table 1) or negligible and so the preferences under the ordinary-GSP are of little or no use. Moreover, other products (eg., temperate raw products or processed food products) have been excluded from any preferential regime for a long period (Bureau et al., 2007; EU Commission, 2004). Finally, the same protectionist motives that prompt the EU to erect high trade barriers in many agricultural sectors (fruits, tropical fruits) also provide the grounds for not granting generous trade preferences in favour of DCs. This also holds true for the EBA initiative which, since its entering into force, has not allowed immediate free access to the EU market of three particularly important products for LDCs (rice, sugar and bananas) (*cfr* footnote 6).

Another important issue is the utilisation of trade preferences, which is defined as the ratio between the value of the imports actually receiving preferential treatment and the value of total imports eligible for that preference. The conclusion drawn from the related literature is that the preferential treatment granted under the EU GSP is underutilised. The main explanation given for this under-utilisation refers to the constraints of RoO, cost of compliance and requirements related to certification. As has been documented by Candau and Jean (2005) and Inama (2004), the rate of utilisation of the EU GSP is estimated at around 50% between 1994 and 2001. In 2000, requests for preferential access to the EU market were made for only 50% of the eligible imports from non-ACP LDCs (Candau and Jean, 2005; Inama, 2004). Two reasons for this are that the utilisation of preferential schemes is often costly and the beneficiary countries are not always able to meet the technical requirements. Thus, the greater the cost, the lower the benefit of any given preferential margin is. Moreover, the GSP often competes with other preferential arrangements. For instance, 36 ACP countries benefited both from the Cotonou

agreement and the EBA initiative, but they prefer to export under the Cotonou agreement because of the high costs attached to EBA preferences (Brenton; 2003; Bureau et al., 2007; Manchin, 2005; Stevens and Kennan, 2004). On the other hand, Brenton and Ikezuki (2005) underline a high degree of preference utilisation and show that, in 2002 only 2.4% of African exports to the EU failed to make use of trade preferences. This result is similar to that found in OECD (2005), where it is argued that, taken individually, the utilisation rate for some schemes may seem low, but that this is mostly due to the fact that certain products are eligible for preferential treatment under more than one scheme. The developing countries' agricultural and food exports that do not benefit from trade preferences represent a fraction of those eligible for preferences. Bureau and Gallezot (2004) compute that eligible imports and utilised preferences represented 38% and 32% respectively of total EU agricultural and food imports in 2002. With regards imports with non-zero MFN tariffs, 56% were eligible for a trade preference and 47% actually received one. Hence, the utilisation rate was 83% for those imports eligible for preferential treatment.

From these studies, it emerges that EU GSP preferences are under-utilised and this is for different reasons. First of all, if one considers exports of a product to the EU, the Cotonou agreement generally offers the same, or greater, advantages to an ACP country as the GSP does, and, if a country only benefits from the GSP, it will tend to be relatively discriminated against rather than preferred (Brenton, 2003). In addition, the RoO could explain the low utilisation of the EU GSP. The costs and complexity of implementing the terms required by a preference are principally due to the cost of compliance with administrative or technical requirements (Candau and Jean 2005; Manchin, 2005; Waino et al. 2005).

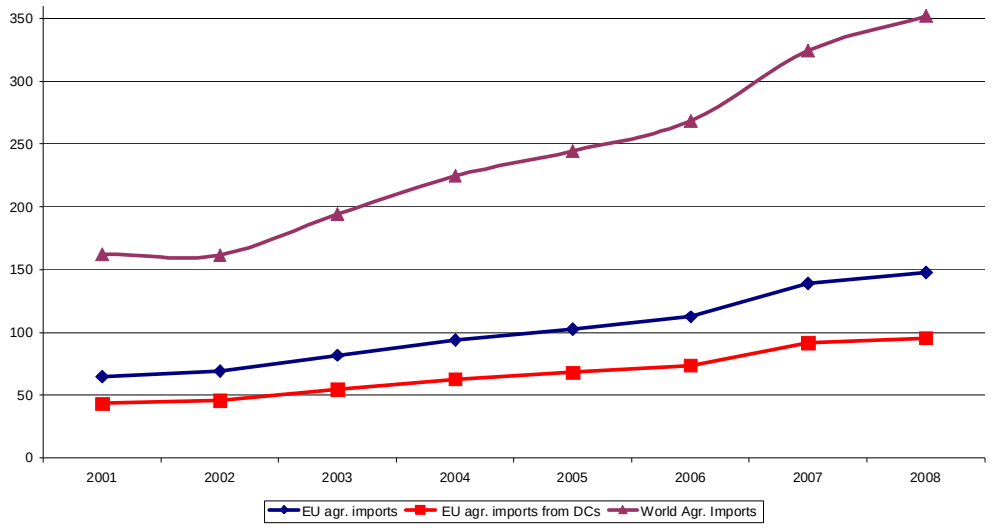
To sum up, studies of the GSP scheme focus on the agricultural sector, as it both plays a crucial role in DC economies and is highly protected in the European market. The literature agrees that the GSP scheme appeared rather generous, when compared to similar schemes run by other developed countries (Japan, USA), albeit only for a limited number of products and countries. At the same time, the literature reveals that there are doubts about the actual effectiveness of GSP preferences in enhancing DC exports to EU markets.

IV. A descriptive analysis of EU agricultural imports from GSP countries

In this section, we present an analysis of EU agricultural imports from GSP countries. We refer to EU agro-food imports for all GSP, GSP-Drug and EBA countries over the period 2001-2007 (data are from the COMTRADE database) and consider both EU agricultural imports as a whole and imports disaggregated by product group.

From figure 1, it emerges that EU agricultural imports increased over the period under scrutiny: in 2008, they were worth about US$148 billion, in other words twice the value (US$65 billion) observed in 2001 (data are expressed at 2001 constant prices). While this trend is in line with that observed for world imports, the comparison between the two time series suggests that a stable trend is exhibited by EU imports as a share of world imports (this share is about 14%-15% for each year of the period under scrutiny). Another interesting detail from figure 1 is that of the role of DCs in EU agricultural markets. On the one hand, data indicate that DCs are the largest suppliers to the EU, with a share of about 2/3 of total EU agricultural imports. On the other hand, it emerges that DC share of these imports is stable over time, with a weak shift from 66.8% in 2001 to 65.8% in 2008.

Figure 1 EU agricultural imports and world agricultural imports (2001-2008)
Data in billions US$ at 2001 constant prices.

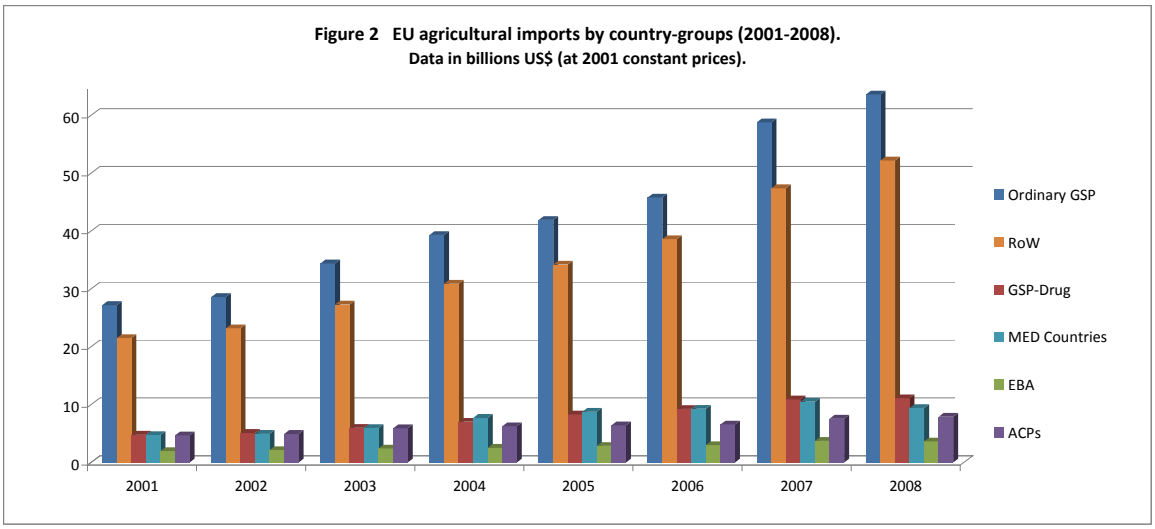


Source: UN COMTRADE

In figure 2 we have presented trends for EU agricultural imports from six groups of countries. The first five groups are those countries which are eligible for the trade preferences established under the GSP, ACP, GSP-Drug, EBA and the EuroMed agreements,[8] while the latter group (Rest of the World, RoW) is comprised of all other exporters. We wanted to ascertain whether EU imports of agro-food products from DCs and LDCs had increased and if their growth was uniform or not. Most EU agricultural imports come from GSP countries and from the RoW. The exports of GSP countries to the EU doubled over the period considered (from US$ 27.2 billion in 2001 to more than US$ 61 billion in 2008). The same applies for the RoW (from US$ 21.5

[8] The EBA, the GSP-Drug and the EuroMed agreements include 49, 15 and 12 countries respectively, while the ACP group we consider is formed by all ACPs non-LDCs and the GSP group comprises all DCs, other than those of ACP, EBA, GSP-Drug and EuroMed samples (*cfr*. Appendix A).

billion in 2001 to US$ 51 billion in 2008 at 2001 constant prices) as well as for Mediterranean countries and for DCs eligible for GSP-Drug. The value of LDC agricultural exports to the EU shows a increasing trend, but at a lesser rate than that observed for the other groups of countries. All these trends imply that the composition of EU agricultural imports has not changed over time and that GSP countries have maintained a dominant position, followed by the RoW. In this context, the EBA and the ACP countries register a decrease in their market shares in the EU agricultural market; in the case of EBA countries, shifting from 3.05% in 2001 to 2.5% in 2007, and dropping from 7.2% in 2001 to 5.3% in 2008 for ACP countries (Figure 2).



Source: UN COMTRADE

A further aspect to be considered is the composition of exports by product. Table 2 highlights the structure of agricultural exports from the DC eligible for GSP treatment to the EU market from 2001 to 2008, while tables 3 and 4 refer to countries eligible for GSP-Drug and EBA respectively. From table 2 it emerges that just four groups of products (fisheries; edible fruits and nuts; residues and waste from the food industry; oil seeds and oleaginous fruits) accounted for about 50% of EU agricultural imports from GSP countries in 2001 and more than 43% in 2008. If, on one hand, these data indicate that GSP agricultural exports have, over time, tended to become less concentrated, on the other hand, it emerges that the shares of each sector appear quite stable, except for animal or vegetables fats and oils whose quota increases from 4.78% in 2001 to 10.36% in 2008. The concentration is higher when considering GSP-Drug (Table 3). In such a case, the exports of two products alone (edible vegetables, roots and tubers; coffee, tea, mate and spices) make up more than 60% of total EU agricultural imports from GSP-Drug countries and the increases in market shares which can be quoted as being significant regard animal or vegetables fats and oils (from less than 1% in 2001-2003 to more than 4% in

2008), preparations of meat (from 3.68% in 2001 to more than 6% at the end of the period) and beverages, spirit and vinegar (from 1% in 2001 to about 2% in 2008). Finally, moving to EU agro-food imports from EBA countries, we find different and conflicting results (Table 4). Indeed, fisheries is the most important sector for EBA countries, although the market share shows a regular, marked, declining trend (from 43.27% in 2001 to 36.13% in 2007 and 29.82% in 2008). The exports of coffee, tea, mate and spices account for about 15% of total EBA agricultural exports to the EU and those of tobacco for about 10%. In contrast with the analysis of export composition under the ordinary GSP and GSP-Drug, the picture coming from the EBA initiative indicates a certain increase in the diversification of EBA agricultural exports. Indeed, the export structure of EBA changed in favour of several products (e.g. sugar, cocoa, live trees, edible fruits) whose weight increased over the period 2001-2008, while, at the same time, the share of a few products (preparations of meat, animal or vegetable fats and oils; oil seeds and oleaginous fruits) decreased slightly.

To sum up, vegetable products (fruits, vegetables, cereals, coffee etc.) and fisheries were the largest group of EU imports from DCs eligible for GSP preferential treatment, followed by prepared foodstuffs (preparations of meat, cereal based foods, sugar confections, beer, wine, spirits, and tobacco). The relative importance of these sectors in the export basket of DCs may be, *ceteris paribus*, a mirror of the protection in the EU market for agricultural and food products. An issue which will be addressed in the following section.

Table 2 Quota of EU agricultural imports from countries eligible for the ordinary-GSP by chapter, from 2001 to 2008 (%).								
Live Animals	0.63	0.64	0.66	0.65	0.62	0.42	0.40	0.39
Meat and edible meat offal	4.59	4.19	4.15	4.04	4.39	4.46	4.95	3.80
Fisheries	15.23	13.83	14.29	13.10	13.47	14.60	12.56	8.62
Dairy products	0.51	0.64	0.76	0.72	0.52	0.48	0.42	0.54
Products of animal origin	1.46	1.42	1.31	1.42	1.41	1.31	1.11	1.32
Live trees and other plants	1.62	1.71	1.70	1.67	1.63	1.63	1.46	1.52
Edible vegetables, roots & tubers	4.53	4.57	4.32	4.87	4.72	4.83	5.62	4.49
Edible fruits & nuts	13.29	13.00	13.72	13.70	14.80	14.15	13.12	12.98
Coffee, tea, mate & spices	5.87	5.14	4.83	4.67	5.40	5.63	5.23	5.82
Cereals	2.16	3.21	2.90	2.59	1.97	2.55	5.35	4.44
Products of the milling industry	0.07	0.08	0.08	0.08	0.10	0.09	0.12	0.10
Oil seeds & oleaginous fruits	9.08	8.43	8.82	8.83	7.93	7.07	7.59	8.30
Lacs, gums, resins & other veg. saps	0.57	0.53	0.47	0.51	0.55	0.57	0.51	0.50
Vegetable products n.e.s.	0.26	0.19	0.18	0.17	0.18	0.16	0.17	0.15
Animal or vegetable fats & oils	4.78	5.76	6.16	7.02	7.32	8.28	7.90	10.36
Preparations of meat	4.59	4.46	4.51	4.48	4.95	5.14	4.92	5.68
Sugars	2.79	2.81	2.67	2.65	2.64	2.44	2.15	2.20
Cocoa & cocoa preparations	2.06	2.77	3.33	2.84	3.08	2.80	2.94	3.15
Preps. of cereals, flour, starch, etc.	0.48	0.54	0.56	0.59	0.62	0.66	0.64	0.76
Preps. of vegetables, fruits, nuts & plants	6.39	6.80	6.43	6.56	6.73	6.62	6.27	6.16
Miscellaneous edible preparations	0.79	0.85	0.84	0.86	0.97	1.12	1.18	1.24
Beverages, spirits & vinegar	3.86	4.10	3.97	4.14	4.16	4.00	3.95	4.05
Residues and waste from food industry	11.25	11.09	10.54	11.33	9.55	8.84	9.41	11.25
Tobacco & tobacco products	3.14	3.22	2.80	2.50	2.27	2.15	2.05	2.17
Source: Own calculations of data from UN COMTRADE database								

Table 3 Quota of EU Agricultural Imports from countries eligible for GSP-Plus (Drug) by chapter, from 2001 to 2008 (%).								
Live Animals	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.01
Meat and edible meat offal	0.01	0.04	0.03	0.04	0.01	0.00	0.01	0.00
Fisheries	8.75	7.54	7.67	7.77	8.68	9.27	8.40	5.44
Dairy products	0.07	0.08	0.16	0.13	0.05	0.06	0.04	0.06
Products of animal origin	0.13	0.15	0.11	0.14	0.13	0.08	0.07	0.08
Live trees and other plants	6.65	6.49	5.64	5.15	4.73	4.59	4.35	3.97
Edible vegetables, roots & tubers	2.00	2.16	2.03	2.34	2.46	2.53	2.52	2.31
Edible fruits & nuts	42.38	46.34	47.98	49.64	46.14	44.10	44.72	48.18
Coffee, tea, mate & spices	21.96	17.73	15.73	15.01	17.09	18.27	16.70	18.80
Cereals	0.10	0.45	0.10	0.12	0.13	0.23	0.26	0.13
Products of the milling industry	0.06	0.06	0.06	0.05	0.07	0.06	0.08	0.08
Oil seeds & oleaginous fruits	0.62	0.54	0.47	0.53	0.82	0.58	0.51	0.83
Lacs, gums, resins & other veg. saps	0.09	0.14	0.06	0.15	0.08	0.13	0.13	0.09
Vegetable products n.e.s.	0.09	0.11	0.09	0.05	0.05	0.05	0.07	0.09
Animal or vegetable fats & oils	0.77	0.68	0.87	1.74	2.30	1.84	3.14	4.12
Preparations of meat	3.68	4.84	5.82	5.49	6.00	6.05	6.20	5.15
Sugars	0.18	0.17	0.17	0.23	0.20	0.32	0.32	0.25
Cocoa & cocoa preparations	0.92	1.49	1.89	1.62	1.52	1.34	1.58	1.80
Preps. of cereals, flour, starch, etc.	0.04	0.04	0.05	0.06	0.10	0.07	0.08	0.05
Preps. of vegetables, fruits, nuts & plants	4.37	4.31	4.01	3.83	3.37	3.72	4.39	3.54
Miscellaneous edible preparations	1.17	1.07	0.88	0.79	0.85	0.79	0.81	0.85
Beverages, spirits & vinegar	0.94	1.20	1.60	1.88	2.03	2.13	1.83	1.83
Residues and waste from food industry	3.79	3.35	3.60	2.34	2.52	3.20	3.16	1.83
Tobacco & tobacco products	1.19	1.00	0.96	0.89	0.61	0.56	0.64	0.49
Source: Own calculations of data from UN COMTRADE database								

Table 4 Quota of EU Agricultural Imports from countries eligible for EBA by chapter, from 2001 to 2008 (%).								
Live Animals	0.15	0.13	0.13	0.13	0.12	0.04	0.05	0.05
Meat and edible meat offal	0.19	0.05	0.05	0.03	0.05	0.07	0.05	0.02
Fisheries	43.27	43.75	41.83	39.99	37.70	39.90	36.13	29.82
Dairy products	0.04	0.05	0.14	0.12	0.05	0.05	0.04	0.05
Products of animal origin	0.15	0.15	0.11	0.10	0.10	0.09	0.08	0.06
Live trees and other plants	2.10	2.04	1.81	1.85	2.13	2.71	3.66	5.18
Edible vegetables, roots & tubers	3.24	3.66	3.45	3.93	3.92	3.94	3.64	3.84
Edible fruits & nuts	2.66	2.63	3.14	5.04	3.00	3.01	4.14	3.82
Coffee, tea, mate & spices	17.31	16.22	16.35	14.90	17.68	16.35	14.99	17.75
Cereals	0.11	0.21	0.22	0.37	0.19	0.27	1.01	0.59
Products of the milling industry	0.09	0.09	0.11	0.13	0.10	0.08	0.10	0.06
Oil seeds & oleaginous fruits	3.78	3.27	3.24	3.36	2.66	2.50	2.22	3.99
Lacs, gums, resins & other veg. saps	2.10	1.98	1.97	3.11	4.90	2.40	2.38	2.75
Vegetable products n.e.s.	0.38	0.36	0.39	0.38	0.28	0.26	0.25	0.25
Animal or vegetable fats & oils	4.22	3.82	2.63	2.20	1.95	1.76	2.89	2.38
Preparations of meat	3.74	3.84	4.56	5.07	4.15	3.34	2.50	2.44
Sugars	3.04	4.25	5.56	5.30	5.98	6.28	7.02	8.50
Cocoa & cocoa preparations	1.07	1.91	2.30	2.36	4.15	5.26	5.44	7.59
Preps. of cereals, flour, starch, etc.	0.04	0.04	0.04	0.07	0.08	0.14	0.14	0.18
Preps. of vegetables, fruits, nuts & plants	0.33	0.49	0.51	0.59	0.59	0.61	0.50	0.53
Miscellaneous edible preparations	0.51	0.47	0.44	0.37	0.53	0.57	0.50	0.76
Beverages, spirits & vinegar	0.12	0.45	0.45	0.08	0.10	0.18	0.15	0.18
Residues and waste from food industry	1.55	1.45	0.84	0.64	0.20	0.52	0.48	0.17
Tobacco & tobacco products	9.81	8.70	9.73	9.89	9.40	9.68	11.65	9.04
Source: Own calculations of data from UN COMTRADE database								

V. Some descriptive statistics on GSP tariffs

This paragraph focuses on the preferential trade tariffs applied by the EU to its imports from GSP countries. The indicators used to measure the level of preferences offered by the EU GSP scheme in 2004 and 2006 are summarised in table 5. In 2004, 1,658 tariff lines were eligible for a tariff reduction under the ordinary GSP, i.e. 48% of the total of 3,453 product lines covered by the scheme. This proportion increased to 69% (2,489 preferred goods out of 3,603 total lines) when considering the GSP-Drug and to approximately 98% (3,631 out of 3,683 lines) for the EBA initiative. In 2006, the coverage of products benefiting from trade preferences was 57% for the GSP, 63% for the GSP-Drug and 98% for the EBA schemes. In terms of the absolute incidence of GSP coverage, it is interesting to note that the number of products enjoying a preference under the ordinary GSP increased from 1,658 in 2004 to 1,998 in 2006, while there was a decrease under the GSP-Drug from 2,489 products in 2004 to 2,178 in 2006. In 2006, there were 3,390 products eligible for EBA preferences, which was fewer than the 3,631 preferred lines in 2004. The sum effect, combining the coverage of the schemes and the number of products with zero-duty in each agreement (columns 5 and 6 of table 5), represents the average tariff faced by exporting countries and the resulting margin of preference. As expected, the simple average tariff was high for products exported under MFN conditions (more than 19% in

2004 and 2006) and decreased to around 17% in the case of the ordinary GSP. The applied tariff for GSP-Drug was 14% and it was very low for the EBA initiative (1.36% in 2004 and 0.38% in 2006). Finally, we can see that the preferential margin was significantly high only for EBA schemes (around 18%), while it was 5% for the GSP-Drug and just around 2% for the ordinary GSP (Table 5). In conclusion, it can be said that even if the average rate for GSP tariffs did not change much between the old and the new GSP schemes, the number of tariff lines involved increased. This is particularly true when considering the ordinary GSP.

Based on these results, on one hand, one would expect the GSP scheme to have a generally modest impact, as the trade preferences it gives to DCs are, on average, very low. However, by analysing EU imports from preferred countries (cfr figures 2 and 3), it emerges, on the other hand, that there was an increase in trade even though the preferential margin in percentage points changed slightly over time. All this suggests that export flows depend not only on other variables (see § VII and VIII), but also on the structure of trade preferences granted by the EU. In order to look at this issue in detail, table 6 shows the number of products by the level of GSP applied duties. In 2004, 973 products faced a duty greater than 20%, while the tariff applied to a further 958 goods ranged between 10% and 20%. These products faced a tariff of more than 10% and represented more than 50% of the products covered by the GSP. In contrast, the tariff applied to 602 products ranged from 1% to 5% and was less than 1% for the other 547 goods.

Table 7 compares the level of GSP tariffs and the margin of preferences for each group of HS2-digit agricultural products for the years 2004 and 2006.[9] The data allows us to observe whether, and to what extent, tariffs differed across sectors, trade arrangements and from one year to another. By limiting the discussion to the margin of preferences, it can be noticed that, as expected, there are relevant differences between the ordinary GSP and the GSP-Drug. Furthermore, the preferential margin is quite stable in 2004 and 2006 (the major changes ™occurred in fisheries [from 3.99% to 2.01%], vegetables [3.1%; 2.25%], preparations of meat [5.22%;4.19%]). The agricultural sectors with the highest margins of preference under the ordinary GSP regime were tobacco (about 8.16% in 2006), preparations of meat (5.22% in

[9] This data is based on the DBTAR database built up by J. Gallezot from INRA (See Gallezot 2006). From this source, we have extracted and computed EU *ad valorem* equivalents (AVE) of the MFN and GSP tariffs for agri-food products for 2006 in order to assess the size of the preference margin offered by the GSP scheme. The 2006 AVE has been computed with the 2004 unit value in order to be comparable with the 2004 AVE; in other words, any differences in the preference margin between the two years are due to changes in the GSP tariff, not to differences in world prices. The HS2 average tariffs faced by the beneficiaries of the GSP have been computed using a simple average of the AVEs calculated at the NC10 level. When a line was excluded from preferences, the MFN AVE has been used for the computation. When the tariff evolved during the year (due to seasonal changes, for example), a simple average over the year has been used.

2006), preparations of fruits and vegetables (4.98% in 2006) and fisheries (3.99% in 2006). The average margin was modest in the chapters of livestock, meat, dairy products, other animal products, cereals, products of the milling industry, oilseeds, sugar, and residues and waste from the food industry. To sum up, the level of the preferential tariff granted by the GSP did not change much as a result of the introduction of the 2006 GSP scheme (on average, less than one percentage point between 2004 and 2006), nor did all chapters benefit from the reductions.

Table 5 Products coverage, number of products with a preference and preferential margin under each GSP scheme in 2004 and 2006.

Regime	Number of Products		Number of products with a preference		Number of products with MFN=0		Simple average faced by beneficiaries		Preferential margins (in percentage points)	
	2004	2006	2004	2006	2004	2006	2004	2006	2004	2006
MFN	3677	3447	0	0	405	388	19.61%	19.04%	0	0
GSP	3683	3453	1658	1998	522	553	17.68%	16.95%	1.93	2.1
GSP+	3683	3453	2489	2178	2236	2161	14.58%	13.97%	5.03	5.07
EBA	3683	3453	3631	3390	3629	3389	1.36%	0.38%	18.25	18.66

Source: Demaria et al. (2008)

Table 6: Duty, number of lines and preferential margin under the GSP schemes in 2004.

Level of the Duty	Number of Tariff Lines	%	Preferential Margin under Ordinary GSP (Min-Max)	Preferential Margin under GSP-Drug (Min-Max)	Preferential Margin under EBA (Min-Max)
Total	**3683**	**100**	0 < marg < 175.22	0 < marg < 184.76	0 < marg < 184.76
>20%	973	26	0 < marg < 175.22	0.14 < marg < 184.76	8.86 < marg < 184.76
10-20%	958	26	1 < marg < 16.97	1.3 < marg < 19.97	1.68 < marg < 19.97
5-10%	603	16	0.5 < marg < 9.71	0.16 < marg < 9.94	3.84 < marg < 9.94
1-5%	602	16	0.09 < marg < 4.36	0.6< marg < 4.96	1.15 < marg < 4.16
<1%	547	15	0 < marg < 0.97	0 < marg < 0.97	0 < marg < 0.97

Source: own computation based on data from DBTAR (2006) and Taric.

Table 7 Tariffs and Preferential Margins under GSP, by HS02-digit agricultural products (in %) (2004 and 2006).

	Ordinary GSP tariffs (%)		GSP Plus (Drug) tariffs (%)		MFN tariffs (%)		Ordinary GSP: Margin of Preferences (percentage points)		GSP Plus (Drug) Margin of Preferences (percentage points)	
Chapters (HS2)	**2006**	**2004**	**2006**	**2004**	**2006**	**2004**	**2006**	**2004**	**2006**	**2004**
01- Live animals	40.17	40.17	40.04	40.04	40.49	40.49	0.33	0.33	0.45	0.45
02- Meat	43.85	43.45	43.47	43.31	43.97	43.71	0.12	0.25	0.50	0.40
03- Fisheries	6.51	8.73	0.03	0.03	10.51	10.74	4.00	2.02	10.47	10.71
04- Dairies	52.40	50.23	51.92	50.12	52.70	50.68	0.30	0.45	0.79	0.56
05- Other animal products	0.08	0.08	0.00	0.00	0.24	0.24	0.17	0.17	0.24	0.24
06- Live trees and plants	3.33	3.56	0.00	0.00	6.40	6.79	3.08	3.23	6.40	6.79
07- Vegetables	38.79	37.67	37.76	36.15	41.89	39.92	3.10	2.25	4.13	3.77
08- Fruits	18.54	19.08	17.38	17.71	20.26	20.64	1.72	1.56	2.88	2.94
09- Coffee, tea, spices	1.09	1.09	0.00	0.12	3.05	3.05	1.96	1.96	3.05	2.93
10- Cereals	18.85	36.60	18.84	36.58	18.86	36.60	0.01	0.00	0.02	0.02
11- Products of the milling ind.	22.29	22.22	21.89	21.78	22.55	22.51	0.26	0.29	0.66	0.73
12- Oilseeds	1.66	1.31	0.87	0.86	2.38	2.35	0.72	1.04	1.51	1.49
13- Lac, gums, resins	5.11	5.24	0.00	0.00	7.93	7.89	2.82	2.65	7.93	7.89
14- Other vegetable products	0	0	0	0	0	0	0	0	0	0
15- Oils and fats	5.61	5.73	2.78	2.86	8.54	8.60	2.94	2.87	5.76	5.75
16- Preparations of meat, fish	12.80	13.75	4.21	4.34	18.03	17.94	5.23	4.19	13.82	13.60
17- Sugar	19.94	21.18	18.78	20.19	20.57	21.74	0.63	0.56	1.80	1.55
18- Cocoa	22.99	22.92	21.27	21.37	24.16	23.96	1.17	1.05	2.89	2.59
19- Preparations of cereals	26.34	27.67	23.45	24.35	29.45	30.86	3.11	3.19	6.00	6.51
20- Preparations of fruits and veg.	18.19	18.18	4.25	3.98	23.16	22.55	4.98	4.37	18.92	18.57
21- Miscellaneous edible preparations	11.03	11.46	5.97	6.28	14.33	14.85	3.29	3.39	8.36	8.57
22- Beverages	11.98	11.16	7.74	7.42	13.34	12.64	1.36	1.49	5.60	5.23
23- Waste from food industry	15.01	12.76	14.71	12.51	15.92	13.60	0.91	0.84	1.21	1.09
24- Tobacco	10.15	10.15	0	0	18.31	18.31	8.16	8.16	18.31	18.31

Source: own computation based on data from DBTAR (2006) and Taric.

VI. The gravity equation

The gravity model is widely used to explain the pattern of bilateral trade between nations and its formulation is based on the idea that trade is positively influenced by the economic mass of the trading countries and negatively affected by the geographical distance between them. Again, trade flows are subject to trade resistance factors which can be improved by preferential trade arrangements, such as the EU GSP.

The basic specification of the gravity equation used in the estimation is the following:

(1)

$$\begin{aligned}\ln(M^{t}_{ijl}) = \alpha &+ \beta_1 \ln(GDP^{t}_{i}) + \beta_2 (GDP^{t}_{j}) + \beta_3 \ln(POP^{t}_{i}) + \beta_4 (POP^{t}_{j}) + \\ &+ \beta_5 \ln(Dist_{ij}) + \beta_6 Colony_{ij} + \beta_7 Language_{ij} + \beta_8 Border_{ij} + \\ &+ \beta_9 \ln(GSP^{t}_{ijl}) + \beta_{10} \ln(GSP - Drug^{t}_{ijl}) + \beta_{11} \ln(EBA^{t}_{ijl}) + \\ &+ \beta_{12} \ln(ACP^{t}_{ijl}) + \beta_{13} \ln(MED^{t}_{ijl}) + u^{t}_{ijl}\end{aligned}$$

where subscript *i* refers to the importing countries, which, in our case, are the members of EU-15; *j* refers to the exporting country; *l* to the product line; *t* is time. The notation is defined as follows: M^{t}_{ijl} are the exports of products *l* from country *j* to country *i* at time *t*; GDP^{t}_{i} and GDP^{t}_{j} represent the economic size of country *i* and country *j* at time *t*; POP^{t}_{i} and POP^{t}_{j} are the populations of the two countries at time *t*; $DIST_{ij}$ is the distance between the locations measured from capital to capital; Language is a dummy that takes value 1 if countries *i* and *j* speak the same language, and 0 otherwise; Colony is a dummy that takes value 1 if colonial links exist (or have existed) between countries *i* and *j*, and 0 otherwise; Border is a binary variable assuming the value 1 if countries *i* and *j* share a common land border, and 0 otherwise; u_{ijl} is a composite error term.

As mentioned above (*cfr* § 1), for the purpose of this study, we have to address the crucial issue of the measure of the trade preferences, which, in the related literature, have been often captured through dummy variables, which are equal to one if the exporting country belongs to a PTA and zero otherwise. Thus, their coefficient is expected to be positive because preferred countries should export more than non-preferred countries. However, this approach is not wholly satisfactory because dummies treat all preferences as a homogeneous group, without taking into account their specific characteristics. Furthermore dummies do not distinguish between different preferential instruments, such us preferential margins, quotas and entry prices. Finally, they do not consider the rate of preference utilisation and the cost of compliance.

There have recently been some studies that have used preferential margin or tariffs to assess potential benefits deriving from preferential schemes (Cardamone, 2009; Cipollina and Salvatici, 2007; Emlinger et al., 2009). Some of these studies (Cardamone, 2009; Cipollina and Salvatici, 2007) have calculated the preferential margin as the difference between the highest tariff applied by the EU and the duty paid by an exporter for a given product. While Cipollina and Salvatici (2007) do not distinguish between different preferential margins, Cardamone (2009) does. Emlinger et al., 2009 used the tariffs rather than the preferential margin to measure the preferences granted. Following these recent papers and in order to overcome many of the shortcomings related to the dummy approach, this paper employs a quantitative measure of the trade preferences and, in this sense, the other elements in eq. [1] (GSP, GSP-Drug, EBA, ACP, MED) become the key variables of our analysis. They represent the preferential margin established under a given agreement in favor of a country when exporting certain commodities to the country giving preferences. For instance, GSP_{ijl}^{t} is the preferential margin under the ordinary GSP that the *j-th* country enjoys at time t when exporting product line *l* to country *i*. The same applies for the other preference variables (GSP-Drug, EBA, ACP and MED). For each trade agreement, the preferential margin is defined as the ratio between the preferential margin (the difference between the MFN and the preferential duties at each tariff line) and the MFN tariff. The formula is:

$$\text{PreferentialMargin}_{ijt}^{l} = \frac{\text{MFN}_{ijt}^{l} - \text{PREF\_TARIFF}_{ijt}^{l}}{\text{MFN}_{ijt}^{l}} \tag{2}$$

where *i* refers to importers, who, in our case, are the members of EU-15, *j* indicates the exporting countries, *l* is the tariff line and *t* is time. PREF_TARIFF indicates the preferential tariffs applied under the specific trade arrangement (GSP, GSP-Drug, EBA, ACP, MED). This measure allows us to take into account the size of the actual tariff preference for a particular product.[10] The overlapping of preferences has been solved by taking for a given trade flow the maximum margin of preference as that which has been used by the beneficiary country. For instance, if a country is eligible for preferential treatment under both the GSP and the Cotonou agreement, and

[10] The MFN and the preferential tariffs come from the DBTAR database (see Appendix B), which has enabled us to identify the tariffs applied by the EU under the different preferential regimes. We have extracted tariff data at the 10-digit level and consolidated it at the 6-digit level for each partner and each year, by averaging (simple average) the data of 10-digit lines. For each preferential scheme, each product line and each year, we have generated the simple average of preferential tariffs and computed the preferential margin. To assign the preferential margin to country groups, we use dummies for the country groups belonging to different preferential schemes. For each country and each preferential scheme, we have constructed a dummy that takes a value of 1 if the country benefits from a particular scheme and zero otherwise.

the preferential margins are, respectively, 3% and 5%, we assume that country will export under the Cotonou agreement and set the GSP preferences equal zero.

The econometric analysis considers the imports of each EU-15 member of HS6-digit 763 agricultural products (*cfr* footnote 3) from 169 exporters (the exporting countries are listed in Appendix A). In estimating the eq. [1] we consider the 4-year period 2001-2004, and this time coverage is due to the availability of data on tariffs for the very large set of products. The only dataset which makes a large amount of statistics easily available on tariffs, such as the ones we need to run our regressions at HS6-digit level, is DBTAR (2006) and this source covers the period 2001-2004.

VII. Econometric issues and the estimation method

In estimating a gravity model, there are three econometric issues to be addressed which are related to the non-observable heterogeneity of countries and to sample selection bias.

With regards country heterogeneity, it ought to be said that it introduces bias into the estimation because of the likely correlation between non–observable, country-specific effects and the explanatory variables of the gravity equation. Heterogeneity may be due to observable and unobservable factors (such as the propensity of one country to export more than others, cultural and historical links or business cycle effects), and/or to several other aspects which define each country-pair background (i.e., common language, colonial past, shared border or religion). While this background based on observable factors can be handled by using a set of dummy variables, it is necessary to use a model with country fixed effects to control for non-observable factors (Serlenga and Shin 2007). In order to take into account countries' heterogeneity, we have decomposed the error term of equation (1) as follows:

$$u^{t}_{ijl} = \alpha_i + \alpha_j + \alpha_l + \alpha_t + \varepsilon^{t}_{ijl} \quad (3)$$

where α_i and α_j refer to time-invariant importer and exporter-country fixed effects, respectively, α_l to commodity fixed effects, α_t to time fixed effects and finally ε^{t}_{ijl} is an idiosyncratic error term. The fixed effects were meant to capture all unobserved factors that influence export flows, while the time variable allowed us to control for macro-economic factors that may have occurred over our sample period.

As far as sample selection bias is concerned, it must be pointed out that there is a long tradition of using a log-linearization of gravity equations. However this procedure fails when zero trade observations are present and will lead to biased estimates. There is a great deal of evidence that zeros are frequent in bilateral trade. For instance, Haveman and Hummels (2004)

find that almost 1/3 of bilateral trade flowing between 173 countries in 1990 was zero, while Helpman et al. (2008) show that about half the country pairs in their sample of 158 trading countries did not trade with each other from 1970 to 1997. In our case, because of the product disaggregation, zeros extend to 90% of the entire sample. Therefore, dropping zeros implies a loss of useful information as to why some countries trade in certain sectors and not in others.

The issue of zero-trade flows has been widely addressed in the literature on gravity empirics (Martinez-Zarzoso et al., 2007; Martin and Pham, 2008; Santos Silva and Tenreyro, 2006). In particular, Santos Silva and Tenreyro (2006) contribute to the discussion as to which estimator provides the most reliable results by assessing the potential bias of elasticities in a log linearised regression. They show that the consistency of an OLS estimator depends on a restrictive assumption regarding the error terms and suggest that the gravity equation could be estimated in its multiplicative form by using the Pseudo Quasi Maximum Likelihood Method (PQML) based on a Poisson Model. Moreover since the standard Poisson model is vulnerable to problems such as over-dispersion and excess zero flows, we have used other estimation techniques, i.e. the Zero Inflated Poisson (ZIP) and the Negative Binomial Regression (NBR), as in Burger, van Oort, and Linders (2009).

More precisely, Santos Silva and Tenreyro (2006) argue that linearisation of the gravity equation in the presence of heteroskedasticity leads to inconsistent estimates because the expected value of the logarithm of a random variable depends both on its mean and on higher-order moments of its distribution. Hence, if variance of the error term depends on regressors, the expected value of the error term logarithm will also depend on the regressors, violating the condition of consistency of OLS. The PML allows us to estimate the gravity equation and, more generally, constant elasticity models in their multiplicative form, and to allow for heteroskedasticity. However, an important condition of the Poisson model is equi-dispersion. In many cases, though, the conditional variance is normally higher than the conditional mean, which implies that the dependent variable is over-dispersed. The Poisson regression model only accounts for observed heterogeneity, where different values of the predictor variables result in a different conditional mean value. Unobserved heterogeneity, however, originates from omitted variables; if we do not take into account unobserved heterogeneity, the results are inconsistent and inefficient. In order to correct for over-dispersion, a negative binomial regression model can be used. The expected value of the observed trade flow in the negative binomial regression model is the same as in the Poisson regression model, but the variance here is specified as a function of both the conditional mean and a dispersion parameter. In other words, an additional error term has been added to the negative binomial regression model. The standard errors in the Poisson Model will be biased downward resulting in spuriously large z-values and spuriously

small p-values (Cameron and Trivedi, 1986, 31). The Zero-Inflated model accounts for two latent groups within the population: a group with zero counts and a group with a non-zero probability of having counts other than zero. As Burger et al. (2009, p. 175) summarise: these models "take into account that not all pairs of countries have the potential (or are at risk) to trade because of trade embargos or a severe mismatch between demand and supply. On a similar note, the geographical or cultural distance between countries may simply be too large for trade to be profitable. Hence, the profitability of trade, which reflects the trade potential, can be separated from the volume of trade as stemming from two different processes".

To sum up, we have evaluated the preferences for agro-food products (from HS01 to HS24) granted by the EU under its GSP scheme from 2001 to 2004 using five different estimators (OLS, LSDV, PQML; ZIP and NBR), the results of which are presented in the successive section.

VIII. Results

In this section, we have summarised the results obtained when estimating equation [1] with the: the OLS, LSDV, PQML, NBR (Negative Binomial Regression) and the ZIP (Zero Inflated Poisson) procedures. The first estimations we made regarded the pooled data of all agricultural exports to the EU. Afterwards we ran separate regressions for the following groups of products: livestock, fisheries, fruits, lacs and gums, oils and fats, products of animal origin, sugar, vegetables, beverages and spirits, tobacco, tropical fruits and residues from the food industry. Whatever the estimation, the trade statistics used are identified at HS6- digit level. The results for the pooled data are presented in table 8, while those obtained sector-by-sector are presented in table 9.

The first five columns of table 8 show the results obtained when equation [1] is estimated using the aforementioned methods. By comparing the outcomes, it emerges that the estimated parameters differed both in sign and magnitude. Briefly, when focussing on gravity standard variables, we found that the elasticity of importing country GDP was always positive and statistically significant in OLS (column 1), Poisson (column 3) and NBR (column 4) estimates. On the other hand, exporting country GDP was only found to exert a significant (and negative) impact in OLS results. As for the observable country-pair variables, we found that the best performing estimators were the Poisson and the NBR. It was only then, indeed, that some variables (Distance, Colonial Ties and Common Language) showed the expected signs and were statistically significant. The impact was significant and often had the wrong sign in all the other

regressions. This was the case with Border, for instance, where, when significant, a negative sign emerged.

With regards to the goal of this work, we found that the GSP preferential scheme exerted a positive and significant impact on beneficiary countries in all the regressions and was significant in OLS, LSDV and ZIP regressions. When significant, its estimated value ranged from 0,024 (ZIP regression) to 0,061 (LSDV estimates), whereas the estimate was 0.042 with the OLS. The same applied for the EBA initiative, whose coefficient was 0.025 in OLS results, 0.038 in the ZIP regression and 0.086 when considering the LSDV estimator. The estimated coefficient of the GSP-Drug was significantly positive only when using the LSDV, while it turned out to be negative in the OLS and the ZIP regression (although in this case the significance was at the 10% level). Little encouraging evidence was found for the impact of the EuroMed agreement, which, at best, was positive and significant only in the LSDV regression. Finally, the preferential margin granted under the Cotonou Agreement in favour of ACPs positively affected the agricultural exports of beneficiaries only when the gravity model was estimated using the OLS and the LSDV techniques (table 8).

Overall, the evidence emerging is mixed. On the one hand, the only clear indication comes in the form of the positive impact exerted by the Ordinary GSP. On the other hand, the only results regarding the impact of all of these preferential agreements are those obtained from the LSDV method. As can be seen in table 8, this estimator yields statistical and positive coefficients whatever the trade preference and, in this sense, one conclusion that can be drawn is that the largest impact was the one brought about by the EBA initiative (the estimated parameter is 0.086), followed by the ordinary GSP (0.061), Med (0.02), GSP-Drug (0.012) and, finally, by the Cotonou agreement (0.009).

In order to check the robustness of results, we have re-estimated our models by replacing the five separate variables measuring the preferential margins (Ordinary GSP, GSP-Drug, EBA, ACP and EuroMed) with the variable named MaxPref, which corresponds to the maximum margin of preference observed for each export flow. The rationale behind this variable is to address the overlapping of preferences by assuming that any trade flow is determined by only one trade agreement, i.e. by the one assuring the largest preference margin. This is similar to what we did before when addressing the issue of preference overlapping (*cfr* § VI), but in this case we use a single, common vector, MaxPref, instead of five different preferential variables. The use of this variable is meant to provide an overall assessment of the effectiveness of the trade preferences granted by the EU. The estimation outcomes, which are summarised in table 8, indicate that the sign of the coefficient of MaxPref is always positive, although is only significant in two out of three regressions (OLS and LSDV estimates). This robustness check

tends to support the view that EU trade preferences help DCs export more to European agricultural markets.

Finally, in the following we limit the presentation of the results obtained when running the gravity regression for each agricultural sector to those related to the Zero Inflated Poisson Regression. The estimates are displayed in table 9.

In comparing results between agricultural groups, we found that the GDP coefficient for importing countries is positive and statistically significant in two cases, oils-fats and residues from the food industry, while it is negative and not significant in the other group of products. The GDP coefficient for exporting countries is negative and significant in all regressions except for tobacco, where it is positive and significant. The population coefficient of importing countries has an ambiguous sign, as well the population coefficient of exporting countries. Distance is unexpectedly positive and significant in the case of live trees, fruits, oils-fats and tropical fruits, at a level of significance of 1%. Border, colony and language have ambiguous signs.

With respect to the preferential margin, the coefficient for the GSP presents a positive coefficient for the following agricultural groupings: live Trees (0.036), sugar (0.020), fruits (0.019), tropical fruits (0.038) and residues from the food industry (0.036), and a negative and significant coefficient for beverages-spirits (-0.084) and oils-fats (-0.204). The GSP-Drug shows positive and significant coefficient in oils-fats (0.054) and beverages-spirits (0.018), while it reports a negative and significant coefficient for residues from the food industry (-0.064) and live trees (-0.012). The EBA special initiative only has a positive and significant coefficient for lacs-gums (0.049), while, in the other groupings, its coefficient is positive but not statistically significant. The ACP coefficient is positive and significant for the following products: fruits (0.027), vegetables (0.012), lacs-gums (0.036) and beverages-spirits (0.031). The Mediterranean preferential margin is positive and significant for tropical fruits (0.028) and beverages-spirits (0.023), while it is negative and statistically significant for tobacco (-0.034). Nothing can be said with regards other products (fisheries and products of animal origin) since the Zero Inflated Poisson Regression does not converge.

Based on these results, it may be argued that the evidence revealed regarding the sector by sector impact of trade preferences is puzzling. The impact of the GSP scheme is effective in increasing DC exports to EU of live trees, sugar, fruits, tropical fruits and residues from the food industry, while the GSP-Drug and the EBA are able to increase DC exports of oils and fats, beverages-spirits and lacs-gums. The Cotonou agreement is effective in increasing the exports of fruits, vegetables, lacs-gums and beverages-spirits, while the EuroMed agreement is effective in increasing the DC exports of tropical fruits and beverages-spirits.

Table 8 UE-15 Agricultural Imports and the impact of the EU GSP scheme. Estimates of a gravity equation when using the OLS, LSDV, Poisson, NBR and the ZIP methods (2001-2004).

	OLS	*LSDV*	*POISSON*	*NBR*	*ZIP*	*OLS*	*LSDV*	*ZIP*
GDP IMPORTER	0.841***	0.119	1.469***	2.900***	0.180	0.889***	0.142	1.491***
	[0.016]	[0.257]	[0.291]	[0.636]	[0.415]	[0.017]	[0.256]	[0.291]
GDP EXPORTER	-0.102***	-0.013	0.010	0.004	-0.008	-0.027***	0.043	0.033*
	[0.004]	[0.038]	[0.020]	[0.051]	[0.044]	[0.003]	[0.037]	[0.018]
POP IMPORTER	-0.065***	-0.644	-2.921**	2.944	-0.163	-0.114***	-0.824	-2.874**
	[0.016]	[1.058]	[1.372]	[3.938]	[1.564]	[0.017]	[1.055]	[1.362]
POP EXPORTER	-0.091***	0.530	-0.564	-1.561**	-0.247	-0.148***	1.087**	-0.262
	[0.004]	[0.436]	[0.659]	[0.739]	[0.550]	[0.004]	[0.431]	[0.655]
DISTANCE	0.079***	0.230***	-0.400***	-0.636***	0.277***	0.083***	0.227***	-0.401***
	[0.006]	[0.017]	[0.068]	[0.091]	[0.027]	[0.005]	[0.017]	[0.068]
GSP	0.042***	0.061***	0.021	0.002	0.024***			
	[0.002]	[0.003]	[0.023]	[0.023]	[0.003]			
GSP DRUG	-0.016***	0.012***	-0.015	-0.045	-0.007*			
	[0.002]	[0.004]	[0.019]	[0.028]	[0.004]			
EBA	0.025***	0.086***	0.042	0.010	0.038***			
	[0.002]	[0.003]	[0.035]	[0.040]	[0.004]			
ACP	0.010***	0.009***	-0.021	-0.038*	-0.022***			
	[0.002]	[0.002]	[0.018]	[0.023]	[0.002]			
MED	-0.021***	0.020***	-0.012	-0.028*	-0.008*			
	[0.002]	[0.004]	[0.013]	[0.017]	[0.005]			
BORDER	-0.274***	-0.014	-0.375***	0.032	0.022	-0.206***	-0.016	-0.375***
	[0.023]	[0.028]	[0.070]	[0.095]	[0.040]	[0.022]	[0.028]	[0.070]
LANGUAGE	-0.157***	-0.181***	0.265***	0.276***	-0.154***	-0.086***	-0.184***	0.265***
	[0.017]	[0.019]	[0.058]	[0.105]	[0.025]	[0.016]	[0.019]	[0.058]
COLONY	-0.002	-0.015	0.365***	0.699***	-0.025	-0.022	-0.019	0.365***
	[0.016]	[0.018]	[0.034]	[0.066]	[0.023]	[0.015]	[0.018]	[0.034]
MAXPREF						0.037***	0.054***	0.010
						[0.001]	[0.001]	[0.018]
CONSTANT	-6.431***	8.162	32.089	-76.210	11.869	-7.959***	-1.550	18.813
	[0.200]	[14.864]	[21.423]	[72.470]	[20.250]	[0.199]	[14.793]	[18.904]
OBSERVATIONS	175884	175884	3712014	3712014	3712014	175884	175884	3712014
R-squared	0.193	0.245				0.197	0.249	

Robust standard errors in brackets * significant at 10%; ** significant at 5%; *** significant at 1%

Table 9: Results from Zero Inflated Poisson regression, by groups of products (2001-2004).

	(1) **Live trees**	(2) **Fruits**	(3) **Lacs, gums, resine & other vegetables**	(4) **Oils & Fats**	(5) **Sugar**	(6) **Tropical fruits**	(7) **Vegetables**	(8) **Beverages, Spirits & Vinegar**	(9) **Residues from Food Industry**	(10) **Tobacco**
GDP IMPORTER	-0.364	0.411	-0.117	4.548***	0.529	-0.676**	-0.520	-0.716	1.482*	-0.202
	[0.702]	[0.313]	[0.442]	[1.362]	[0.703]	[0.318]	[0.566]	[0.569]	[0.781]	[1.024]
GDP EXPORTER	-0.155***	-0.030	0.027	-0.011	-0.158***	-0.176***	-0.065**	-0.059**	0.037	0.085**
	[0.026]	[0.019]	[0.030]	[0.035]	[0.032]	[0.023]	[0.029]	[0.024]	[0.045]	[0.034]
POP IMPORTER	7.804***	-1.220	1.035	-16.906***	-0.635	1.678	2.504	0.882	-6.167**	2.403
	[2.809]	[1.245]	[1.634]	[5.269]	[3.093]	[1.383]	[2.573]	[2.452]	[3.032]	[5.063]
POP EXPORTER	0.029	-0.091***	-0.089***	-0.050	0.034	0.008	-0.036	-0.008	-0.083	-0.109***
	[0.027]	[0.020]	[0.026]	[0.041]	[0.032]	[0.021]	[0.025]	[0.023]	[0.051]	[0.039]
DIST	0.113***	0.065**	-0.027	0.114**	0.055	0.177***	0.029	0.024	0.119***	-0.016
	[0.031]	[0.026]	[0.040]	[0.056]	[0.048]	[0.030]	[0.031]	[0.033]	[0.044]	[0.056]
GSP	0.036***	0.019***	-0.204***	-0.015	0.020**	0.038***	0.005	-0.084***	0.036***	0.018
	[0.008]	[0.006]	[0.030]	[0.038]	[0.008]	[0.007]	[0.009]	[0.008]	[0.013]	[0.015]
GSP DRUG	-0.012*	-0.010	0.054***	-0.017	-0.010	-0.015	-0.009	0.018*	-0.064**	-0.006
	[0.007]	[0.011]	[0.014]	[0.033]	[0.008]	[0.010]	[0.009]	[0.010]	[0.030]	[0.014]
EBA	-0.009	-0.001	0.049***	0.006	0.002	-0.012	-0.000	0.006	0.003	0.014
	[0.008]	[0.008]	[0.008]	[0.015]	[0.011]	[0.008]	[0.007]	[0.009]	[0.011]	[0.011]
ACP	-0.004	0.027***	0.036***	-0.012	0.007	-0.024***	0.012*	0.031***	0.008	-0.007
	[0.008]	[0.006]	[0.012]	[0.013]	[0.007]	[0.007]	[0.007]	[0.009]	[0.011]	[0.012]
MED	0.010	-0.006	0.055**	0.039	-0.013	0.028**	-0.002	0.023**	0.021	-0.034*
	[0.010]	[0.010]	[0.024]	[0.027]	[0.014]	[0.012]	[0.012]	[0.011]	[0.020]	[0.017]
BORDER	-0.066	-0.062	-0.278**	0.006	-0.093	-0.045	-0.245***	-0.197**	-0.075	-0.040
	[0.095]	[0.062]	[0.139]	[0.166]	[0.137]	[0.093]	[0.078]	[0.082]	[0.122]	[0.161]
LANGUAGE	-0.111	-0.072	0.025	0.107	0.040	-0.126**	-0.126**	-0.063	-0.146	-0.153
	[0.081]	[0.056]	[0.060]	[0.093]	[0.082]	[0.061]	[0.051]	[0.066]	[0.117]	[0.129]
COLONY	-0.038	-0.033	0.007	-0.117	0.019	-0.071	-0.064	-0.051	-0.161*	-0.069
	[0.066]	[0.050]	[0.067]	[0.077]	[0.080]	[0.060]	[0.055]	[0.068]	[0.089]	[0.108]
Constant	-99.518***	21.626	-2.421	162.095***	11.470	5.352	-12.384	18.192	71.581*	-21.044
	[36.783]	[15.026]	[19.606]	[57.891]	[36.204]	[19.964]	[30.303]	[28.019]	[40.000]	[60.362]
Observations	83771	865525	143109	408350	111687	411853	410121	153594	174502	62825

Robust standard errors in brackets * significant at 10%; ** significant at 5%; *** significant at 1%

IX. Concluding remarks

The purpose of this paper was to provide an empirical assessment of the impact that the EU GSP exerts on the exports of those developing countries that are eligible for this preferential treatment.

The literature which has investigated the effectiveness of the EU GSP concludes that this preferential trade agreement does not achieve its objectives in terms of enhancing the export flows of beneficiaries towards EU markets. This is due to the magnitude of the granted margin of preference as well as to the high administrative costs, the restrictive RoO, and other conditions which undermine the potential of the preferential treatment.

While research on the EU GSP has focused mainly on its impact on total trade by using the dummy variable model to measure the extent of the preferential treatment, assessment of the trade effects brought about by the GSP has been rarely made by referring to sectoral data or by exploiting data on tariffs which would allow us to gauge the margin of preferences enjoyed by developing countries precisely.

Our work aims to contribute to this literature by providing further evidence based on HS6-digit agricultural products and introducing into the estimations a quantitative measure for five different trade agreements: the ordinary GSP, GSP-Drug , EBA, Cotonou Agreement, and European Mediterranean Agreement. Furthermore, besides standard estimators (OLS and LSDV), we employed the Poisson, the NRB and ZIP procedures, in order to cope with the existence of many zero trade values in trade statistics.

The analysis was carried out by considering a large sample of agricultural exports from 169 exporting countries to the EU over the period 2001-2004. The sample of products is comprised of 763 agricultural goods.

The main findings of our analysis may be summarised as follows. There is evidence that the EU GSP has a positive and significant impact on the agricultural exports of preferred countries. This evidence is quite robust, being confirmed in all the regressions we estimated by pooling the data of agricultural exports and using very different techniques. Yet, although positive effects were recorded in the case of EBA and EuroMed agreements, the findings on the role of GSP-Drug and the ACP were puzzling. After replacing the margins of preference for each agreement with an index meant to capture the overall effect of EU preferential trade policy, we can argue that the entire system of EU trade preferences is beneficial to countries eligible of GSP preferential treatment.. Although the evidence at sectoral level is much more mixed that that obtained when pooling the data, the impact of the ordinary GSP is positive for many agricultural sectors suggesting that the EU trade preferences actually help beneficiary countries to increase their exports.

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Appendix A
The list of exporting countries included in the analysis

GSP: Albania (AL), Andorra (AD), Anguilla (AI), Argentina (AR), Armenia (AM), Aruba (AW), Azerbaijan (AZ), Bahrain (BH), Belarus (BY), Bermuda (BM), Bosnia and Herzegovina (BA), Brazil (BR), British Indian Territory (IO),
Brunei Darussalam (BN), Bulgaria (BG), Cayman Islands (KY), Chile (CL), China, People's Republic of (CN), Christmas Island (CX), Cocos Islands or Keeling Islands (CC), Cook Islands (CK), Croatia (HR), Cuba (CU), Democratic Republic of Korea(KP), Falklands Islands (FK), Republic of Korea (KR), Faeroe Islands (FO), French Polynesia (PF), French Southern territories (TF), Gibraltar (GI),Greenland (GL), India (IN), Indonesia (ID), Iran, Islamic Republic of (IR), Iraq (IQ),Kazakhstan (KZ), Kuwait (KW), Libyan Arab Jamahiriya (LY), Malaysia (MY), Mayotte (YT), Mexico (MX), Micronesia, Federated States of (FM), Montserrat (MS), Netherlands Antilles (AN), New-Caledonia (NC), Norfolk Island (NF), Northern Mariana Islands (MP), Oman (OM), Pakistan (PK), Palau (PW), Paraguay (PY), Philippines (PH), Pitcairn (PN), Qatar (QA), Romania (), Russian Federation (RU), Santa Helena (SH), Saudi Arabia (SA), Singapore (SG), South Africa (ZA), South Georgia and South Sandwich Islands (GS), Tajikistan (TJ), Thailand (TH), Tokelau (TK), Turkmenistan (TM), Turks and Caicos Islands (TC), Uganda (UG), United Arab Emirates (AE), United States Minor outlying Islands (UM), Uruguay (UY), Uzbekistan (UZ), Wallis and Futuna (WF),

ACP: Antigua and Barbuda (AG), Bahamas (BS), Barbados (BB) ,Belize (BZ), Botswana (BW), Cook Islands (CK), Cameroon (CM), Côte d'Ivoire (CI), Dominica (DM), Dominican Republic (DO), Fiji (FJ), Gabon (GA), Grenada (GD), Ghana (GH), Grenada (GD), Republic of Guinea (GN), Guyana (GY), Jamaica (JM), Kenya (KE), Marshall Islands (MH), Mauritius (MU), Namibia (MA), Nauru (NR), Nicaragua (NI),Nigeria (NG), Niue (NU), Papua New Guinea (PG), St. Kitts and Nevis (KN), St. Lucia (LC), St. Vincent and the Grenadines (VC), Seychelles (SC), Suriname (SR), Swaziland (SZ), Tonga (TO), Trinidad and Tobago (TT), Tuvalu (TV), Zimbabwe (ZW).

GSP-Drug[11]: Bolivia (BO), Colombia (CO), Costa Rica (CR), Ecuador (EC), Georgia (GE), Guatemala (GT), Honduras (HN), Sri Lanka (LK), Moldova, Republic of (MD), Mongolia (MN), Nicaragua (NI), Panama (PA), Peru (PE), El Salvador (SV), Venezuela (VE).

EBA: Afghanistan (AF), Angola (AO), Bangladesh (BD), Burkina Faso (BF), Burundi (BI), Benin (BJ), Bhutan (BT), Congo, Democratic Republic of (CD), Central African Republic (CF), Cape Verde (CV), Djibouti (DJ), Eritrea (ER), Ethiopia (ET), Gambia (GM), Guinea (GN), Equatorial Guinea (GQ), Guinea-Bissau (GW), Haiti (HT), Cambodia (KH), Kiribati (KI), Comoros (KM), Laos People's Democratic Republic (LA), Liberia (LR), Lesotho (LS), Madagascar (MG), Mali (ML), Myanmar (MM), Mauritania (MR), Maldives (MV), Malawi (MW), Mozambique (MZ), Niger (NE), Nepal (NP), Rwanda (RW), Solomon Islands (SB), Sudan (SD), Sierra Leone (SL), Senegal (SN), Somalia (SO), São Tomé and Príncipe (ST), Chad (TD), Togo (TG), Timor-Leste (TL), Tuvalu (TV), Tanzania, United Republic of (TZ), Uganda (UG), Vanuatu (VU), Samoa (WS), Yemen (YE), Zambia (ZM).

EuroMed: Algeria (DZ), Cyprus (CY), Egypt (EG), Israel (IL), Jordan (JO), Lebanon (LB), Malta (MT), Morocco (MA), Palestinian Territory, occupied (PS), Syria (SY), Tunisia (TN), Turkey (TR).

DEVELOPED COUNTRIES USA (US), Norway (NO) Japan (JP), New Zealand (NZ) Australia (AU), Canada (CA), Switzerland (CH).

[11] COMMISSION DECISION of 21st December, 2005 regarding the list of beneficiary countries which qualify for the special incentive arrangement for sustainable development and good governance, provided for by Article 26(e) of Council Regulation (EC) No 980/2005 which applied a scheme of generalised tariff preferences (2005/924/EC). Moldova and Sri Lanka were added to the list while Pakistan was removed.

Appendix B

Data Sources

To build the final database needed to estimate the equation (1), we use four different data sources, UN COMTRADE, MACMAP, WBDI and DBTAR. COMTRADE is a dataset on trade flows provided by the United Nations Trade Database (available at http://unstat.un.org/unsd/comtrade/). It is used to gather data regarding the imports of each EU-15 country in terms of products and exporting countries. Commodities are classified according to different international classifications. We use net imports for the EU15 members at HS 6 digit level. We consider imports rather than total trade flows (imports+exports), because total trade is used to measure the impact of PTAs when there is a mutual reduction in tariffs. Since the EU GSP scheme is non-reciprocal, the use of import data is more appropriate. Moreover imports rather than exports are used as a dependent variable because imports are much more reliable, as it is easier to check for incoming flows of goods. Gross Domestic Product and the Population, are from the World Bank Development Indicators (WDI) http://www.worldbank.org/data. Distance and dummy variables are drawn from MAcMap, a database developed by the Centre d'Etuds Prospectives et d'Informations Internationales (CEPII) and UNCATD. It is available at http://www.cepii.fr/anglaisgraph/macmap/form_macmap/access.asp, and provides information on tariffs applied at the tariff level, distance and other variables by 165 countries. Geographical distance is used as a proxy for transport costs. Distance is often a measure of "remoteness"; moreover, this is complemented with additional regressors capturing other country pair specific trade costs. A set of dummy variables are included in the model (Contiguity, Colony, and Common Language) affecting bilateral trade. Tariffs come from DBTAR, which is a database on European Agricultural tariffs providing applied tariffs for products over the period 2001-2004. The main source of this database is TARIC (Integrated Tariff of the European Community - TARIC contains about 15.000 tariff lines). In DBTAR, specific or complex duties are transformed into *ad-valorem* equivalents (AVE) by using an estimation of unit values based on EU import statistics from COMEXT database. DBTAR provides complete information on EU tariffs at a very detailed level, including the tariffs applied within each preferential agreement for each product. *Ad valorem* tariff equivalents are also included.

Do trade preferential agreements enhance the exports of developing countries? Evidence from the EU GSP•

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Abstract The EU grants preferential access to its imports from developing countries under several trade agreements. The widest arrangement, in terms of country and product coverage, is the Generalised System of Preferences (GSP) through which, since 1971, virtually all developing countries have received preferential treatment when exporting to world markets. This paper evaluates the impact of GSP in enhancing developing countries' exports to EU markets. It is based on the estimation of a gravity model for a sample of 769 products exported from 169 countries to EU over the period 2001-2004. While, from an econometric point of view, the estimation methods take into account unobservable country heterogeneity as well as the potential selection bias which zero-trade values pose, the empirical setting considers an explicit measure of trade preferences, the margin of preferences. The analysis offers new empirical evidence that the impact of GSP on developing countries' agricultural exports to the EU is positive.

Keywords: Trade Preferences, Agricultural Trade, Gravity Model
JEL Codes: Q17, O19, F13, C23

I. Introduction

The EU plays a crucial role in promoting sustainable growth in developing countries (DCs) because it is one of the most important actors in international trade (accounting for about one

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fifth of all world trade). Its trade policy may influence DCs' economic growth in many ways, eg. by enhancing their export earnings and encouraging diversification in their economies. One of the classical instruments for achieving these objectives is to offer preferential terms in favour of DC exports, through which the EU provides incentives to traders to import products from preferred DCs and, thus, help them to compete in international markets.

An important preferential trade agreement (PTA) adopted by the EU is the Generalised System of Preferences (GSP), which is a set of unilateral trade concessions exclusively granted to DCs. It is a multiregional PTA covering numerous criteria and levels of differentiation between the beneficiary countries. This preferential scheme dates back to 1968 when the United Nations Conference on Trade and Development (UNCTAD) recommended the creation of a 'Generalised System of Tariff Preferences' under which developed countries would grant trade preferences to all DCs. It was adopted by the EU in 1971 for a period of ten years and has been renewed several times, with revisions involving product coverage, quotas, ceilings and their administration, as well as the lists of beneficiaries and of tariff cuts for agricultural products.

The impact of the EU GSP has been analysed in some detail and much research has been conducted using the gravity model. This approach posits that export flows are positively influenced by the economic masses of trading countries, negatively influenced by the distance between them (Tinbergen, 1962) and, within this analytical framework, that preferential treatment extended to exporters will increase their exports to the preference-giving countries. This is because countries which benefit from GSP tariff reductions face more favourable access to EU markets than do exporters who are not eligible for GSP support. Looking at the gravity empirics, the main outcome is that the EU GSP does not achieve its objectives in terms of enhancing the export flows of beneficiaries towards EU markets (see, Agostino et al., 2008; Cardamone 2009; Cipollina and Salvatici, 2007; Nilsson, 2002; Persson, 2005; Persson and Wilhelmsonn, 2007; Pishbahar and Huchet-Bourdon, 2009; Subramanian and Wei, 2007; Verdeja, 2006). This is mainly due to the size of the trade preferences, to the high administrative costs, the restrictive Rules of Origin (RoO) and other conditions that undermine the full potential of the preferential treatment.[1]

While the EU GSP has received a great deal of attention, research has focused mainly on the impact on total trade by using the dummy variable approach to measure the effect of the preferential treatment. In other words, assessment of the trade effects induced by the GSP has not

[1] The GSP is governed by strict RoO to ensure that benefits only go to the GSP countries. In fact, products originate in a country if they were wholly obtained in the country or sufficiently worked upon or processed within it. However, cumulation rules enable production processes to take place in certain other countries without affecting the exporter's entitlement to GSP benefits.

been made by referring to sectoral data and by exploiting data on tariffs which would allow precise gauging of the margin of preferences enjoyed by DCs.

This paper attempts to fill this gap in the literature by providing new empirical evidence of the impact of the EU GSP, the evaluation of which is based on the estimation of a gravity model using trade data at a very high level of disaggregation. With respect to the related literature on the impact of the EU GSP, the distinguishing features of the study are threefold.

Firstly, as far as the measure of PTAs is concerned, instead of considering a dummy variable, we use a quantitative measure of the preferential treatment granted by the EU to the exports of DCs involved in a trade agreements (GSP, Cotonou Agreement, European Mediterranean Agreements). This measure is defined as the ratio between the margin of preference and the Most-Favoured Nation (MFN) duty, where the margin of preference is the difference between the MFN tariff and the preferential tariff to be applied, under a given trade agreement, to any specific trade flow.

Secondly, we shall focus on agricultural exports using disaggregated data at HS6-digit level.[2] To be more precise, we shall analyse the export flows towards EU markets of twelve groups of agricultural products[3] over the period 2001-2004. This is due to the fact that the trade preferences granted to DCs are substantial for agricultural exports, whereas the trade restrictions applied by the EU to its non-agricultural imports are modest. Furthermore, by using the sectoral data, we intend to limit the aggregation bias which characterises, for instance, the indicators meant to reveal the trade protection of all imports (Anderson and Neary, 2005; Cipollina and Salvatici, 2008). Finally, GSP trade preferences, like those of any other trade agreement, are conceived of as being applied at product level and are extremely heterogonous across sectors. Therefore, it seems reasonable to evaluate their impact at disaggregated level. The econometric analysis is carried out by pooling the data for all HS6-digit agricultural products and by running a regression, using data at HS6-digit level, for each of the twelve agricultural sectors covered by the study (*cfr* note 3).

Thirdly, the methods used in the estimations deal with several issues which are common when using a gravity equation to analyse trade flows. Indeed, we shall use a fixed effect model to check for country non-observable heterogeneity. Again, following the method adopted by many

[2] The Harmonized System (HS) is an internationally standardised nomenclature for the description, classification and coding of goods. It consists of around 1,200 4-digit headings and 5,000 6-digit subheadings, which are organised into 21 Sections and 97 Chapters. The HS covers all goods in international trade.

[3] The twelve HS2-digit agricultural products included in the analysis are the following: live animals, fisheries, fruits, lacs and gums, oils and fats, products of animal origin, sugar, vegetables, beverages and spirits, tobacco, tropical fruits and residues of the food industry.

authors (Burger *et al*., 2009; Helpman *et al*., 2007; Linders and de Groot, 2006; Martin and Pham, 2008; Santos Silva and Tenreyro, 2006), we shall apply a Poisson family model and its extensions, Zero Inflated Poissoin (ZIP) and Negative Binomial Regression (NBR), in order to overcome the questions posed by zero-trade flows, the frequency of which is severe when a study is based on disaggregated data. These procedures consider the non-multiplicative form of the gravity equation and lead to more reliable results than do the estimations based on the log-linear specification of the model carried out using the standard methods (i.e., OLS or Fixed Effect Models). This is because Poisson, ZIP and NRB estimators capture zero-trade flows and, therefore, can shed light on why countries do not trade with each other.

The samples on which the econometric section of the present study is based consist of 169 countries and 763 agricultural product lines at HS6-digit level. The period under consideration is 2001- 2004. This choice is brought about by the fact that data on tariffs for such a large number of commodities are easily available only from DBTAR (2006). Any other solution is hard to put into practice because it implies a massive extraction of tariffs, e.g. from TARIC, for each product, each year and each preferential scheme.

The paper is divided into nine sections. The second section describes the GSP scheme; the third summarises the literature on the effectiveness of the EU GSP scheme. The fourth section presents a descriptive analysis of DC agricultural exports to the EU market, while the fifth paragraph gives a breakdown of the preferential tariffs implemented through the EU GSP. The sixth section focuses on the gravity equation, whereas section seven deals with the econometric methods used to estimate the gravity model, the results of which are discussed in section eight. Section nine concludes.

II. The EU GSP scheme

Since 1971, when the GSP was initially adopted by the EU, almost all DCs have enjoyed non-reciprocal preferential trading terms for exporting to the EU market. The first GSP was in force for a period of ten years. The 1981 GSP revision involved product coverage, quotas, ceilings and their administration, as well as the list of beneficiaries and the tariff cuts for agricultural products. From 1981 to 1995, there were no substantial changes in the operating rules of the EU GSP, whereas in January, 1995 a new 10-year EU GSP scheme was introduced, providing five types of arrangement. The ordinary GSP, where about 7,000 products were classified in four groups according to the tariff cuts they received, was still the main part of the arrangement.[4]

[4] There were 3,000 non-sensitive products entering the EU market duty free, whereas the duty applicable was 85% of the MFN rate for 3,700 products classified as “very sensitive”. Another group of products

Besides the ordinary GSP, the EU implemented a specific arrangement providing incentives for the protection of labour rights and another specific agreement to promote environmental protection. Finally, there were the GSP-Drug and the EBA initiatives. The GSP-Drug initiative is a special agreement granting preferential treatment to the exports of Pakistan and all Central and South American countries belonging to the Andean Community with the aim of combatting drug production and its trafficking by enhancing export diversification in favour of GSP products,[5] The Everything But Arms (EBA) initiative allowed the world's 49 poorest countries free access for all products except for arms and ammunition.[6]

Another GSP revision was made on June 2001. This new GSP regulated the preferential treatment granted to DCs over the years 2002-2004 and it both simplified and harmonised the previous arrangements by, among other things, reducing the number of product categories from 4 to 2. Duty-free access was maintained for all non sensitive products, while all other goods were now classified as sensitive products and benefited from a flat rate reduction of 3.5 percentage points from the MFN duty. With the 2006 GSP revision, the EU maintained the ordinary GSP and the EBA initiative and launched the GSP-Plus, which was designed to sustain the exports of the poorest and most vulnerable countries. To benefit from GSP-Plus, countries must meet a number of criteria and must effectively adopt the recommendations of 27 international conventions on human and labour rights, environmental protection, the good governance and the fight against drugs (in this regards it is useful remember that the GSP-Plus incorporates the GSP Drug and, in the following, we use these two names as synonymous).

The EBA has remained unchanged. It provides duty-free and quota-free treatment for all products originating in LDCs, except for arms and ammunition. Moreover, a special regulation has been introduced for three sensitive products (bananas, sugar and rice), where duty free access was given to bananas in January, 2006, for sugar in January, 2009 and for rice in September, 2009 (*cfr* note 6).

The most important feature of the new GSP regulations is the graduation mechanism according to which the preferential tariffs may be either suspended or re-established when each

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comprised a sub set of sensitive products which had an applicable duty of 70% of the MFN rate and, finally, there was a group of semi-sensitive products, which had an applicable duty of 35% of the MFN rate.

[5] The eligible countries for GSP-Drug are Armenia, Azerbaijan, Bolivia, Colombia, Costa Rica, Ecuador, El Salvador, Georgia, Guatemala, Honduras, Mongolia, Nicaragua, Paraguay, Peru, Sri Lanka, Venezuela.

[6] Tariff duties on bananas were reduced by 20% annually as of 1st January, 2002 and they have been completely suspended since 1st January, 2009. Tariff duties on rice were reduced by 20% on 1st September, 2006, by 50% on 1st September, 2007 and have been completely suspended since 1st September, 2009. Finally tariff duties on sugar were reduced by 20% on 1st July, 2006, by 50% on 1st July, 2007 and by 80% on 1st July, 2008, and have been completely suspended since 1st July, 2009.

country's exports to EU markets exceed or fall below a certain threshold over a three-year period.[7] Finally, a general rule, which has been applied since 1971, regards the possibility of removing a country from the scheme. This removal occurs when a country becomes competitive in its exporting of a particular product or range of products, when a country is classified as a high-income country by the World Bank for three consecutive years, or when exports of the five major GSP products account for less than 75 % of total GSP-covered exports to the EU market.

The current operating rules of GSP were established by regulation 732/2008 which will apply until 31st December, 2011. In order to guarantee stability, predictability and transparency within the operation of the scheme, the new GSP has not changed the structure or the substance of the old scheme and has renewed the ordinary GSP, the GSP-Drug and the EBA initiatives for a period of three years.

As is summarised in table 1, in 2009, the ordinary GSP extended trade preferences to 6,244 products divided into one group of 3,200 non sensitive products and another group of 3,044 sensitive products. The first group has duty free access, whereas the sensitive products receive, when an *ad valorem* duty is applied, a tariff cut of 3.5% with respect to MFN tariff rates (the tariff cut is 20% for textiles and clothing, 15% for ethyl alcohol and 30% when specific duties are applied). The GSP-Drug essentially offers duty free access to 6,336 products (table 1) in order to help vulnerable countries in their ratification and implementation of relevant international conventions, whereas the EBA initiative provides duty-free and quota-free access to all products (except for arms and ammunitions) exported by the 49 LDCs to EU markets. Within each scheme there are 2,405 products which do not enjoy any preferential treatment, because the MFN tariffs are already zero. Again within each scheme there are products entering the EU at MFN rates (these goods are 919 in the case of the ordinary GSP, 827 for the GSP-Drug and 23 in the case of EBA) (Table 1).

[7] As a result of the graduation mechanism applied to trade statistics covering the years 2004-2006, GSP preferences will be re-established for Algeria (Mineral products), India (Jewellery, pearls, precious metals and stones), Indonesia (Wood and articles of wood), Russia (products of the chemical or allied industries and base metals), South Africa (transport equipment) and Thailand (Transport equipment) and will be suspended for Vietnam (Footwear, headgear, umbrellas, parasols, artificial flowers).

Table 1: Products Covered by GSP schemes in 2009

	Ordinary GSP scheme	GSP-Drug	EBA
Products Covered	6244	6336	7140
of which with: MFN=0	2405	2405	2405
MFN>0	919	827	23

Source: EU Commission (2009)

III. The Literature on the Impact of the EU GSP: a brief review

There is substantial literature analysing the role of preferential trade agreements (for a review see, Nielsen, 2003; Cardamone, 2008) and some of it has specifically evaluated the impact of the EU GSP scheme. In reviewing these studies, we have mainly focussed on those papers which use the gravitational approach (Agostino et al. 2008; Cardamone 2009; Cipollina and Salvatici 2007; Nilsson 2002; Oguledo and MacPhee 1994; Persson 2005; Persson and Wilhelmsson 2007; Pishbahar and Huchet-Bourdon 2009; Sapir 1981; Subramanian and Wei 2007; Verdeja 2006). These studies do not converge towards a common result with regards the effectiveness of the scheme. However, Sapir (1981), Oguledo and MacPhee (1994), Nilsson (2002), Verdeja, (2006) and Agostino et al. (2008) show that the GSP scheme has a positive effect, albeit a smaller one than that of other preferential schemes.

To be more precise, Sapir (1981) uses yearly cross-sectional OLS regressions of a gravity model for the period 1967-1978 to estimate the effect of the GSP scheme on manufactured products. He finds that the scheme had a significant and positive effect in 1973 and 1974. Oguledo and MacPhee (1994) use a similar method to estimate the effects of the GSP, Lomé, EFTA and Mediterranean agreements for 1976. The authors model the preferential treatment of the various schemes by using dummy variables which capture the trade diversion effect of preferences and import tariffs which gauge the trade creation effect of lower tariffs. Results show that GSP preferences have a significant effect on DC exports. Verdeja (2006) analyses whether trade preferences granted by the EU through the GSP, the Cotonou Agreement and the Euro-Med agreements have been beneficial to Least Developed Countries (LDCs). He considers the period

1972-2000 and finds that the GSP positively affected the exports of LDCs, although its impact was lower than that revealed for the ACP agreement. Similar results are provided by Nilsson (2002), while Subramanian and Wei (2007) find a significant and positive impact of the EU GSP on total trade, albeit the effect is negative for the agro-food sector. In a recent paper, Cardamone (2009) restricts the evaluation to four products included in the fruit and vegetable sector (oranges, mandarins, apples and fresh grapes) by using monthly data at HS8 level. She shows that the impact of trade preferences differs according to the commodity under scrutiny. In particular, the GSP has a positive impact in increasing exports of apples and mandarins to the EU, while the ACPs preferences are successful in enhancing EU imports of fresh grapes and mandarins. Furthermore, RTAs seem to achieve the goal of improving EU imports of all fruit but oranges. Agostino et al. (2008) find a positive impact of the EU GSP on the total exports of DCs, although the significance of the estimated parameter is very low. Moreover, when using 2-digit agricultural data, they reveal that the ordinary GSP only has a positive effect in the meat sector and that its impact is negative and significant in the livestock and sugar sectors and not significant in other agricultural sectors. Finally, the authors find that, for LDCs, the GSP only has a positive impact in the fruit and vegetable sector. Persson and Wilhelmsson (2007) find that ACPs preferences had the largest effects over the period 1960-2002, while eligible countries for GSP did not gain any advantage from the scheme. The same result can be found for the year 2004 in Cipollina and Salavatici (2007). As far as the EU GSP-Drug is concerned, Persson and Wilhelmsson (2007) find a negative impact for this scheme on the exports of beneficiaries. Finally, considering LDCs and the period 1991-1999, Persson (2005) finds that the trade preferences enjoyed by LDCs had a negative influence on their exports. Further evidence of the negative impact of the EBA preferences is provided by Pishbahar and Huchet-Bourdon (2009), who also show that EU agricultural imports from EBA countries decreased over the period 2000-2004.

These mixed results regarding the actual effectiveness of the EU GSP may be better understood if we briefly refer to the conclusions obtained by other authors who have studied the structure and the utilisation of GSP preferences.

When dealing with the structure of the GSP trade preferences, some authors (Brenton, 2003; Hoekman et al., 2001; Stevens and Kennan, 2000; Tangermann, 2002) observe that the preferential treatment of GSP is only generous with regards to a few products. Indeed, not every product benefits from trade preferences, and many goods receive a preference only within tight quotas. For instance, the MFN tariffs applied to EU imports of tropical products are zero (*cfr* table 1) or negligible and so GSP preferences are of little or no use. Moreover, other products (eg., temperate raw products or processed food products) are still excluded from any preferences

(Bureau et al., 2006; EU Commission, 2004). Finally, the same protectionist motives that prompt the EU to erect high trade barriers in many agricultural sectors (fruits, tropical fruits) also provide the grounds for not granting generous trade preferences in favour of DCs. This also holds true for the EBA initiative which, since its entering into force, has not allowed immediate free access to the EU market of three particularly important products for LDCs (rice, sugar and bananas) (*cfr* note 6).

Another important issue is the utilisation of trade preferences, which is defined as the ratio between the value of the imports actually receiving preferential treatment and the value of total imports eligible for a preference. The conclusion drawn from the related literature is that the preferential treatment granted under the EU GSP is underutilised. The main explanation given for this under-utilisation refers to the constraints of RoO, cost of compliance and requirements related to certification. As has been documented by Candau and Jean (2005) and Inama (2004), the rate of utilisation of the EU GSP is estimated at around 50% between 1994 and 2001. In the same period, 63% of EU imports were covered by at least one preference and only 25% of EU total imports were covered by GSP preferences. In 2000, requests for preferential access to the EU market were made for only 50% of the eligible imports from non-ACP LDCs (Candau and Jean, 2005; Inama, 2004). One reason for this is that the utilisation of preferential schemes is often costly as beneficiary countries are not always able to meet the technical requirements. Thus, the greater the cost, the lower the benefit of any given preferential margin is. Moreover, the GSP often competes with other preferential arrangements. For instance, 36 ACP countries benefited both from the Cotonou agreement and the EBA initiative, but they prefer to export under the Cotonou agreement because of the high costs attached to EBA preferences (Brenton; 2003; Bureau et al., 2006; Manchin, 2005; Stevens and Kennan, 2004). On the other hand, Brenton and Ikezuki (2005) underline a high degree of preference utilisation and show that, in 2002, only 2.4% of African exports to the EU failed to make use of trade preferences. This result is similar to that found in OECD (2005), where it is argued that, taken individually, the utilisation rate for some schemes may seem low, but that this is mostly due to the fact that certain products are eligible for preferential treatment under more than one scheme. The developing countries' agricultural and food exports that do not benefit from trade preferences represent a fraction of those eligible for preferences. Bureau and Gallezot (2004) compute that eligible imports and utilised preferences represented 38% and 32% respectively of total EU agricultural and food imports in 2002. With regards imports with non-zero MFN tariffs, 56% were eligible for a trade preference and 47% actually received one. Hence, the utilisation rate was 83% for those imports eligible for preferential treatment.

From these studies, it emerges that EU GSP preferences are under-utilised and this is for different reasons. First of all, if one considers exports of a product to the EU, the Cotonou agreement generally offers the same, or greater, advantages to an ACP country as the GSP does, and, if a country only benefits from the GSP, it will tend to be relatively discriminated against rather than preferred (Brenton, 2003). In addition, the RoO could explain the low utilisation of the EU GSP. The costs and complexity of implementing the terms required by a preference are principally due to the cost of compliance with administrative or technical requirements (Candau and Jean 2005; Manchin, 2005; Waino et al. 2005).

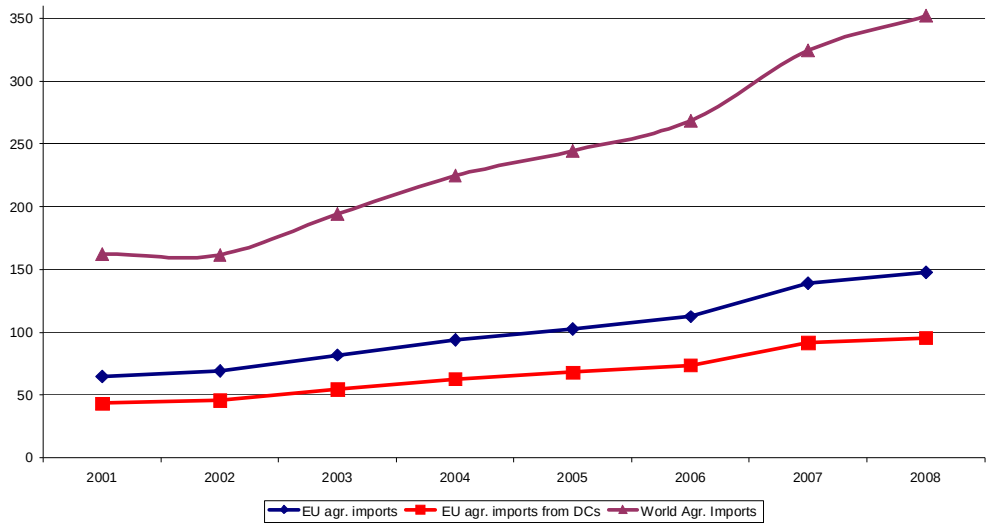
To sum up, studies of the GSP scheme focus on the agricultural sector, as it both plays a crucial role in DC economies and is highly protected in the European market. The literature agrees that the GSP scheme appeared rather generous, when compared to similar schemes run by other developed countries (Japan, USA), albeit only for a limited number of products and countries. At the same time, the literature review shows that there are many doubts about the actual effectiveness of GSP preferences in enhancing DC exports to EU markets.

IV. A descriptive analysis of EU agricultural imports from GSP countries

In this section, we present an analysis of EU agricultural imports from GSP countries. We refer to EU agro-food imports for all GSP, GSP-Drug and EBA countries over the period 2001-2007 (data are from COMTRADE database) and consider both EU agricultural imports as a whole and the imports disaggregated by product group.

From figure 1, it emerges that EU agricultural imports increased over the period under scrutiny: in 2008, they were worth about US$148 billion, in other words twice the value (US$65 billion) observed in 2001 (data are expressed at 2001 constant prices). While this trend is in line with that observed for world imports, the comparison between the two time series suggests that a stable trend is exhibited by EU imports as a share of world imports (this share is about 14%-15% for each year of the period under scrutiny). Another interesting detail from figure 1 is that of the role of DCs in EU agricultural markets. On the one hand, data indicate that DCs are the largest suppliers to the EU, with a share of about 2/3 of total EU agricultural imports; these figures also suggest that the EU is the largest agricultural importer from DCs. On the other hand, it emerges that DC share of these imports declines slightly over time, with a shift from 66.8% in 2001 to 65.8% in 2008.

Figure 1 EU agricultural imports and world agricultural imports (2001-2008)
Data in billions of US$ at 2001 constant prices.

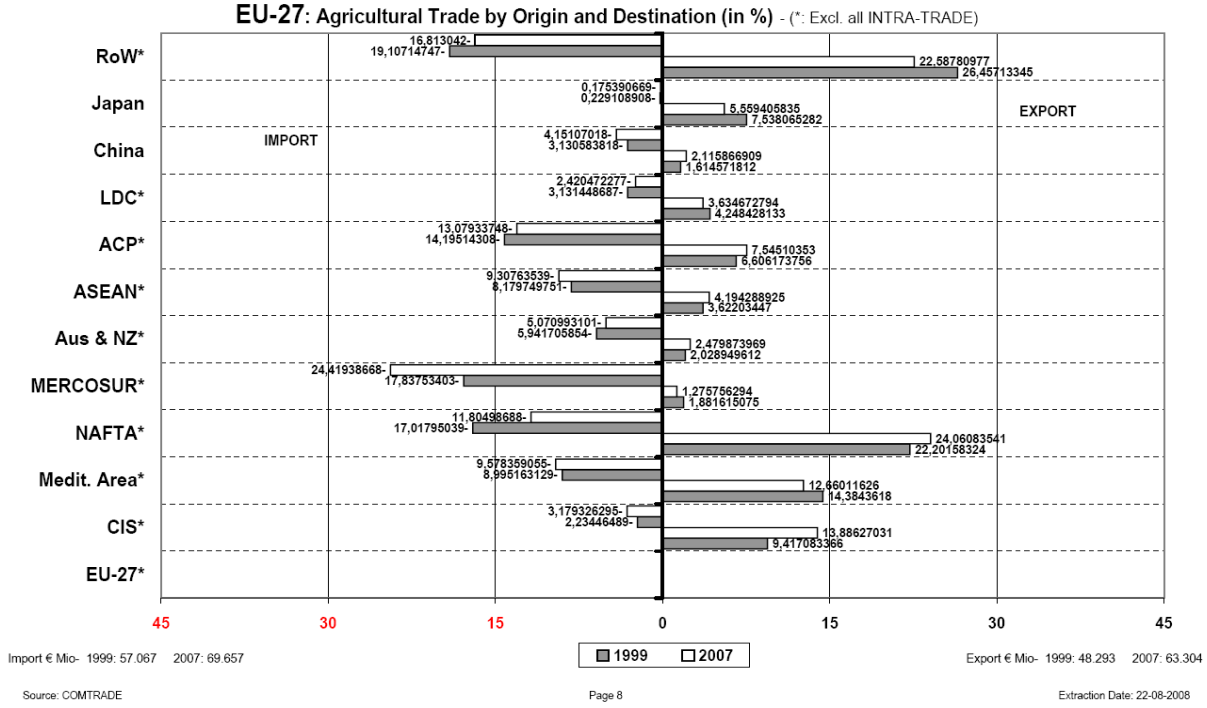


Source: UN COMTRADE DATABASE

Figure 2 shows the composition of EU agricultural trade in terms of origin and destination for the major groups of partners between 1999-2007. EU imports from the rest of the world decreased from 19.10% in 1999 to 16.81% in 2007, while at the same time both the imports from and exports to LDCs also decreased (imports from 3.13% in 1999 to 2.04% in 2007; exports from 4.2% in 1999 to 3.63% in 2007). Moreover, Mercosur (South America's leading trading block), the Mediterranean area, the CIS,[8] ASEAN (the Association of South East Asian Nations) and China were the regions that provided the strongest import growth, while EU imports from NAFTA (the North American Free Trade Agreement), Australia – New Zealand, Japan and ACP countries fell. With regards exports, we note that exports to ACPs, NAFTA, Australia – New Zealand, ASEAN and China increased, while exports to Japan, LDCs, Mercosur and the Mediterranean area decreased. EU exports towards the rest of the world decreased.

[8] CIS is the geographical zone to which the following countries belong: Ukraine, Belarus, Moldova, Russian Federeation, Georgia, Armenia, Azerbijan, KazaKhstan, Turkemenistan, Uzbekistan, Taijkistan, Kyrgyzistan.

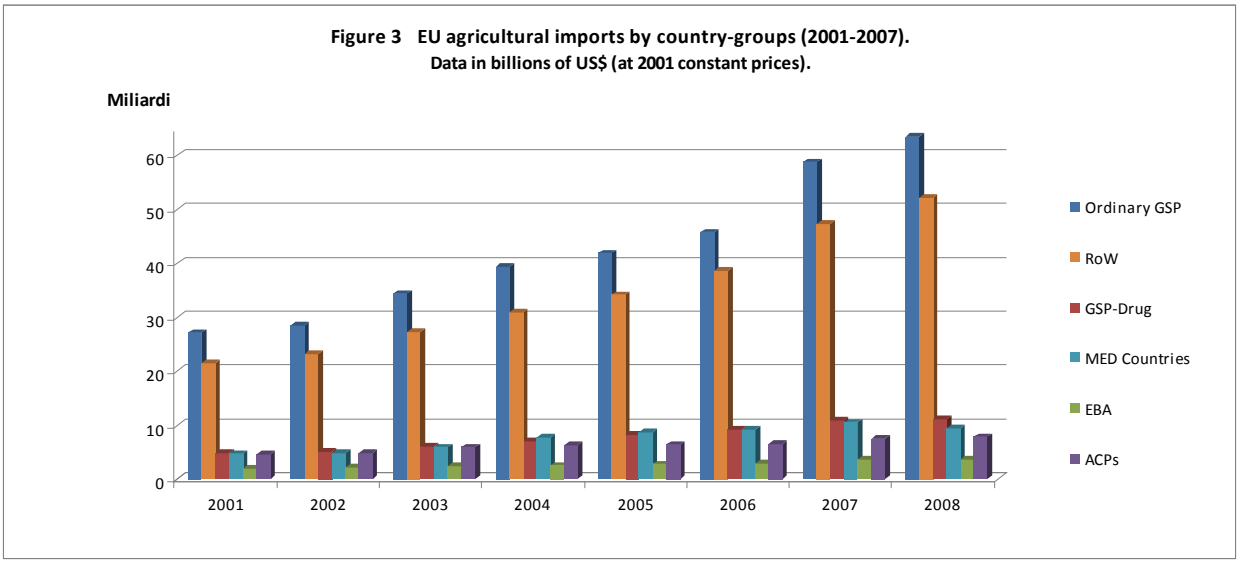
Figure 2 Composition of EU Agricultural trade by origin and destination for the major groups of partners between 1999-2007.



In figure 3, we have presented trends for EU agricultural imports from six groups of countries. The first five groups are those countries which are eligible for the trade preferences established under the GSP, ACP, GSP-Drug, EBA and the EuroMed agreements,[9] while the latter group (Rest of the World, RoW) is comprised of all other exporters. We wanted to ascertain whether EU imports of agro-food products from DCs and LDCs had increased and if their growth was uniform or not. Most EU agricultural imports come from GSP countries and from the RoW. The exports of GSP countries to the EU doubled over the period considered (from US$ 27.2 billion in 2001 to more than US$ 61 billion in 2008). The same applies for the RoW (from US$ 21.5 billion in 2001 to US$ 51 billion in 2008) as well as for Mediterranean countries and for DCs eligible for GSP-Drug. The value of LDC agricultural exports to the EU shows a increasing trend, but at a lesser rate than that observed for the other groups of countries. All these trends imply that the composition of EU agricultural imports has not changed over time and that GSP countries have maintained a dominant position, followed by the RoW. In this context, the EBA and the ACP countries register a decrease in their market shares in the EU agricultural market; in

[9] The EBA, the GSP-Drug and the EuroMed agreements include 49, 15 and 12 respectively, while the ACP group we consider is formed by all ACPs non-LDCs and the GSP group comprises all DCs, other than those of ACP, EBA, GSP-Drug and EuroMed samples (*cfr*. Appendix A).

the case of EBA countries, shifting from 3.05% in 2001 to 2.5% in 2007, and, dropping from 7.2% in 2001 to 5.3% in 2008 for ACP countries (Figure 3).



Source: UN COMTRADE DATABASE

A final issue is that of the composition of exports by product. Table 2 highlights the structure of agricultural exports from GSP countries to the EU market from 2001 to 2008, while tables 3 and 4 refer to countries eligible for GSP-Drug and EBA preferential treatment respectively. Among the total EU agricultural imports from GSP countries, just four groups of products (fisheries; edible fruits and nuts; residues and waste from the food industry; oil seeds and oleaginous fruits) accounted for about 50% of GSP's exports in 2001 and more than 43% in 2008. If, on one hand, these data indicate that the GSP agricultural exports have, over time, tended to become less concentrated, on the other hand, it emerges that the shares of each sector appear quite stable, except for animal or vegetables fats and oils whose quota increases from 4.78% in 2001 to 10.36% in 2008. The concentration is higher when considering GSP-Drug (Table 3). In such a case, the exports of two products alone (edible vegetables, roots and tubers; coffee, tea, mate and spices) make up more than 60% of total EU agricultural imports from GSP-Drug countries and the increases in market shares which can be quoted as being significant regard animal or vegetables fats and oils (from less than 1% in 2001-2003 to more than 4% in 2008), preparations of meat (from 3.68% in 2001 to more than 6% at the end of the period) and beverages, spirit and vinegar (from 1% in 2001 to about 2% in 2008). Finally, moving to EU agro-food imports from EBA countries, we find different and conflicting results (Table 4). Indeed, fisheries is the most important sector for EBA countries, although the market share shows a regular, marked, declining trend (from 43.27% in 2001 to 36.13% in 2007 and 29.82%

in 2008). The exports of coffee, tea, mate and spices account for about 15% of total EBA agricultural exports to the EU and those of tobacco for about 10%. In contrast with the analysis of export composition under the ordinary GSP and the GSP-Drug, the picture coming from the EBA initiative indicates a certain increase in the diversification of EBA agricultural exports. Indeed, the export structure of EBAs changed in favour of several products (e.g. sugar, cocoa, live trees, edible fruits) whose weight increased over the period 2001-2008, while, at the same time, the share of a few products (preparations of meat, animal or vegetable fats and oils; oil seeds and oleaginous fruits) decreased slightly.

To sum up, vegetable products (fruits, vegetables, cereals, coffee etc.) and fisheries were the largest group of EU imports from DCs eligible for GSP preferential treatment, followed by prepared foodstuffs (preparations of meat, cereal based foods, sugar confections, beer, wine, spirits, and tobacco). The relative importance of these sectors in the export basket of DCs may be, *ceteris paribus*, a mirror of the protection in the EU market for agricultural and food products. An issue which will be addressed in the following section.

Table 2: Quota of the EU Agricultural Imports under GSP General Agreement chapter by chapter from 2001 to 2008								
HS2	2001	2002	2003	2004	2005	2006	2007	2008
Live Animals	0.63	0.64	0.66	0.65	0.62	0.42	0.40	0.39
Meat and edible meat offal	4.59	4.19	4.15	4.04	4.39	4.46	4.95	3.80
Fisheries	15.23	13.83	14.29	13.10	13.47	14.60	12.56	8.62
Dairy products	0.51	0.64	0.76	0.72	0.52	0.48	0.42	0.54
Products of animal origin	1.46	1.42	1.31	1.42	1.41	1.31	1.11	1.32
Live trees and other plants	1.62	1.71	1.70	1.67	1.63	1.63	1.46	1.52
Edible vegetables, roots & tubers	4.53	4.57	4.32	4.87	4.72	4.83	5.62	4.49
Edible fruits & nuts	13.29	13.00	13.72	13.70	14.80	14.15	13.12	12.98
Coffee, tea, mate & spices	5.87	5.14	4.83	4.67	5.40	5.63	5.23	5.82
Cereals	2.16	3.21	2.90	2.59	1.97	2.55	5.35	4.44
Products of the milling industry	0.07	0.08	0.08	0.08	0.10	0.09	0.12	0.10
Oil seeds & oleaginous fruits	9.08	8.43	8.82	8.83	7.93	7.07	7.59	8.30
Lacs, gums, resins & other veg. saps	0.57	0.53	0.47	0.51	0.55	0.57	0.51	0.50
Vegetable products n.e.s.	0.26	0.19	0.18	0.17	0.18	0.16	0.17	0.15
Animal or vegetable fats & oils	4.78	5.76	6.16	7.02	7.32	8.28	7.90	10.36
Preparations of meat	4.59	4.46	4.51	4.48	4.95	5.14	4.92	5.68
Sugars	2.79	2.81	2.67	2.65	2.64	2.44	2.15	2.20
Cocoa & cocoa preparations	2.06	2.77	3.33	2.84	3.08	2.80	2.94	3.15
Preps. of cereals, flour, starch, etc.	0.48	0.54	0.56	0.59	0.62	0.66	0.64	0.76
Preps. of vegetables, fruits, nuts & plants	6.39	6.80	6.43	6.56	6.73	6.62	6.27	6.16
Miscellaneous edible preparations	0.79	0.85	0.84	0.86	0.97	1.12	1.18	1.24
Beverages, spirits & vinegar	3.86	4.10	3.97	4.14	4.16	4.00	3.95	4.05
Residues and waste from food industry	11.25	11.09	10.54	11.33	9.55	8.84	9.41	11.25
Tobacco & tobacco products	3.14	3.22	2.80	2.50	2.27	2.15	2.05	2.17
	100%	100%	100%	100%	100%	100%	100%	100%
Source: Own calculations of data from UN COMTRADE database								

Table 3: Quota of the EU Agricultural Imports under GSP-Plus (Drug) chapter by chapter from 2001 to 2008								
HS2	2001	2002	2003	2004	2005	2006	2007	2008
Live Animals	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.01
Meat and edible meat offal	0.01	0.04	0.03	0.04	0.01	0.00	0.01	0.00
Fisheries	8.75	7.54	7.67	7.77	8.68	9.27	8.40	5.44
Dairy products	0.07	0.08	0.16	0.13	0.05	0.06	0.04	0.06
Products of animal origin	0.13	0.15	0.11	0.14	0.13	0.08	0.07	0.08
Live trees and other plants	6.65	6.49	5.64	5.15	4.73	4.59	4.35	3.97
Edible vegetables, roots & tubers	2.00	2.16	2.03	2.34	2.46	2.53	2.52	2.31
Edible fruits & nuts	42.38	46.34	47.98	49.64	46.14	44.10	44.72	48.18
Coffee, tea, mate & spices	21.96	17.73	15.73	15.01	17.09	18.27	16.70	18.80
Cereals	0.10	0.45	0.10	0.12	0.13	0.23	0.26	0.13
Products of the milling industry	0.06	0.06	0.06	0.05	0.07	0.06	0.08	0.08
Oil seeds & oleaginous fruits	0.62	0.54	0.47	0.53	0.82	0.58	0.51	0.83
Lacs, gums, resins & other veg. saps	0.09	0.14	0.06	0.15	0.08	0.13	0.13	0.09
Vegetable products n.e.s.	0.09	0.11	0.09	0.05	0.05	0.05	0.07	0.09
Animal or vegetable fats & oils	0.77	0.68	0.87	1.74	2.30	1.84	3.14	4.12
Preparations of meat	3.68	4.84	5.82	5.49	6.00	6.05	6.20	5.15
Sugars	0.18	0.17	0.17	0.23	0.20	0.32	0.32	0.25
Cocoa & cocoa preparations	0.92	1.49	1.89	1.62	1.52	1.34	1.58	1.80
Preps. of cereals, flour, starch, etc.	0.04	0.04	0.05	0.06	0.10	0.07	0.08	0.05
Preps. of vegetables, fruits, nuts & plants	4.37	4.31	4.01	3.83	3.37	3.72	4.39	3.54
Miscellaneous edible preparations	1.17	1.07	0.88	0.79	0.85	0.79	0.81	0.85
Beverages, spirits & vinegar	0.94	1.20	1.60	1.88	2.03	2.13	1.83	1.83
Residues and waste from food industry	3.79	3.35	3.60	2.34	2.52	3.20	3.16	1.83
Tobacco & tobacco products	1.19	1.00	0.96	0.89	0.61	0.56	0.64	0.49
	100%	100%	100%	100%	100%	100%	100%	100%
Source: Own calculations of data from UN COMTRADE database								

Table 4: Quota of the EU Agricultural Imports under EBA initiative chapter by chapter from 2001 to 2008								
HS2	2001	2002	2003	2004	2005	2006	2007	2008
Live Animals	0.15	0.13	0.13	0.13	0.12	0.04	0.05	0.05
Meat and edible meat offal	0.19	0.05	0.05	0.03	0.05	0.07	0.05	0.02
Fisheries	43.27	43.75	41.83	39.99	37.70	39.90	36.13	29.82
Dairy products	0.04	0.05	0.14	0.12	0.05	0.05	0.04	0.05
Products of animal origin	0.15	0.15	0.11	0.10	0.10	0.09	0.08	0.06
Live trees and other plants	2.10	2.04	1.81	1.85	2.13	2.71	3.66	5.18
Edible vegetables, roots & tubers	3.24	3.66	3.45	3.93	3.92	3.94	3.64	3.84
Edible fruits & nuts	2.66	2.63	3.14	5.04	3.00	3.01	4.14	3.82
Coffee, tea, mate & spices	17.31	16.22	16.35	14.90	17.68	16.35	14.99	17.75
Cereals	0.11	0.21	0.22	0.37	0.19	0.27	1.01	0.59
Products of the milling industry	0.09	0.09	0.11	0.13	0.10	0.08	0.10	0.06
Oil seeds & oleaginous fruits	3.78	3.27	3.24	3.36	2.66	2.50	2.22	3.99
Lacs, gums, resins & other veg. saps	2.10	1.98	1.97	3.11	4.90	2.40	2.38	2.75
Vegetable products n.e.s.	0.38	0.36	0.39	0.38	0.28	0.26	0.25	0.25
Animal or vegetable fats & oils	4.22	3.82	2.63	2.20	1.95	1.76	2.89	2.38
Preparations of meat	3.74	3.84	4.56	5.07	4.15	3.34	2.50	2.44
Sugars	3.04	4.25	5.56	5.30	5.98	6.28	7.02	8.50
Cocoa & cocoa preparations	1.07	1.91	2.30	2.36	4.15	5.26	5.44	7.59
Preps. of cereals, flour, starch, etc.	0.04	0.04	0.04	0.07	0.08	0.14	0.14	0.18
Preps. of vegetables, fruits, nuts & plants	0.33	0.49	0.51	0.59	0.59	0.61	0.50	0.53
Miscellaneous edible preparations	0.51	0.47	0.44	0.37	0.53	0.57	0.50	0.76
Beverages, spirits & vinegar	0.12	0.45	0.45	0.08	0.10	0.18	0.15	0.18
Residues and waste from food industry	1.55	1.45	0.84	0.64	0.20	0.52	0.48	0.17
Tobacco & tobacco products	9.81	8.70	9.73	9.89	9.40	9.68	11.65	9.04
	100%	100%	100%	100%	100%	100%	100%	100%
Source: Own calculations of data from UN COMTRADE database								

V. Some descriptive statistics on GSP tariffs

This paragraph focuses on the preferential trade tariffs applied by the EU to its imports from GSP countries. The indicators used to measure the level of preferences offered by the EU GSP scheme in 2004 and 2006 are summarised in table 5. In 2004, 1,658 tariff lines were eligible for a tariff reduction under the ordinary GSP, i.e. 48% of the total of 3,453 product lines covered by the scheme. This proportion increased to 69% (2,489 preferred goods out of 3,603 total lines) when considering the GSP-Drug and to approximately 98% (3,631 out of 3,683 lines) for the EBA initiative. In 2006, the coverage of products benefiting from trade preferences was 57% for the GSP, 63% for the GSP-Drug and 98% for the EBA schemes. In terms of the absolute incidence of GSP coverage, it is interesting to note that the number of products enjoying a preference under the ordinary GSP increased from 1,658 in 2004 to 1,998 in 2006 and that there was an analogous increase under the GSP-Drug from 2,489 products in 2004 to 2,178 in 2006. In 2006, there were 3,390 products eligible for EBA preferences, which was fewer than the 3,631 preferred lines in 2004. The sum effect, combining the coverage of the schemes and the number of products with zero-duty in each agreement (columns 5 and 6 of table 5), represents the average tariff faced by exporting countries and the resulting margin of preference. As expected, the average tariff was high for products exported under MFN conditions (more than 19% in 2004

and 2006) and decreased to around 17% in the case of the ordinary GSP. The applied tariff for GSP-Drug was 14% and it was very low for the EBA initiative (1.36% in 2004 and 0.38% in 2006). Finally, we can see that the preferential margin was significantly high only for EBA schemes (around 18%), while it was 5% for the GSP-Drug and just around 2% for the ordinary GSP (Table 5). In conclusion, it can be said that even if the average rate for GSP tariffs did not change much between the old and the new GSP schemes, the number of tariff lines involved increased. This is particularly true when considering the ordinary GSP.

Based on these results, on one hand, one would expect the GSP scheme to have a generally modest impact, as the trade preferences it gives to DCs are, on average, very low. However, by analysing EU imports from preferred countries (cfr figures 2 and 3), it emerges, on the other hand, that there was an increase in trade even though the preferential margin in percentage points changed slightly over time. All this suggests that export flows depend not only on other variables (see § VII and VIII), but also on the structure of trade preferences granted by the EU. In order to look at this issue in detail, table 6 shows the number of products by the level of GSP applied duties. In 2004, 973 products faced a duty greater than 20%, while the tariff applied to a further 958 goods ranged between 10% and 20%. These products faced a tariff of more than 10% and represented more than 50% of the products covered by the GSP. In contrast, the tariff applied to 602 products ranged from 1% to 5% and was less than 1% for the other 547 goods.

Table 7 compares the level of GSP tariffs and the margin of preferences for each group of HS2-digit agricultural products for the years 2004 and 2006.[10] The data allows us to observe whether, and to what extent, tariffs differed across sectors, trade arrangements and from one year to another. By limiting the discussion to the margin of preferences, it can be noticed that, as expected, there were relevant differences between the ordinary GSP and the GSP-Drug. Furthermore, the preferential margin was found to be quite stable from 2004 to 2006 (the major changes occurred in fisheries [from 3.99% to 2.01%], vegetables [3.1%; 2.25%], preparations of meat [5.22%;4.19%]). The agricultural sectors with the highest margins of preferences under the ordinary GSP regime were tobacco (about 8.16% in 2006), preparations of meat (5.22% in

[10] This data is based on the DBTAR database built up by J. Gallezot from INRA (See Gallezot 2006). From this source, we have extracted and computed EU *ad valorem* equivalents of the MFN and GSP tariffs for agri-food products for 2006 in order to assess the size of the preference margin offered by the GSP scheme. The 2006 AVE has been computed with the 2004 unit value in order to be compared with the 2004 AVE; in other words, any differences in the preference margin between the two years are due to changes in the GSP tariff, not because of differences in world prices. The HS2 average tariffs faced by the beneficiaries of the GSP have been computed using a simple average of the AVEs calculated at the NC10 level. When a line was excluded from preferences, the MFN AVE has been used for the computation. When the tariff evolved during the year (due to seasonal changes, for example), a simple average over the year has been used.

2006), preparations of fruits and vegetables (4.98% in 2006) and fisheries (3.99% in 2006). The average margin was modest in the chapters of livestock, meat, dairy products, other animal products, cereals, products of the milling industry, oilseeds, sugar, and residues and waste from the food industry. To sum up, the level of the preferential tariff granted by the GSP did not change much as a result of the introduction of the 2006 GSP scheme (on average, less than one percentage point between 2004 and 2006), nor did all chapters benefit from the reductions.

Table 5: Comparison of some indicators under MFN and GSP regimes in 2004 and 2006.

Regime	No. of lines 2004	No. of lines 2006	No. of preferred lines 2004	No. of preferred lines 2006	No. of zero lines 2004	No. of zero lines 2006	Average tariff faced by beneficiaries 2004	Average tariff faced by beneficiaries 2006	Preferential Margin (% points) 2004	Preferential Margin (% points) 2006
MFN	3,677	3,447	0	0	405	388	19.61%	19.04%	0	0
GSP	3,683	3,453	1,658	1,998	522	553	17.68%	16.95%	1.93	2.1
GSP+	3,683	3,453	2,489	2,178	2,236	2,161	14.58%	13.97%	5.03	5.07
EBA	3,683	3,453	3,631	3,390	3,629	3,389	1.36%	0.38%	18.25	18.66

Source: De Maria et al. (2008)

Table 6: Duty, number of lines and the preferential margin under the GSP schemes in 2004.

Level of the Duty	Number of Tariff Lines	In %	Preferential Margin under Ordinary GSP (Min-Max)	Preferential Margin under GSP-Drug (Min-Max)	Preferential Margin under EBA (Min-Max)
Total	**3683**	**100**	0 < marg < 175.22	0 < marg < 184.76	0 < marg < 184.76
20%	973	26	0 < marg < 175.22	0.14 < marg < 184.76	8.86 < marg < 184.76
10-20%	958	26	1 < marg < 16.97	1.3 < marg < 19.97	1.68 < marg < 19.97
5-10%	603	16	0.5 < marg < 9.71	0.16 < marg < 9.94	3.84 < marg < 9.94
1-5%	602	16	0.09 < marg < 4.36	0.6< marg < 4.96	1.15 < marg < 4.16
<1%	547	15	0 < marg < 0.97	0 < marg < 0.97	0 < marg < 0.97

Source: own computation on data from DBTAR (2006) and Taric.

Table 7 Tariffs and Preferential Margins under GSP, by HS02-digit agricultural products (in %) (2004 and 2006).

	Ordinary GSP tariffs (%)		GSP Plus (Drug) tariffs (%)		MFN tariffs (%)		Ordinary GSP: Margin of Preferences (%)		GSP Plus (Drug) Margin of Preferences (%)	
Chapters (HS2)	**2006**	**2004**	**2006**	**2004**	**2006**	**2004**	**2006**	**2004**	**2006**	**2004**
01- Live animals	40.17	40.17	40.04	40.04	40.49	40.49	0.33	0.33	0.45	0.45
02- Meat	43.85	43.45	43.47	43.31	43.97	43.71	0.12	0.25	0.50	0.40
03- Fisheries	6.51	8.73	0.03	0.03	10.51	10.74	4.00	2.02	10.47	10.71
04- Dairies	52.40	50.23	51.92	50.12	52.70	50.68	0.30	0.45	0.79	0.56
05- Other animal products	0.08	0.08	0.00	0.00	0.24	0.24	0.17	0.17	0.24	0.24
06- Live trees and plants	3.33	3.56	0.00	0.00	6.40	6.79	3.08	3.23	6.40	6.79
07- Vegetables	38.79	37.67	37.76	36.15	41.89	39.92	3.10	2.25	4.13	3.77
08- Fruits	18.54	19.08	17.38	17.71	20.26	20.64	1.72	1.56	2.88	2.94
09- Coffee, tea, spices	1.09	1.09	0.00	0.12	3.05	3.05	1.96	1.96	3.05	2.93
10- Cereals	18.85	36.60	18.84	36.58	18.86	36.60	0.01	0.00	0.02	0.02
11- Products of the milling ind.	22.29	22.22	21.89	21.78	22.55	22.51	0.26	0.29	0.66	0.73
12- Oilseeds	1.66	1.31	0.87	0.86	2.38	2.35	0.72	1.04	1.51	1.49
13- Lac, gums, resins	5.11	5.24	0.00	0.00	7.93	7.89	2.82	2.65	7.93	7.89
14- Other vegetable products	0	0	0	0	0	0	0	0	0	0
15- Oils and fats	5.61	5.73	2.78	2.86	8.54	8.60	2.94	2.87	5.76	5.75
16- Preparations of meat, fish	12.80	13.75	4.21	4.34	18.03	17.94	5.23	4.19	13.82	13.60
17- Sugar	19.94	21.18	18.78	20.19	20.57	21.74	0.63	0.56	1.80	1.55
18- Cocoa	22.99	22.92	21.27	21.37	24.16	23.96	1.17	1.05	2.89	2.59
19- Preparations of cereals	26.34	27.67	23.45	24.35	29.45	30.86	3.11	3.19	6.00	6.51
20- Preparations of fruits and veg.	18.19	18.18	4.25	3.98	23.16	22.55	4.98	4.37	18.92	18.57
21- Miscellaneous edible preparations	11.03	11.46	5.97	6.28	14.33	14.85	3.29	3.39	8.36	8.57
22- Beverages	11.98	11.16	7.74	7.42	13.34	12.64	1.36	1.49	5.60	5.23
23- Waste from food industry	15.01	12.76	14.71	12.51	15.92	13.60	0.91	0.84	1.21	1.09
24- Tobacco	10.15	10.15	0	0	18.31	18.31	8.16	8.16	18.31	18.31

Source: own computation on data from DBTAR and Taric.

VI. The gravity equation

The gravity model is widely used to explain the pattern of bilateral trade between nations and its formulation is based on the idea that trade is positively influenced by the economic mass of the trading countries and negatively affected by the geographical distance between them. Again, trade flows are subject to trade resistance factors which can be improved by preferential trade arrangements, such as the EU GSP.

The basic specification of the gravity equation used in the estimation is the following:

(1)

$$\begin{aligned}\ln(M^{t}_{ijl}) = \alpha &+ \beta_1 \ln(GDP^{t}_{i}) + \beta_2 (GDP^{t}_{j}) + \beta_3 \ln(POP^{t}_{i}) + \beta_4 (POP^{t}_{j}) + \\ &+ \beta_5 \ln(Dist_{ij}) + \beta_6 Colony_{ij} + \beta_7 Language_{ij} + \beta_8 Border_{ij} + \\ &+ \beta_9 \ln(GSP^{t}_{ijl}) + \beta_{10} \ln(GSP - Drug^{t}_{ijl}) + \beta_{11} \ln(EBA^{t}_{ijl}) + \\ &+ \beta_{12} \ln(ACP^{t}_{ijl}) + \beta_{13} \ln(MED^{t}_{ijl}) + u^{t}_{ijl}\end{aligned}$$

where subscript *i* refers to the importing countries, which, in our case, are the members of EU-15; *j* refers to the exporting country; *l* to the product line; *t* is time. The notation is defined as follows: M^{t}_{ijl} are the exports of products *l* from country *j* to country *i* at time *t*; GDP^{t}_{i} and GDP^{t}_{j} represent the economic size of country *i* and country *j* at time *t*; POP^{t}_{i} and POP^{t}_{j} are the populations of the two countries at time *t*; $DIST_{ij}$ is the distance between the locations measured from capital to capital; Language is a dummy that takes value 1 if countries *i* and *j* speak the same language, and 0 otherwise; Colony is a dummy that takes value 1 if colonial links exist (or have existed) between two countries *i* and *j*, and 0 otherwise; Border is a binary variable assuming the value 1 if countries *i* and *j* share a common land border, and 0 otherwise; u_{ijl} is a composite error term.

As mentioned above (*cfr* § 1), for the purpose of this study, we have to address the crucial issue of the measure of the trade preferences, which, in the related literature, have been captured through dummy variables. Therefore, in order to overcome many of the shortcomings related to the dummy approach,[11] this paper employs a quantitative measure of the trade

[11] Dummy variables have been widely used as measure of preferential treatment. Being equal to one if the exporting country belongs to a PTA and zero otherwise, their estimated coefficient is expected to be positive because preferred countries should export more than non-preferred countries. However, this approach is not wholly satisfactory because dummies treat all countries as a homogeneous group, without taking into account their specific characteristics. Furthermore dummies do not consider that PTAs may have different impacts on trade in different products and do not distinguish between different preferential instruments, such us preferential margins, quotas and entry prices. Finally, they do

preferences and, in this sense, the other elements in eq. [1] (GSP, GSP-Drug, EBA, ACP, MED) become the key variables of our analysis. They represent the preferential margin established under a given agreement in favor of a country when exporting certain commodities to the country giving preferences. For instance, GSP_{ijl}^{t} is the preferential margin under the ordinary GSP that the *j-th* country enjoys when exporting product line *l* to country *i*. The same applies for the other preference variables (GSP-Drug, EBA, ACP and MED). For each trade agreement, the preferential margin is defined as the ratio between the preferential margin (the difference between the MFN and the preferential duties at each tariff line) and the MFN tariff. The formula is:

$$\text{PreferentialMargin}_{ijt}^{l} = \frac{\text{MFN}_{ijt}^{l} - \text{PREF\_TARIFF}_{ijt}^{l}}{\text{MFN}_{ijt}^{l}} \tag{2}$$

where *i* refers to importers, who, in our case, are the members of EU-15, *j* indicates the exporting countries, *l* is the tariff line and *t* is time. PREF_TARIFF indicates the preferential tariffs applied under any specific trade arrangement (GSP, GSP-Drug, EBA, ACP, MED). This measure allows us to take into account the size of the actual tariff preference for a particular product.[12] The overlapping of preferences has been solved by taking for a given trade flow, the maximum margin of preference as that which has been used by the beneficiary country. For instance, if a country is eligible for preferential treatment under both the GSP and the Cotonou agreement, and the preferential margins are, respectively, 3% and 5%, we assume that country will export under the Cotonou agreement.

The analysis considers the imports of each EU-15 member of HS6-digit 763 agricultural products from 169 exporters (the exporting countries are listed in Appendix A). The product coverage is comprised of the agricultural products of the HS classification, i.e. all the product

not consider the rate of preference utilisation and the cost of compliance. There have recently been some studies that have used preferential margin or tariffs to assess potential benefits deriving from preferential schemes (Cardamone, 2009; Cipollina and Salvatici, 2007; Emlinger et al., 2009). Some of these studies (Cardamone, 2009; Cipollina and Salvatici, 2007) have calculated the preferential margin as the difference between the highest tariff applied by the EU and the duty paid by an exporter for a given product. While Cipollina and Salvatici (2007) do not distinguish between different preferential margins, Cardamone (2009) does. Emlinger et al., 2009 used the tariffs rather than the preferential margin to measure the preferences granted.

[12] The MFN and the preferential tariffs come from the DBTAR database (see Appendix B), which has enabled us to identify the tariffs applied by the EU under the different preferential regimes. We have extracted tariff data at the 10-digit level and consolidated it at the 6-digit level for each partner and each year, by averaging (simple average) the data of 10-digit lines. For each preferential scheme, each product line and each year, we have generated the simple average of preferential tariffs and computed the preferential margin. To assign the preferential margin to country groups, we use dummies for the country groups belonging to different preferential schemes. For each country and each preferential scheme, we have constructed a dummy that takes a value of 1 if the country benefits from a particular scheme and zero otherwise.

groups from HS01 to HS24. In the econometric analysis, we consider the 4-year period 2001-2004, and this time coverage is due to the availability of data on tariffs for a very large set of products. The only dataset which makes a large amount of statistics easily available on tariffs, such as the ones we need to run our regressions at HS6-digit level, is DBTAR (2006) and this source covers the period 2001-2004.

VII. Econometric issues and the estimation method

In estimating a gravity model, there are three econometric issues to be addressed which are related to the non-observable heterogeneity of countries and to sample selection bias.

With regards country heterogeneity, it ought to be said that it introduces bias into the estimation because of the likely correlation between non–observable, country-specific effects and the explanatory variables of the gravity equation. Heterogeneity may be due to observable and unobservable factors (such as the propensity of one country to export more than others, cultural and historical links or business cycle effects), and/or to other several aspects which define the background behind two countries (i.e., common language, colonial past, shared border or religion). While this background based on observable factors can be handled by using a set of dummy variables, it is necessary to use a model with country fixed effects to check for non-observable factors (Serlenga and Shin 2007). In order to take into account countries' heterogeneity, we have decomposed the error term of equation (1) as follows:

(3)
$$u^{t}_{ijl} = \alpha_i + \alpha_j + \alpha_l + \alpha_t + \varepsilon^{t}_{ijl}$$

where α_i and α_j refer to time-invariant importer and exporter-country fixed effects, respectively, α_l to commodity fixed effects, α_t to time fixed effects and finally ε^{t}_{ijl} is an idiosyncratic error term. The fixed effects were meant to capture all unobserved factors that influence export flows, while the time variable allowed us to control for macro-economic factors that may have occurred over our sample period.

As far as sample selection bias is concerned, it must be pointed out that there is a long tradition of using a log-linearization of gravity equations. However this procedure fails when zero trade observations are present and will lead to biased estimates. There is a great deal of evidence that zeros are frequent in bilateral trade. For instance, Haveman and Hummels (2004) find that almost 1/3 of bilateral trade flowing between 173 countries in 1990 was zero, while Helpman et al. (2008) show that about half the country pairs in their sample of 158 trading countries did not trade with each other from 1970 to 1997. In our case, zeros extend to 90% of

the entire sample. Therefore, dropping zeros implies a loss of useful information as to why some countries trade in certain sectors and not in others.

The issue of zero-trade flows has been widely addressed in the literature on gravity empirics (Martinez-Zarzoso-Novak, 2007; Martin and Pham, 2008; Santos Silva and Tenreyro, 2006). In particular, Santos Silva and Tenreyro (2006) contribute to the discussion as to which estimator provides the most reliable results by assessing the potential bias of elasticities in a log linearised regression. They show that the consistency of an OLS estimator depends on a restrictive assumption regarding the error terms and suggest that the gravity equation could be estimated in its multiplicative form by using the Pseudo Quasi Maximum Likelihood Method (PQML) based on a Poisson Model. Moreover since the standard Poisson model is vulnerable to problems such as over-dispersion and excess zero flows,[13] we have used other estimation techniques, i.e. the Zero Inflated Poisson (ZIP) and the Negative Binomial Regression (NBR), as in Burger, van Oort, and Linders (2009). To sum up, we have evaluated the preferences for agro-food products (from HS01 to HS24) granted by the EU under its GSP scheme from 2001 to 2004 using five different estimators (OLS, LSDV, PQML; ZIP and NBR), the results of which are presented in the successive section.

[13] More precisely, Santos Silva and Tenreyro (2006) argue that linearisation of the gravity equation in the presence of heteroskedasticity leads to inconsistent estimates because the expected value of the logarithm of a random variable depends both on its mean and on higher-order moments of its distribution. Hence, if variance of the error term depends on regressors, the expected value of the error term logarithm will also depend on the regressors, violating the condition of consistency of OLS. The PML allows us to estimate the gravity equation and, more generally, constant elasticity models in their multiplicative form, and to allow for heteroskedasticity. However, an important condition of the Poisson model is equi-dispersion. In many cases, though, the conditional variance is normally higher than the conditional mean, which implies that the dependent variable is over-dispersed. The Poisson regression model only accounts for observed heterogeneity, where different values of the predictor variables result in a different conditional mean value. Unobserved heterogeneity, however, originates from omitted variables; if we do not take into account unobserved heterogeneity, the results are inconsistent and inefficient. In order to correct for over-dispersion, a negative binomial regression model can be used. The expected value of the observed trade flow in the negative binomial regression model is the same as in the Poisson regression model, but the variance here is specified as a function of both the conditional mean and a dispersion parameter. In other words, an additional error term has been added to the negative binomial regression model. The standard errors in the Poisson Model will be biased downward resulting in spuriously large z-values and spuriously small p-values (Cameron and Trivedi, 1986, 31). The Zero-Inflated model accounts for two latent groups within the population: a group with zero counts and a group with a non-zero probability of having counts other than zero. As Burger et al. (2009, p. 175) summarise: these models "take into account that not all pairs of countries have the potential (or are at risk) to trade because of trade embargos or a severe mismatch between demand and supply. On a similar note, the geographical or cultural distance between countries may simply be too large for trade to be profitable. Hence, the profitability of trade, which reflects the trade potential, can be separated from the volume of trade as stemming from two different processes"

VIII. Results

In this section, we have summarised the results obtained when estimating equation [1] with the: the OLS, LSDV, PQML, NBR (Negative Binomial Regression) and the ZIP (Zero Inflated Poisson) procedures. The first estimations we made regarded the pooled data of all agricultural exports to the EU. Afterwards we ran separate regressions for the following homogenous groups of products: livestock, fisheries, fruits, lacs and gums, oils and fats, products of animal origin, sugar, vegetables, beverages and spirits, tobacco, tropical fruits and residues from the food industry. Whatever the estimation, the trade statistics used are identified at HS6- digit level. The results for the pooled data are presented in table 8, while those obtained sector-by-sector are presented in table 9.

The first five columns of table 8 show the results obtained when equation [1] is estimated using the aforementioned methods. By comparing the outcomes, it emerges that the estimated parameters differed regarding the sign and magnitude. Briefly, when focussing on gravity standard variables, we found that the elasticity of importing country GDP was always positive and statistically significant in OLS (column 1), Poisson (column 3) and NBR (column 4) estimates. On the other hand, exporting country GDP was only found to exert a significant and negative impact in OLS results. As for the observable country-pair variables, we found that the best performing estimators were the Poisson and the NBR. It was only then, indeed, that some variables (Distance, Colonial Ties and Common Language) showed the expected signs and were statistically significant. The impact was significant and often had the wrong sign in all the other regressions. This was the case with Border, for instance, where, when significant, a negative sign emerged.

With regards to the goal of this work, we found that the GSP preferential scheme exerted a positive and significant impact on beneficiary countries in all the regressions and was significant in OLS, LSDV and ZIP regressions. When significant, its estimated value ranged from 0,024 (ZIP regression) to 0,061 (LSDV estimates), whereas the estimate was 0.042 with the OLS. The same applied for the EBA initiative, whose coefficient was 0.025 in OLS results, 0.038 in the ZIP regression and 0.086 when considering the LSDV estimator. The estimated coefficient of the GSP-Drug was significantly positive only when using the LSDV, while it turned out to be negative in the OLS and the ZIP regression (although in this case the significance was at the 10% level). Little encouraging evidence was found for the impact of the EuroMed agreement, which, at best, was positive and significant only in the LSDV regression. Finally, the preferential margin granted under the Cotonou Agreement in favour of ACPs positively affected the agricultural exports of beneficiaries only when the gravity model was estimated using the OLS and the LSDV techniques (table 8).

Overall, the evidence emerging is mixed. On the one hand, the only clear indication comes in the form of the positive impact exerted by the Ordinary GSP. On the other hand, the only results regarding the impact of all of these preferential agreements are those obtained from the LSDV method. As can be seen in table 8, this estimator yields statistical and positive coefficients whatever the trade preference and, in this sense, one conclusion that can be drawn is that the largest impact was the one brought about by the EBA initiative (the estimated parameter is 0.086), followed by the ordinary GSP (0.061), Med (0.02), GSP-Drug (0.012) and, finally, by the Cotonou agreement (0.009).

In order to check the robustness of results, we have re-estimated our models by replacing the five separate variables measuring the preferential margins (Ordinary GSP, GSP-Drug, EBA, ACP and EuroMed) with the variable named MaxPref, which corresponds to the maximum margin of preference observed for each export flow. The rationale behind this variable is to address the overlapping of preferences by assuming that any trade flow is determined by only one trade agreement, i.e. by the one assuring the largest preference margin. This is similar to what we did before when addressing the issue of preference overlapping (*cfr* § VI), but in this case we use a single, common vector, MaxPref, instead of five different preferential variables. The use of this variable is meant to provide an overall assessment of the effectiveness of the trade preferences granted by the EU. The estimation outcomes, which are summarised in table 8, indicate that the sign of the coefficient of MaxPref is always positive, although is only significant in two out of three regressions (OLS and LSDV estimates). This robustness check tends to support the view that EU trade preferences help DCs export more to European agricultural markets.

Finally, in the following we limit the presentation of the results obtained when running the gravity regression for each agricultural sector to those related to the Zero Inflated Poisson Regression. The estimates are displayed in table 9.

In comparing results between agricultural groups, we found that the GDP coefficient for importing countries is positive and statistically significant in two cases, oils-fats and residues from the food industry, while it is negative and not significant in the other group of products. The GDP coefficient for exporting countries is negative and significant in all regressions except for tobacco, where it is positive and significant. The population coefficient of importing countries has an ambiguous sign, as well the population coefficient of exporting countries. Distance is unexpectedly positive and significant in the case of live trees, fruits, oils-fats and tropical fruits, at a level of significance of 1%. Border, colony and language have ambiguous signs.

With respect to the preferential margin, the coefficient for the GSP presents a positive coefficient for the following agricultural groupings: live Trees (0.036), sugar (0.020), fruits (0.019), tropical fruits (0.038) and residues from the food industry (0.036), and a negative and significant coefficient for beverages-spirits (-0.084) and oils-fats (-0.204). The GSP-Drug shows positive and significant coefficient in oils-fats (0.054) and beverages-spirits (0.018), while it reports a negative and significant coefficient for residues from the food industry (-0.064) and live trees (-0.012). The EBA special initiative only has a positive and significant coefficient for lacs-gums (0.049), while, in the other groupings, its coefficient is positive but not statistically significant. The ACP coefficient is positive and significant for the following products: fruits (0.027), vegetables (0.012), lacs-gums (0.036) and beverages-spirits (0.031). The Mediterranean preferential margin is positive and significant for tropical fruits (0.028) and beverages-spirits (0.023), while it is negative and statistically significant for tobacco (-0.034). Nothing can be said with regards other products (fisheries and products of animal origin) since the Zero Inflated Poisson Regression does not converge.

Based on these results, it may be argued that the evidence revealed regarding the sector by sector impact of trade preferences is puzzling. The impact of the GSP scheme is effective in increasing DC exports of live trees, sugar, fruits, tropical fruits and residues from the food industry to the EU, while the GSP-Drug and the EBA are able to increase DC exports of oils and fats, beverages-spirits and lacs-gums. The Cotonou agreement is effective in increasing the exports of fruits, vegetables, lacs-gums and beverages-spirits, while the EuroMed agreement is effective in increasing the DC exports of tropical fruits and beverages-spirits.

Table 8 UE-15 Agricultural Imports and the impact of the EU GSP scheme. Estimates of a gravity equation when using the OLS, LSDV, Poisson, NBR and the ZIP methods (2001-2004).

	OLS	*LSDV*	*POISSON*	*NBR*	*ZIP*	*OLS*	*LSDV*	*ZIP*
GDP IMPORTER	0.841***	0.119	1.469***	2.900***	0.180	0.889***	0.142	1.491***
	[0.016]	[0.257]	[0.291]	[0.636]	[0.415]	[0.017]	[0.256]	[0.291]
GDP EXPORTER	-0.102***	-0.013	0.010	0.004	-0.008	-0.027***	0.043	0.033*
	[0.004]	[0.038]	[0.020]	[0.051]	[0.044]	[0.003]	[0.037]	[0.018]
POP IMPORTER	-0.065***	-0.644	-2.921**	2.944	-0.163	-0.114***	-0.824	-2.874**
	[0.016]	[1.058]	[1.372]	[3.938]	[1.564]	[0.017]	[1.055]	[1.362]
POP EXPORTER	-0.091***	0.530	-0.564	-1.561**	-0.247	-0.148***	1.087**	-0.262
	[0.004]	[0.436]	[0.659]	[0.739]	[0.550]	[0.004]	[0.431]	[0.655]
DISTANCE	0.079***	0.230***	-0.400***	-0.636***	0.277***	0.083***	0.227***	-0.401***
	[0.006]	[0.017]	[0.068]	[0.091]	[0.027]	[0.005]	[0.017]	[0.068]
GSP	0.042***	0.061***	0.021	0.002	0.024***			
	[0.002]	[0.003]	[0.023]	[0.023]	[0.003]			
GSP DRUG	-0.016***	0.012***	-0.015	-0.045	-0.007*			
	[0.002]	[0.004]	[0.019]	[0.028]	[0.004]			
EBA	0.025***	0.086***	0.042	0.010	0.038***			
	[0.002]	[0.003]	[0.035]	[0.040]	[0.004]			
ACP	0.010***	0.009***	-0.021	-0.038*	-0.022***			
	[0.002]	[0.002]	[0.018]	[0.023]	[0.002]			
MED	-0.021***	0.020***	-0.012	-0.028*	-0.008*			
	[0.002]	[0.004]	[0.013]	[0.017]	[0.005]			
BORDER	-0.274***	-0.014	-0.375***	0.032	0.022	-0.206***	-0.016	-0.375***
	[0.023]	[0.028]	[0.070]	[0.095]	[0.040]	[0.022]	[0.028]	[0.070]
LANGUAGE	-0.157***	-0.181***	0.265***	0.276***	-0.154***	-0.086***	-0.184***	0.265***
	[0.017]	[0.019]	[0.058]	[0.105]	[0.025]	[0.016]	[0.019]	[0.058]
COLONY	-0.002	-0.015	0.365***	0.699***	-0.025	-0.022	-0.019	0.365***
	[0.016]	[0.018]	[0.034]	[0.066]	[0.023]	[0.015]	[0.018]	[0.034]
MAXPREF						0.037***	0.054***	0.010
						[0.001]	[0.001]	[0.018]
CONSTANT	-6.431***	8.162	32.089	-76.210	11.869	-7.959***	-1.550	18.813
	[0.200]	[14.864]	[21.423]	[72.470]	[20.250]	[0.199]	[14.793]	[18.904]
OBSERVATIONS	175884	175884	3712014	3712014	3712014	175884	175884	3712014
R-squared	0.193	0.245				0.197	0.249	

Robust standard errors in brackets * significant at 10%; ** significant at 5%; *** significant at 1%

Table 9: Results from Zero Inflated Poisson regression, by groups of products (2001-2004).

	(1) **Live trees**	(2) **Fruits**	(3) **Lacs, gums, resine & other vegetables**	(4) **Oils & Fats**	(5) **Sugar**	(6) **Tropical fruits**	(7) **Vegetables**	(8) **Beverages, Spirits & Vinegar**	(9) **Residues from Food Industry**	(10) **Tobacco**
GDP IMPORTER	-0.364	0.411	-0.117	4.548***	0.529	-0.676**	-0.520	-0.716	1.482*	-0.202
	[0.702]	[0.313]	[0.442]	[1.362]	[0.703]	[0.318]	[0.566]	[0.569]	[0.781]	[1.024]
GDP EXPORTER	-0.155***	-0.030	0.027	-0.011	-0.158***	-0.176***	-0.065**	-0.059**	0.037	0.085**
	[0.026]	[0.019]	[0.030]	[0.035]	[0.032]	[0.023]	[0.029]	[0.024]	[0.045]	[0.034]
POP IMPORTER	7.804***	-1.220	1.035	-16.906***	-0.635	1.678	2.504	0.882	-6.167**	2.403
	[2.809]	[1.245]	[1.634]	[5.269]	[3.093]	[1.383]	[2.573]	[2.452]	[3.032]	[5.063]
POP EXPORTER	0.029	-0.091***	-0.089***	-0.050	0.034	0.008	-0.036	-0.008	-0.083	-0.109***
	[0.027]	[0.020]	[0.026]	[0.041]	[0.032]	[0.021]	[0.025]	[0.023]	[0.051]	[0.039]
DIST	0.113***	0.065**	-0.027	0.114**	0.055	0.177***	0.029	0.024	0.119***	-0.016
	[0.031]	[0.026]	[0.040]	[0.056]	[0.048]	[0.030]	[0.031]	[0.033]	[0.044]	[0.056]
GSP	0.036***	0.019***	-0.204***	-0.015	0.020**	0.038***	0.005	-0.084***	0.036***	0.018
	[0.008]	[0.006]	[0.030]	[0.038]	[0.008]	[0.007]	[0.009]	[0.008]	[0.013]	[0.015]
GSP DRUG	-0.012*	-0.010	0.054***	-0.017	-0.010	-0.015	-0.009	0.018*	-0.064**	-0.006
	[0.007]	[0.011]	[0.014]	[0.033]	[0.008]	[0.010]	[0.009]	[0.010]	[0.030]	[0.014]
EBA	-0.009	-0.001	0.049***	0.006	0.002	-0.012	-0.000	0.006	0.003	0.014
	[0.008]	[0.008]	[0.008]	[0.015]	[0.011]	[0.008]	[0.007]	[0.009]	[0.011]	[0.011]
ACP	-0.004	0.027***	0.036***	-0.012	0.007	-0.024***	0.012*	0.031***	0.008	-0.007
	[0.008]	[0.006]	[0.012]	[0.013]	[0.007]	[0.007]	[0.007]	[0.009]	[0.011]	[0.012]
MED	0.010	-0.006	0.055**	0.039	-0.013	0.028**	-0.002	0.023**	0.021	-0.034*
	[0.010]	[0.010]	[0.024]	[0.027]	[0.014]	[0.012]	[0.012]	[0.011]	[0.020]	[0.017]
BORDER	-0.066	-0.062	-0.278**	0.006	-0.093	-0.045	-0.245***	-0.197**	-0.075	-0.040
	[0.095]	[0.062]	[0.139]	[0.166]	[0.137]	[0.093]	[0.078]	[0.082]	[0.122]	[0.161]
LANGUAGE	-0.111	-0.072	0.025	0.107	0.040	-0.126**	-0.126**	-0.063	-0.146	-0.153
	[0.081]	[0.056]	[0.060]	[0.093]	[0.082]	[0.061]	[0.051]	[0.066]	[0.117]	[0.129]
COLONY	-0.038	-0.033	0.007	-0.117	0.019	-0.071	-0.064	-0.051	-0.161*	-0.069
	[0.066]	[0.050]	[0.067]	[0.077]	[0.080]	[0.060]	[0.055]	[0.068]	[0.089]	[0.108]
Constant	-99.518***	21.626	-2.421	162.095***	11.470	5.352	-12.384	18.192	71.581*	-21.044
	[36.783]	[15.026]	[19.606]	[57.891]	[36.204]	[19.964]	[30.303]	[28.019]	[40.000]	[60.362]
Observations	83771	865525	143109	408350	111687	411853	410121	153594	174502	62825

Robust standard errors in brackets * significant at 10%; ** significant at 5%; *** significant at 1%

IX. Concluding remarks

The purpose of this paper was to provide an empirical assessment of the impact that the EU GSP exerts on the exports of those developing countries that are eligible for this preferential treatment.

The literature which has investigated the effectiveness of the EU GSP concludes that this preferential trade agreement does not achieve its objectives in terms of enhancing the export flows of beneficiaries towards EU markets (see, i.e., Nilsson, 2002; Persson and Wilhelmsonn, 2007; Verdeja, 2006; Subramanian and Wei, 2007; Cardamone 2009; Agostino et al., 2008; Cipollina and Salvatici, 2007; Persson, 2005; Pishbahar and Huchet-Bourdon, 2009). This is due to the magnitude of the granted margin of preference as well as to the high administrative costs, the restrictive RoO, and other conditions which undermine the potential of the preferential treatment.

While research on the EU GSP has focused mainly on its impact on total trade by using the dummy variable model to measure the extent of the preferential treatment, assessment of the trade effects brought about by the GSP has not been made by referring to sectoral data or by exploiting data on tariffs which would allow us to gauge the margin of preferences enjoyed by developing countries precisely.

Our work aims to contribute to this literature by providing further evidence based on HS6-digit agricultural products and introducing into the estimations a quantitative measure for five different trade agreements: the ordinary GSP, GSP-Drug , EBA, Cotonou Agreement, and European Mediterranean Agreement. Furthermore, besides standard estimators (OLS and LSDV), we employed the Poisson, the NRB and ZIP procedures, in order to cope with the existence of many zero trade values in trade statistics.

The analysis was carried out by considering a large sample of agricultural exports from 169 exporting countries to the EU over the period 2001-2004. The sample of products is comprised of 763 agricultural goods.

The main findings of our analysis may be summarised as follows. There is evidence that the EU GSP has a positive and significant impact on the agricultural exports of preferred countries. This evidence is quite robust, being confirmed in all the regressions we estimated by pooling the data of agricultural exports and using very different techniques. Yet, although positive effects were recorded in the case of EBA and EuroMed agreements, the findings on the role of GSP-Drug and the ACP were puzzling. Finally, after replacing the margins of preference for each agreement with an index meant to capture the overall effect of EU preferential trade policy, we can argue that the entire system of EU trade preferences is beneficial to a large sample of countries. Although the evidence at sectoral level is much more mixed that that

obtained when pooling the data, the impact of the ordinary GSP is positive for many agricultural sectors confirming that, for a large proportion of DCs, the losses of welfare from preference erosion may be greater than the gains from liberalisation.

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Appendix A
The list of exporting countries included in the analysis

GSP: Albania (AL), Andorra (AD), Anguilla (AI), Argentina (AR), Armenia (AM), Aruba (AW), Azerbaijan (AZ), Bahrain (BH), Belarus (BY), Bermuda (BM), Bosnia and Herzegovina (BA), Brazil (BR), British Indian Territory (IO),
Brunei Darussalam (BN), Bulgaria (BG), Cayman Islands (KY), Chile (CL), China, People's Republic of (CN), Christmas Island (CX), Cocos Islands or Keeling Islands (CC), Cook Islands (CK), Croatia (HR), Cuba (CU), Democratic Republic of Korea(KP), Falklands Islands (FK), Republic of Korea (KR), Faeroe Islands (FO), French Polynesia (PF), French Southern territories (TF), Gibraltar (GI),Greenland (GL), India (IN), Indonesia (ID), Iran, Islamic Republic of (IR), Iraq (IQ),Kazakhstan (KZ), Kuwait (KW), Libyan Arab Jamahiriya (LY), Malaysia (MY), Mayotte (YT), Mexico (MX), Micronesia, Federated States of (FM), Montserrat (MS), Netherlands Antilles (AN), New-Caledonia (NC), Norfolk Island (NF), Northern Mariana Islands (MP), Oman (OM), Pakistan (PK), Palau (PW), Paraguay (PY), Philippines (PH), Pitcairn (PN), Qatar (QA), Romania (), Russian Federation (RU), Santa Helena (SH), Saudi Arabia (SA), Singapore (SG), South Africa (ZA), South Georgia and South Sandwich Islands (GS), Tajikistan (TJ), Thailand (TH), Tokelau (TK), Turkmenistan (TM), Turks and Caicos Islands (TC), Uganda (UG), United Arab Emirates (AE), United States Minor outlying Islands (UM), Uruguay (UY), Uzbekistan (UZ), Wallis and Futuna (WF),

ACP: Antigua and Barbuda (AG), Bahamas (BS), Barbados (BB) ,Belize (BZ), Botswana (BW), Cook Islands (CK), Cameroon (CM), Côte d'Ivoire (CI), Dominica (DM), Dominican Republic (DO), Fiji (FJ), Gabon (GA), Grenada (GD), Ghana (GH), Grenada (GD), Republic of Guinea (GN), Guyana (GY), Jamaica (JM), Kenya (KE), Marshall Islands (MH), Mauritius (MU), Namibia (MA), Nauru (NR), Nicaragua (NI),Nigeria (NG), Niue (NU), Papua New Guinea (PG), St. Kitts and Nevis (KN), St. Lucia (LC), St. Vincent and the Grenadines (VC), Seychelles (SC), Suriname (SR), Swaziland (SZ), Tonga (TO), Trinidad and Tobago (TT), Tuvalu (TV), Zimbabwe (ZW).

GSP-Drug[14]: Bolivia (BO), Colombia (CO), Costa Rica (CR), Ecuador (EC), Georgia (GE), Guatemala (GT), Honduras (HN), Sri Lanka (LK), Moldova, Republic of (MD), Mongolia (MN), Nicaragua (NI), Panama (PA), Peru (PE), El Salvador (SV), Venezuela (VE).

EBA: Afghanistan (AF), Angola (AO), Bangladesh (BD), Burkina Faso (BF), Burundi (BI), Benin (BJ), Bhutan (BT), Congo, Democratic Republic of (CD), Central African Republic (CF), Cape Verde (CV), Djibouti (DJ), Eritrea (ER), Ethiopia (ET), Gambia (GM), Guinea (GN), Equatorial Guinea (GQ), Guinea-Bissau (GW), Haiti (HT), Cambodia (KH), Kiribati (KI), Comoros (KM), Laos People's Democratic Republic (LA), Liberia (LR), Lesotho (LS), Madagascar (MG), Mali (ML), Myanmar (MM), Mauritania (MR), Maldives (MV), Malawi (MW), Mozambique (MZ), Niger (NE), Nepal (NP), Rwanda (RW), Solomon Islands (SB), Sudan (SD), Sierra Leone (SL), Senegal (SN), Somalia (SO), São Tomé and Príncipe (ST), Chad (TD), Togo (TG), Timor-Leste (TL), Tuvalu (TV), Tanzania, United Republic of (TZ), Uganda (UG), Vanuatu (VU), Samoa (WS), Yemen (YE), Zambia (ZM).

EuroMed: Algeria (DZ), Cyprus (CY), Egypt (EG), Israel (IL), Jordan (JO), Lebanon (LB), Malta (MT), Morocco (MA), Palestinian Territory, occupied (PS), Syria (SY), Tunisia (TN), Turkey (TR).

DEVELOPED COUNTRIES USA (US), Norway (NO) Japan (JP), New Zealand (NZ) Australia (AU), Canada (CA), Switzerland (CH).

[14] COMMISSION DECISION of 21st December, 2005 regarding the list of beneficiary countries which qualify for the special incentive arrangement for sustainable development and good governance, provided for by Article 26(e) of Council Regulation (EC) No 980/2005 which applied a scheme of generalised tariff preferences (2005/924/EC). Moldova and Sri Lanka were added to the list while Pakistan was removed.

Appendix B

Data Sources

To build the final database needed to estimate the equation (1), we use four different data sources, UN COMTRADE, MACMAP, WBDI and DBTAR. COMTRADE is a dataset on trade flows provided by the United Nations Trade Database (available at http://unstat.un.org/unsd/comtrade/). It is used to gather data regarding the imports of each EU-15 country in terms of products and exporting countries. Commodities are classified according to different international classifications. We use net imports for the EU15 members at HS 6 digit level. We consider imports rather than total trade flows (imports+exports), because total trade is used to measure the impact of PTAs when there is a mutual reduction in tariffs. Since the EU GSP scheme is non-reciprocal, the use of import data is more appropriate. Moreover imports rather than exports are used as a dependent variable because imports are much more reliable, as it is easier to check for incoming flows of goods. Gross Domestic Product and the Population, are from the World Bank Development Indicators (WDI) http://www.worldbank.org/data. Distance and dummy variables are drawn from MAcMap, a database developed by the Centre d'Etuds Prospectives et d'Informations Internationales (CEPII) and UNCATD. It is available at http://www.cepii.fr/anglaisgraph/macmap/form_macmap/access.asp, and provides information on tariffs applied at the tariff level, distance and other variables by 165 countries. Geographical distance is used as a proxy for transport costs. Distance is often a measure of "remoteness"; moreover, this is complemented with additional regressors capturing other country pair specific trade costs. A set of dummy variables are included in the model (Contiguity, Colony, and Common Language) affecting bilateral trade. Tariffs come from DBTAR, which is a database on European Agricultural tariffs providing applied tariffs for products over the period 2001-2004. The main source of this database is TARIC (Integrated Tariff of the European Community - TARIC contains about 15.000 tariff lines). In DBTAR, specific or complex duties are transformed into *ad-valorem* equivalents (AVE) by using an estimation of unit values based on EU import statistics from COMEXT database. DBTAR provides complete information on EU tariffs at a very detailed level, including the tariffs applied within each preferential agreement for each product. *Ad valorem* tariff equivalents are also included.