WPS4710

POLICY RESEARCH WORKING PAPER 4710

Trade Diversion under Selective Preferential Market Access

Ingo Borchert

The World Bank
Development Research Group
Trade Team
September 2008

Policy Research Working Paper 4710

Abstract

Through its diverse trade preference schemes, the European Union provides different groups of developing countries with different degrees of market access. This paper is the first to demonstrate empirically that such staggered market access induces sizable trade diversion to the detriment of relatively less preferred beneficiary countries. In particular, preferences granted to African, Caribbean and Pacific economies are shown to impair the export performance of seven developing countries whose products only qualify for basic preferences under the Generalized System of Preferences. Exports to the European Union decline by about 30 percent if the African, Caribbean and Pacific tariff falls by 10 percentage points. In terms of forgone trade volume, losses for these relatively disadvantaged countries amount on average to 9 percent of their total trade with the European Union, depending on the country and its main exports. These intra-developing country distortions are driven by highly substitutable, often labor-intensive commodities.

This paper—a product of the Trade Team, Development Research Group—is part of a larger effort in the department to analyze the consequences of trade policy for developing countries. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at IBorchert@worldbank.org.

Trade Diversion under Selective Preferential Market Access

Ingo Borchert*

Keywords: trade diversion, trade preferences, GSP, regionalism

JEL-Codes: F13, F15

*Development Research Group, The World Bank, 1818 H Street NW, Washington D.C. 20433, phone: +1-202-4588526, email: IBorchert@worldbank.org.

This research was mainly conducted while the author was with the University of St.Gallen, Switzerland. He is indebted to Heinz Hauser for valuable advice on an earlier draft, and to conference participants at the European Economic Association and the European Trade Study Group for many helpful suggestions. Data support from the International Trade Centre, Geneva, is gratefully acknowledged. The findings, interpretations, and conclusions expressed herein are entirely those of the author and should not be attributed to any of the aforementioned persons or institutions. The author assumes sole responsibility for any remaining errors.

1 Market Access for Developing Countries

The design of preferential market access for developing countries under Generalized System of Preferences (GSP) regimes has long been a contentious issue. Now the structure of the European Community's (EC) multi-layered GSP scheme, in which different groups of developing countries are granted varying degrees of market access, has recently been successfully challenged by India before the WTO Dispute Settlement System.[1] The adjudication, and filing this complaint in the first instance, highlights the fact that granting preferential treatment in a discriminatory manner to a subset of developing countries might entail a negative externality on less preferred developing countries (Grossman and Sykes, 2005; Bartels, 2003). The motivation for this study is the obvious interest in determining empirically the existence, and likely magnitude, of GSP-induced trade distortions among beneficiary countries. The discriminatory nature of preferential market access begs the question in what ways, if any, trade concessions made to developing countries have been impaired by the GSP scheme's *selectivity*.

Using recent and detailed data, this paper demonstrates that trade diversion, which results from a situation of staggered market access, specifically comes at the expense of other *developing* countries. Already the classic work by Sapir (1981) on the EC's GSP system noted that "among the developing countries there has been different degrees of benefit from the GSP" (p.352). The higher preference margins for certain beneficiary countries convey them benefits analogous to those of customs union members, to the potential detriment of other GSP recipients. As in the customs union case, the degree of intra-developing country trade diversion plausibly depends on the magnitude of the product-specific preference margins. Hence, a testable implication is that the change in imports from GSP countries should be negatively related to the extent of tariff preferences accorded to more preferred competitors.

[1] See *European Communities – Conditions for the Granting of Tariff Preferences to Developing Countries*, WTO document No. WT/DS246/AB/R, adopted 20 April 2004.

Despite this obvious conjecture, there is to the best of my knowledge no empirical evidence on trade diversion among beneficiary developing countries, although the GSP's selectivity has indeed been a cause of concern (Panagariya 2002, Baldwin and Murray 1977, p.39). Haveman et al. (2003) study the differential impact of protection across countries and find a very elastic demand for imports from alternative exporters, which suggests "a tremendous potential for trade diversion due to the preferential application of tariffs" (p.484). MacPhee (1992, p.21) reports on the flip side of the mechanism portrayed here in that continuing GSP beneficiaries often seized exports from those countries that lost preferential treatment due to graduation. Research on the relative position of different beneficiary groups also relates to the recent literature on preference erosion (Hoekman and Çaglar Özden, 2005; Francois et al., 2005). The complaints currently voiced by several developing countries about adverse effects of eroding preferences clearly imply that, in a reversed fashion, some less preferred developing countries must have been harmed in the first place.

Related empirical papers on distorting effects from preferential treatment include Romalis (2007), Fukao et al. (2003), and Clausing (2001) on trade diversion under NAFTA (and its predecessor CUSFTA). Romalis (2007) conducts a panel data study to estimate, among other things, the effects of the discriminatory removal of US trade barriers towards Mexican and Canadian commodities, using imports from the (non-participating) EC as 'control trade flows'. In comparing the sourcing patterns of the US and the EC, respectively, the growing wedge between US and EC import patterns then identifies NAFTA's trade impact. Romalis finds that every 1% reduction in intra-North American tariffs causes a 2.8–3.9% decline in the import ratio from outside countries (p.432). The idea of using 'control imports' is at the heart of Romalis' new technique, which will also be employed in this paper as it seems particularly suited for identifying trade diversion between subgroups of developing countries.

The findings in this paper suggest that staggered market access regimes are a serious

concern for developing countries at the lower end of the 'preference pyramid'. Moreover, trade diverting effects turn out to be industry-specific, thus making a strong point for a disaggregated analysis. The contribution of this paper is to study the alleged adverse effects of preferences' selectivity on beneficiary countries. The finding of non-negligible trade diverting effects at the expense of developing countries can be considered as one step in quantifying the economic costs of the GSP system. Furthermore, this work on the economic aspects of selective market access is complementary to the ongoing legal discussion on the admissible degree and desirability of discrimination in GSP schemes.

The following Section 2 provides a brief overview of the EC GSP scheme's structure and presents the distribution of preference margins. Section 3 lays out the theoretical model and derives the estimation equation. Section 4 turns to the empirical implementation, presents the main results of the paper and discusses country- and product specific findings. Section 5 offers a counterfactual calculation of foregone export volumes, and Section 6 concludes.

2 The GSP Scheme of the European Community, 1995-2001

Apart from numerous reciprocal trade agreements, the EC's preferential market access conditions are regulated by two main frameworks that are both relevant for the present study: the GSP and the African, Caribbean and Pacific states (ACP) regime, respectively. Note that while both are non-reciprocal, the former is unilaterally granted based on the so-called "Enabling Clause"[2] whereas the ACP preferences are an integral part of an international treaty and thus are, due to their contractual nature, legally binding. Prior to

[2]Decision of 28 November 1979 on "Differential and More Favourable Treatment, Reciprocity and Fuller Participation of Developing Countries" (WTO document No. LT/TR/D/1). It stipulates that the GSP schemes be guided by the three principles of generality, non-reciprocity, and non-discrimination.

the introduction of the "Everything but Arms" (EBA) initiative in 2001, ACP countries were accorded the most favorable preferential market access conditions to the EC market: about 94 percent of ACP exports enter free of any tariff or quota restriction (100 percent in the case of industrial products and 80 percent for agricultural products, see UNCTAD, 2001*a*, p.18).

In 1995 a major overhaul of the EC GSP scheme brought about the elimination of most quantitative restrictions.[3] On 1 January 1995 the EC promulgated a four-year scheme of generalized tariff preferences for the period 1995–1998 which contains the relevant provisions for the present analysis.[4] Among other features, the concept of "tariff modulation" places all products eligible for GSP treatment into four categories and assigns staggered tariff cuts to each of them. Moreover, from 1998 onwards a mechanism for the graduation of countries and sectors entered into force. The regulations typically allot 'base line' tariff cuts that are applicable to all developing countries, while Least Developed Countries (LDC) are separately accommodated with more favorable conditions.

Since ACP preferences are the most generous ones, this paper focuses mainly on the distinction between ACP and 'residual' GSP countries, among which trade diversion should be expected to take place. It can be shown, though, that the same effect is present between LDC and GSP countries. Despite the long-standing discussion about the 'erosion' of preferences, Inama (2003) has in contrast pointed to a growing heterogeneity between beneficiary countries. While graduation has reduced the value of preferences for some recipients, certain improvements like the Special Incentive Arrangements, enacted in 1998, or the EBA initiative of 2001 have again worked towards etiolating the *relative* position

[3]For a very detailed comparison of the pre- and post-1995 provisions see Peers (1995). However, no changes have been made concerning the rules of origin, in which field the regulations originating from the beginning of the 1990s continue to be applicable.

[4]Council Regulation 3281/94 (OJ L 384/1 of 19 December 1994). Council Regulation 1256/96 contains the companion provisions for agricultural goods, starting from 1 July 1996. Council Regulation 2820/98 (OJ L 357/1 of 21 December 1998) revised and extended the scheme until 2001 but the basic structure was not substantially modified.

of GSP countries. This clearly reinforces the potential for intra-beneficiary trade distortions.

Figure 1 concludes the EC GSP scheme's brief characterization by presenting the sectoral distribution of preference margins enjoyed by ACP countries over 'ordinary' GSP recipients. The chart shows averages for the period 1996–2001 of all tariff lines per sector (solid bars) as well as only those products with a positive preference margin (shaded bars). The shaded bars therefore display the extent of preferential market access conditional on the fact that a strictly positive margin is observed at all. It becomes apparent that agriculture (first four sectors from the left) as well as textiles and footwear are major areas in which preferences are granted. Romalis (2007, p.424) finds the same to be true for the US, noting that highest preferences are found in products in which developed countries have a comparative disadvantage. In all other sectors the average extent of preferential treatment is close to or below 5 percent, although especially in agriculture the median is considerably lower than the average, thus suggesting the existence of some tariff lines with quite high preference margins.

{ Figure (1) about here }

3 Model Specification

The theoretical model follows closely the setup developed in Romalis (2007). There is a continuum of commodities, z, and within each industry (which is synonymous to commodity), varieties are differentiated with respect to country of production. Markets are competitive in every industry, thus final goods prices in a given country equal marginal cost, a_t, augmented by transport costs, g_t, and tariffs, τ_t.[5] Since the latter two are importer-

[5]Thus the model employs the usual iceberg assumption on transport costs. On a cautionary note though, Hummels and Skiba (2002) show that shipping costs often more closely resemble per unit, rather than per value, charges.

specific variables, for any arbitrary importing country M landed prices of products from country c are given by

$$p_M(z_c) \equiv a(z_c) g_M(z_c) \tau_M(z_c) \tag{1}$$

Consumer utility is of the CES form, with the CES aggregator being defined over country varieties *within* each industry z. Let σ denote the corresponding elasticity of substitution among different country varieties within industry z. The CES aggregator for quantities, and its corresponding minimum-cost price index, are then as follows:

$$Q_{M,t}(z) \equiv \left(\sum_c q_M(z_c)^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} \quad ; \quad P_{M,t}(z) \equiv \left(\sum_c p_M(z_c)^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \tag{2}$$

Consumers in country M maximize utility with respect to each commodity z from country c, $q_M(z_c)$, subject to a budget constraint, whereby national income, Y_M, is assumed to be exogenous, as is the constant consumption share of variety z in aggregate income, $b_M(z)$. Hence, with n potential supplier countries c, there are n corresponding first-order conditions (FOC) for each commodity z. The usual CES demand for any good, in value terms, obtained from a particular country j is a function of the respective good's own price and the aggregate price index in industry z, $P_M(z)$:

$$p_M(z_j) q_M(z_j) = \frac{p_M(z_j)^{1-\sigma_M}}{P_M(z)^{1-\sigma_M}} \cdot b_M(z) Y_M \tag{3}$$

To allow for a more general specification, notice that the elasticity of substitution now carries the importing country's index. Hence, σ is not restricted to be the same across importing countries. For the purposes of this paper, I will hereafter consider the EC and the US as two different importing countries M.[6] Dividing equation (3) for $M \in \{EC, US\}$ and taking logarithms yields an analog expression to Equation (22) in Romalis (2007,

[6]The US has been chosen as the control importer because as a trading bloc it is broadly comparable to the EC, and because the inclusion of US tariffs towards country j allows to account for changes in the control country's trade policy.

p.431).

$$\ln\left(\frac{ag_{EC}\tau_{EC}q_{EC}(z_j)}{ag_{US}\tau_{US}q_{US}(z_j)}\right) = (\sigma_{EC}-1)\ln\left(\frac{P_{EC}(z)}{p_{EC,j}}\right) - (\sigma_{US}-1)\ln\left(\frac{P_{US}(z)}{p_{US,j}}\right) + \ln\left(\frac{b_{EC}(z)Y_{EC}}{b_{US}(z)Y_{US}}\right) \tag{4}$$

Equation (4) is essentially a ratio of bilateral imports at the Harmonized System (HS) 6-digit level, and estimation is to be implemented separately for a particular country j. Note that the left-hand side ratio of imports from the same developing country effectively controls for all kinds of product-specific supply side shocks on the part of the exporting country j as these equally affect trade flows to both destinations (the marginal cost term $a(z_j)$ cancels out). This is an important feature of the approach developed by Romalis for it eliminates much 'nuisance' variation unrelated to the issue of preferential market access. Moreover, this approach avoids a contentious assumption that usually afflicts cross-sectional regressions, namely that all countries included in an aggregate analysis operate on the same production function. Here all observations are a panel from the same single country.

In order to proceed to an estimable equation, insert the expression for prices from equation (1), move the term $\ln\frac{\tau_{EC,j}}{\tau_{US,j}}$ from the left-hand side to the right so that the dependent variable corresponds to standard import statistics, and simplify to obtain

$$\begin{aligned}\ln\left(\frac{ag_{EC}q_{EC}(z_j)}{ag_{US}q_{US}(z_j)}\right) = {} & (\sigma_{EC}-1)\ln P_{EC}(z) - \sigma_{EC}\ln\tau_{EC,j} \\ & - (\sigma_{US}-1)\ln P_{US}(z) + \sigma_{US}\ln\tau_{US,j} \\ & - \frac{(\sigma_{EC}-1)}{(\sigma_{US}-1)}\ln\left(\frac{g_{EC,j}}{g_{US,j}}\right) + \ln\left(\frac{b_{EC}(z)Y_{EC}}{b_{US}(z)Y_{US}}\right)\end{aligned} \tag{5}$$

Everything else equal, the effect of preferential market access to the EC for imports from

a relatively more preferred country $k \notin j$, $\tau_{EC,k}$, is to lower the price index $P_{EC}(z)$, i.e. the price index of *all* varieties' exports of good z to the EC. For instance, k could denote the group of ACP countries, all of which enjoy the same preferential advantage as compared to ordinary GSP countries. One of the latter would then constitute a j country. Since $p_{EC,j}$ remains unchanged (by construction) and because $(\sigma - 1) > 0$, Equation (4) predicts that a decline in $P_{EC}(z)$ depresses exports from country j to the EC relative to that of another destination (here the US). This is the trade diverting effect to the detriment of the less preferred country j.[7] Hence, a testable hypothesis of the model is whether the preferential tariff rate accorded to country k, e.g. the ACP group, is negatively related to the less preferred country's exports, conditional on relevant control variables that will affect the GSP country's exports to the EC and to the US.

Equation (5) shows that in order to isolate this effect market entry conditions for GSP countries to both the EC and the US need to be accounted for, alongside proxies for the price indices of product z in the EC and the US and relative transport costs and expenditure shares. In order to address all of those theoretical channels, I include in the empirical specification the EU's MFN as well as preferential ACP tariff rates to capture the first term on the right of Equation (5), the individual GSP country's EU tariff rates correspond to the second term, the US MFN and preferential Mexico rates to capture the third term, and the individual GSP country's US tariff rates for the fourth term. In addition to serving as a proxy for unobserved price indices, a commodity's MFN tariff is also likely to depend on the existence of a preferential rate, as Karacaovali and Limão (2008) find, thus omitting them would lead to inconsistent estimates. Further I assume that the fifth and sixth term—relative transport costs and expenditure shares—can be

[7] In general equilibrium, tariff changes will affect goods prices if the elasticity of supply is less than infinite. Recent evidence for this to be case is furnished by Broda et al. (2007) (on 15 non-WTO countries) and Romalis (2007) (on elastic exports to the US). While those price changes are an important part of welfare analysis, here I abstract from terms of trade effects because the primary focus is on identifying trade diversion. At any rate, the negative demand shock to GSP countries would causes the prices of their exports to fall so that the terms of trade effect, if anything, works in the same direction as does trade diversion.

represented by full sets of time and product fixed effects plus an error term orthogonal to the tariff variables.

Lastly, not all imports which are in principle eligible for preferential treatment *de facto* enter the EC market under that respective import program.[8] To incorporate less than full utilization rates into the model, let $\lambda_{EC,t}(z)$ denote the fraction of imports of product z which are actually accorded the preferential rate $\tau_{EC,k}$. Adding back in the time subscript, we obtain the reduced form estimation equation, in which $\tau \equiv (1 + \text{tariff rate})$, as

$$\begin{aligned} \ln \frac{\lambda_{EC,t} a_t g_{EC,t} q_{EC,t}(z_j)}{a_t g_{US,t} q_{US,t}(z_j)} = \; & \alpha + \beta_1 \ln(\tau_{EC,GSP,t}) + \beta_2 \ln(\tau_{EC,ACP,t}) \\ & + \beta_3 \ln(\tau_{EC,MFN,t}) + \beta_4 \ln(\tau_{US,GSP,t}) \\ & + \beta_5 \ln(\tau_{US,MFN,t}) + \beta_6 \ln(\tau_{US,Mex,t}) \\ & + \mu_t + \mu_z + \varepsilon_{z,t} \end{aligned} \tag{6}$$

The coefficient β_1 is expected to be negative (the conventional impact of lower tariffs triggering higher imports), while β_2, $\beta_3 > 0$ as changes in ACP and MFN market access conditions *ceteris paribus* erode a GSP country's position. In particular, a positive coefficient β_2 would testify to intra-developing country trade diversion as lower ACP tariffs translate into lower GSP exports. Coefficient β_4 is expected positive as US tariff cuts stimulate US imports which, however, decreases the import ratio; and finally β_5, $\beta_6 < 0$ for analogous reasons as above (changes in US MFN and NAFTA tariff schedules impairs GSP countries' relative position, and a fall in the denominator causes the ratio to increase).

[8]Generically, one important reason for intra-beneficiary trade diversion is probably the systematic difference in utilization rates across beneficiary groups. The latter is markedly higher for LDC and ACP countries as compared to ordinary GSP recipients. For instance, in 2001 the overall utilization rate for GSP recipients, i.e. the ratio of preferential to eligible imports, was around 45 percent (CEC, 2003, Table T3), whereas in contrast the corresponding figure for ACP imports reached 76 percent (Inama, 2003, p.966).

As equation (6) incorporates an unobserved individual effect, μ_z, the issue of dealing with unobserved heterogeneity looms large. Time-invariant product level effects might include comparative advantage characteristics or trade policy devices.[9] In particular, Broda et al. (2007) have shown that a (large) country's trade policy for a given product is a function of its market power, thus linking the EC's and US's tariff profile to their commodity specific buyer power. In order to accommodate arbitrary correlation between the unobserved product effect and the regressors, estimation of equation (6) proceeds with a fixed effects panel estimator and robust standard errors that allow for intra-group correlation. Data will be pooled across seven GSP countries so that a cross-sectional unit corresponds to a (country $\times$ tariff line) pair.

4 Empirical Assessment of Trade Diversion

4.1 Data Description

Trade data to estimate equation (6) is sampled at the HS 6-digit level, the most detailed yet internationally comparable one, for the time period 1996–2001. EC tariff and trade data is obtained from the International Trade Centre (ITC), Geneva, and additional trade data on EC imports as well as trade conversion factors are from OECD (2004). Tariff data consists of *ad valorem* tariff equivalents at the HS 8-digit level which are based on applied, rather than bound, rates and also encompass specific duties and quantitative measures (if any). At this level of disaggregation, it is thus one of the most accurate tariff data bases currently available. US imports and duties collected are obtained from the United States International Trade Commission (USITC), and US tariffs are calculated as implicit rates

[9] For instance, the main factor that influences the scope of preference utilization, as identified by a number of empirical studies, is most likely the complexity of the 'rules of origin' regime in place (see UNCTAD, 2003, 2001*b*).

from duties collected (most recent studies employ this strategy, see Romalis 2007, p.424, Santos-Paulino and Thirlwall 2004, p.F51, and Clausing 2001, p.684).[10]

The EC's tariff schedule for alternative beneficiary groups does not vary across individual member countries of that group, thus it is sufficient to use one beneficiary country's tariff schedule to infer the profile of market access that this group of countries faces in the EC market. For the ACP group, I consider the EC's tariffs for Cote d'Ivoire to be representative for ACP members. This choice is as good as any since tariffs do not vary among ACP countries.[11] While the same holds in principle for GSP members as well, here the tariff profile differs to the extent that HS 6-digit tariffs are a trade-weighted average of HS 8-digit data. Information to correct for 'under-utilization' of preferences, to the extent possible, is taken from CEC (2003, Table T6) and CEC (2004, Table 1).[12] Table (1) collects summary statistics of all the variables. It is apparent that the dependent variable, the ratio of imports, exhibits tremendous variation as compared to the one of the regressors.

{ Table (1) about here }

As residual GSP beneficiaries I consider Brazil, China, India, Thailand, Vietnam, Colombia and Tunisia, for which the hypothesis of intra-developing country trade diversion is tested. While there are certainly many more such countries which could have been selected, the country sample is chosen with a view to minimize missing observations due to zero trade flows. Recall that the estimation strategy requires that for any given tariff line a country must record exports to the EC *and* to the US. Moreover, it is worth

[10] Under the current EC reporting regime data on duties collected per tariff line and country is not available. Even if it would be, duties from imports with and without GSP treatment would be lumped together (unless reported separately by import program), which renders this kind of calculation impossible for the EC.

[11] In the ancillary estimation of LDC–GSP diversion, I employ Bangladeshi tariff rates; Bangladesh is a LDC that is not simultaneously a member of the ACP group.

[12] The attempt to account for utilization rates in a fully detailed and country-specific manner is thwarted by the confidential handling of this type of data by the European Commission.

emphasizing that the term 'representative' is not to be misunderstood in a sense to imply that trade has been diverted towards that country whose tariff schedule has (arbitrarily) been taken to represent this preference area. Indeed, *any* country (or group of countries) within that category could have caused a decline in EC imports from a residual GSP country.

Table (2) highlights features of the preference margin's variation in the cross-sectional and time-series dimension, respectively. The first and second column show the 'between' and the 'within' standard deviation of preference margins. The former is the standard deviation of each product line's time average whereas the 'within' measure shows the dispersion of deviations-from-means over time. The ratio of 'between' over 'within' standard deviation in the third column shows that the cross-sectional variation in the data is in general larger than the variation over time. Column four displays the share of tariff lines with no time variation at all and thus suggests that slow-moving tariff variables are a major reason for the dominance of the cross-sectional variation.

{ Table (2) about here }

4.2 Main Results

The main results from a pooled estimation of equation (6) are collected in Table (3). The first two columns divide the entire product space into agricultural imports (HS Chapters 01–24) and manufacturing imports (HS Chapters 25–96). Columns three and four present results for two specific industries within manufacturing, namely chemical products and machinery/equipment. Results from simply retaining all products are given in the last column. The key hypothesis holds that after accounting for direct market access effects in the EC and US market, changes in the EC's ACP tariff schedule are adversely related to GSP countries' export performance. This is evidenced by a positive coefficient on EU

ACP tariffs as the drop in an ACP tariff leads to a concomitant decline in GSP exports to the EC (relative to the US) for that commodity.

{ Table (3) about here }

As the most important result, there is indeed strong evidence of intra-developing country trade diversion within the realm of non-agricultural goods. In the manufacturing subsample (second column), the estimated coefficient on ACP tariffs is positive and highly significant. This finding suggests that ordinary GSP beneficiaries are frequently outpaced by members of a more favorable preferential regime. The 'own-tariff' effect of GSP rates is likewise highly significant and negative, as should be expected. Apart from opposite signs the absolute magnitude of coefficients is remarkably similar. Furthermore, the chief control variable that captures US market access conditions is also very precisely estimated and carries the expected positive sign. The only unexpected sign belongs to the US Mexican tariff rate which should be negative but in fact comes in positive (but see disaggregated results below).

With an estimated coefficient of about 3, GSP imports respond more than proportionately to a variation in preferential tariff rates. In the current logarithmic specification, coefficients represent approximately semi-elasticities. That is, the ratio of imports from a GSP country, say Brazil, in a given product category declines by about 30 percent if the preferential ACP tariff for that product falls by 10 percentage points. This response is large but is still within a conceivable range. The result is best benchmarked against the one reported by Haveman et al. (2003). The majority of their diversion coefficients exceeds a value of -6, with a mean of -10.6 in the subset of significant parameters. The results are also remarkably close to those obtained by Romalis (2007, Table 6) in a NAFTA context.

The sectoral breakdown of results shows in addition that trade diversion ensuing from staggered market access is a phenomenon that arises in the realm of industrialized goods

rather than in agriculture. Recalling the overview of the sectoral distribution of preference margins in Section 2, this is a somewhat unexpected finding, since the extent of preference margins is among the highest in agricultural products (see Figure 1). It does appear, in contrast, that considering all goods in an aggregated manner rather blurs the strong adverse effect that is present in certain industries.

Three forces likely contribute to this result: for one, protectionism is still much more prevalent in agriculture than in non-agricultural goods. Hence, trade diversion might not arise at all as countries with strong agricultural exports are hampered by overt or hidden protection from the start. This is likely to be an issue for Brazil (and to a lesser extent for Colombia), for which food items figure quite prominently among the top ten traded goods categories, in particular meat, vegetables, sugar, feeding stuff, or fish. These are the types of products that are typically subject to SPS regulation on the part of the EC.[13]

A second corollary of protectionism is that quantitative restrictions, specific duties, seasonally varying entry prices, and the like might obfuscate the conversion of non-tariff barriers to *ad valorem* equivalents. This potentially renders those tariff equivalents a less meaningful measure as compared to industrial goods. Thirdly, for an array of agricultural products there might simply exist few competitors. That very fact makes substitution difficult in the first place. And to the extent that it is possible at all, competitors might not necessarily be other developing countries. The effect of a GSP country's agricultural products being displaced by imports from *another industrialized country* by design cannot be captured in the current framework.

The results in Table (3) emanate from the ACP preferential wedge, but the central finding continues to hold when looking at the preferential disadvantage towards LDC countries, albeit on a somewhat weaker scale (see Appendix, Table 7).

[13]On the other hand, for countries like China and Thailand industrial goods are of overwhelming importance; China for instance does not exhibit any major agricultural item among its top 10 export categories.

4.3 Country and Product Analyses

In addition to the pooled estimation discussed in the previous section, Table (4) takes a closer look at the disaggregated results of Brazil, China and Vietnam. Within each country, the left column in Table (4) contains coefficients pertaining to the manufacturing sample whereas the right-hand side column highlights the textiles and clothing subsector. The country level findings are instructive in that they provide a sense of the different economic rationales that drive the results for every country. For example, the highly significant and rather large positive coefficient for Vietnam is clearly driven by the textiles sector; the same holds true for Tunisia. Brazil and China, in contrast, are affected in other manufacturing industries. The Brazilian coefficient for instance is driven by the transport equipment sector.

{ Table (4) about here }

Notice also that the coefficient on US Mexican tariffs is now significantly negative—as it should be—for Chinese manufacturing products and Vietnamese textiles. Given the economic specialization of these individual countries and the range of products with which they compete on world markets, all the results that obtain at the detailed level are highly plausible. Overall, these findings illustrate that there is an important country specific component in the force that drives trade diversion for GSP countries in the aggregate.

Another issue of interest is the magnitude of the ACP coefficient, which can attain values as high as about 20 for Vietnamese textiles. The chief rationale that explains such a strong response lies in the fact—as is apparent from Equation 4—that the reduced form coefficients do also subsume the impact of the substitution elasticity σ. Thus, a high elasticity of substitution among country varieties at this highly disaggregated level is at the heart of coefficients' magnitude. Notwithstanding different methodologies, estimation techniques and levels of aggregation, it is safe to say that a 'consensus range'

has emerged from previous studies that includes (industry-specific) values of σ between 3 and 11 (see Hummels, 2001; Baier and Bergstrand, 2001; Head and Ries, 2001; Klenow and Rodríguez-Clare, 1997). Broda and Weinstein (2006), whose study includes the most comprehensive estimation of substitution elasticities among Armington varieties, make further efforts to link their results to the 'Rauch classification' and find that for "commodities" the estimated elasticity is about three times as large as the one for "differentiated" goods.

To check whether the majority of traded goods indeed conforms to the presumption of substitutable products, Table (5) lists the most traded product categories, in terms of HS 2-digit headings, which gives a sense of the broad economic sectors involved. It is striking to find that two broad product categories clearly dominate the top five ranks of exports to the EC over the period 1996–2001: on the one hand, machinery and electrical equipment, or vehicles, are exported at substantial volumes (HS headings 84, 85, 87) as well as textiles, apparel and footwear products (HS headings 61–64) on the other hand. Furthermore, toys (HS 95) and leather products (HS 42) figure prominently. The top six ranks featuring these sectors account for slightly more than half of total export volume.

{ Table (5) about here }

With respect to the degree of substitutability, the list of most traded products accords well with the detailed study by Hummels (2001) on the value of σ at the SITC 2-digit level: while most of his estimates of σ range between 3 and 8, the ones for machinery, electrical equipment or apparel are at the upper bound, occasionally even attaining double-digit numbers. It is interesting to note that already Sapir (1981) in his early analysis finds that the trade creating effects of the European GSP system mainly arose from labor-intensive products with substantial preferences margins.

The sectoral analysis therefore reinforces the presumption that North–South trade is still dominated by rather homogenous products for which elasticities of substitution could

potentially be high. Labor-intensive manufactures are more price sensitive and are more easily substituted away should even slight price differentials arise. Hence, even small differentials in tariff treatment across countries may indeed confer a decisive cost advantage to relatively more preferred developing country suppliers. This characteristic may explain a good deal of why coefficients are comparatively large.

4.4 Robustness

The pattern and dispersion of preference margins suggests to check for robustness towards outliers. To this end, various regression diagnostics have been examined to characterize the 'influence'—in a technical sense—of observations on the regression outcomes. For the broad sample of non-agricultural goods and the ACP preferential wedge, both the leverage[14] and studentized residuals have been calculated as well as Cook's D, a statistic that summarizes the impact of the aforementioned metrics on the coefficient vector with and without the respective observation. Cook's D is an Euclidean distance that is scale-invariant with respect to regressors, and hence also to estimated coefficients.

It turns out that results are extraordinarily robust and do not appear to depend on the inclusion of particular observations. The pooled estimation has been rerun excluding either the percentile of observations that feature the highest values of the Cook's D statistic, or alternatively excluding all observations whose Cook's D exceed the cutoff of $4/N$, which is sometimes considered the threshold for critical values of this statistic. The results remain virtually unchanged. Another useful robustness exercise, plotting observations' residuals across the range of a particular regressor, namely the ACP tariff profile, does also not reveal any noticeable pattern in the residuals, as it should be the case.

[14]The extension of the leverage concept as it is used in the cross-sectional context to panel data is not straightforward. A data point x_i is said to have a high leverage if it is far from the center of mass of the other values of x. In a panel, this can refer to the time series of an individual tariff line as well as to the cross-section of x. Leverage here refers to all other data points of x, i.e. it is the diagonal element of the projection matrix where X includes the full sample.

5 Quantifying Trade Diversion

In order to provide a sense of the magnitude of trade diversion that is associated with less preferred market access, this section goes on to calculate an estimate of intra-beneficiary trade diversion in absolute dollar terms. Table (6) below lists the estimated volume of trade diverted away from each of the residual GSP country considered in this study. That estimate is obtained as the difference between the observed export volume and the counterfactual one had no preferential disadvantage existed for these countries. The table also gives the share of this absolute amount relative to the country's total exports to the EC, and the number of products from which these estimated trade volumes originate. The dollar amount in the second column is a grand total over all products and years. The share figures in the third column obtain when the total loss figures are normalized by total exports over all products and years, thus the given share represents an annual average in percentage terms. The last line calculates the total over all seven countries.

The share of those countries' foregone exports that is lost due to the preferential wedge ranges from 2.2 to 25.5 percent of total exports. The absolute amount necessarily varies with the country's size but ranges from USD 15m for Colombia to slightly above three billion for China. Evidently, and quite plausibly, the smaller economies like Vietnam and Tunisia are more severely affected by trade diversion in percentage terms.

{ Table (6) about here }

In calculating these results, it is assumed that the counterfactual change in the dependent variable, the ratio of EC to US imports, is entirely due to a change in EC imports that would follow from a complete elimination of the preferential disadvantage. However, the results are also designed to be rather conservative estimates, for two main reasons: first, the total sum of foregone exports are based solely on those product lines that enter

the main regression in Table (3), and is not an extrapolation based on all possible tariff lines. Given the many zero trade flows, especially from smaller developing countries, this is a restrictive condition. Second, very similar trade diversion results obtain when focussing on the preferential disadvantage towards LDC economies (see Appendix, Table 8). Clearly both phenomena are not mutually exclusive and coefficients on the ACP and LDC preference margin, respectively, surely capture to some extent the same effect. While the loss estimates associated with both more preferred country groups cannot simply be added, taking the figure from only one group, i.e. the ACP countries, is akin to a lower bound with regard to the total loss. In sum, while Table (6) is merely supposed to provide an idea of what trade volumes are implied by the previous section's regression results, but it seems safe to conclude that the losses from being put at a preferential disadvantage are not negligible, neither in absolute nor in relative terms.

6 Conclusions

This paper is the first to analyze trade distorting effects ensuing from the EC's multi-layered GSP scheme at a highly disaggregated level and for multiple beneficiary countries. The conjecture that additional preference margins accorded selectively to certain subgroups of developing countries, namely to ACP beneficiaries, are undermining export opportunities of less preferred developing countries receives ample support. The elasticity of normalized exports to the EC with respect to preferential tariff rates is found to be around 3, meaning that the decline in GSP country exports responds more than proportionately to a cut in ACP tariffs.

A sectoral analysis further shows that trade diversion is in fact a matter of industrialized goods sectors. The estimated elasticity of exports with respect to the relative preferential disadvantage of GSP countries translates into a substantial volume of forgone trade. For the countries considered in this study it ranges between 15 million and three billion US

dollars, which translates into a share of actual exports that ranges from 2–20 percent of countries' total exports to the EC market, depending on country size. It is important to keep in mind that all estimation results as well as the derivative findings of forgone trade are conditional on trade taking place at all. In that sense an analysis of the impact of relative preferential disadvantage on the extensive margin of trade is not attempted (but obviously an interesting issue).

The estimates of intra-beneficiary trade diversion are consistent with an analysis of the products upon which the estimations are based. Contrary to the fact that the highest preferential margins pertain to agricultural goods, most of the actual impact in terms of trade diversion originates from the realm of manufacturing products. Since those countries that are most boldly affected mainly export machinery, electrical equipment, toys, textiles & clothing, and leather products, a substantial portion of trade takes place in arguably homogenous goods and labor-intensive industries. At the same time those sectors are also the ones for which previous studies have established quite high values of the elasticity of substitution. Hence, a high price sensitivity and thus a high propensity for trade to be substituted away explain the magnitude of this particular kind of trade diversion.

This paper has focused on the EC GSP regime's impact on seven particular 'residual' GSP beneficiary countries, and the country level analyses in Section 4.3 suggests that there is an important economy-specific component to the prevailing pattern of trade diversion. It is thus important to keep in mind that the results, as they stand, pertain primarily to the countries considered here.

A further limitation of this study is that it abstracts from terms of trade effects. However, terms of trade changes would primarily work in the same direction and thus would even magnify the detrimental impact on residual GSP countries: not only would they export less to the EC market (the substitution effect analyzed in this paper) but their sales

would also fetch a lower price.[15] The partial equilibrium model employed here is therefore likely to underestimate the true impact of trade diversion ensuing from the selectivity of preferences.

Overall, these findings cast considerable doubt on the appropriateness of an approach that maintains a staggered regime of preferential market access. While many countries that benefit from deeper-than-GSP preferential market access currently voice their concerns in the ongoing debate about preference erosion, this study in contrast makes an attempt to quantify the extent to which 'residual' GSP countries have been affected by the selectivity of preferential market access in the first place. The present study has focused exclusively on the cross-sectional relationship between trade flows and tariff preferences. Yet, having established a negative impact of preferential margins on GSP countries' exports into the advanced EC market begs further questions; for example, one of dynamic losses from foregone export opportunities in terms of diversification or productivity.

References

Baier, S. L. and J. H. Bergstrand (2001): The growth of world trade: tariffs, transport costs, and income similarity, *Journal of International Economics*, 53(1), pp. 1–27.

Baldwin, R. E. and T. Murray (1977): MFN Tariff Reductions and Developing Country Trade Benefits Under the GSP, *The Economic Journal*, 87, pp. 30–46.

Bartels, L. (2003): The WTO Enabling Clause and Positive Conditionality in the European Community's GSP Program, *Journal of International Economic Law*, 6(2), pp. 507–532.

Broda, C., N. Limão and D. E. Weinstein (2007): Optimal Tariffs and Market Power: The Evidence, Working paper version december 2007; forthcoming in the *American Economic Review*.

Broda, C. and D. E. Weinstein (2006): Globalization and the Gains from Variety, *Quarterly Journal of Economics*, 121(2), pp. 541–585.

CEC (2003): Green Paper — On the Future of Rules of Origin in Preferential Trade Arrangements, Technical Report COM(2003) 787 final, Commission of the European Communities.

[15] Grossman and Sykes (2005) term this effect the negative externality of preferential treatment.

CEC (2004): Developing countries, international trade and sustainable development: the function of the Community's generalized system of preferences (GSP) for the ten-year period from 2006 to 2015. Communication from the Commission to the Council, the European Parliament and the European Economic and Social Committee, Technical Report COM(2004) 461 final, Commission of the European Communities.

Clausing, K. A. (2001): Trade creation and trade diversion in the Canada–United States Free Trade Agreement, *Canadian Journal of Economics*, 34(3), pp. 667–696.

Francois, J., B. M. Hoekman and M. Manchin (2005): Preference Erosion and Multilateral Trade Liberalization, CEPR Discussion Paper No. 5153.

Fukao, K., T. Okubo and R. M. Stern (2003): An econometric analysis of trade diversion under NAFTA, *North American Journal of Economics and Finance*, 14, pp. 3–24.

Grossman, G. M. and A. O. Sykes (2005): A preference for development: the law and economics of GSP, *World Trade Review*, 4(1), pp. 41–67.

Haveman, J. D., U. Nair-Reichert and J. G. Thursby (2003): How Effective Are Trade Barriers? An Empirical Analysis of Trade Reduction, Diversion, and Compression, *The Review of Economics and Statistics*, 85(2), pp. 480–485.

Head, K. and J. Ries (2001): Increasing Returns Versus National Product Differentiation as an Explanation for the Pattern of U.S.–Canada Trade, *American Economic Review*, 91(4), pp. 858–876.

Hoekman, B. M. and Çaglar Özden (2005): Trade Preferences and Differential Treatment for Developing Countries: A Selective Survey, World Bank Policy Research Working Paper No. 3566.

Hummels, D. (2001): Toward a Geography of Trade Costs. Purdue University, mimeo.

Hummels, D. and A. Skiba (2002): Shipping the good apples out? An empirical confirmation of the Alchian-Allen conjecture, Technical Report WP No. 9023, NBER.

Inama, S. (2003): Trade Preferences and the World Trade Organization Negotiations on Market Access, *Journal of World Trade*, 37(5), pp. 959–976.

Karacaovali, B. and N. Limão (2008): The clash of liberalizations: Preferential vs. multilateral trade liberalization in the European Union, *Journal of International Economics*, 74(2), pp. 299–327.

Klenow, P. J. and A. Rodríguez-Clare (1997): Quantifying Variety Gains from Trade Liberalization. Stanford University (http://www.klenow.com), mimeo.

MacPhee, C. R. (1992): GSP Graduation, International Trade, and Investment in the Asia and Pacific Region, Technical Report ST/ESCAP/1146, UNESCAP – United Nations Economic and Social Commission for Asia and the Pacific, New York: United Nations.

OECD (2004): ITCS International Trade by Commodity Database, Database Edition – Harmonized System 1996 [HS Rev.2] – EU-15 Extra-EU – vol. 2004 rel. 01.

Panagariya, A. (2002): EU Preferential Trade Policies and Developing Countries, *World Economy*, 25(10), pp. 1415–1432.

Peers, S. (1995): Reform of the European Community's Generalized System of Preferences – A Missed Opportunity, *Journal of World Trade*, 29(6), pp. 79–96.

Romalis, J. (2007): NAFTA's and CUSFTA's Impact on International Trade, *Review of Economics and Statistics*, 89(3), pp. 416–435.

Santos-Paulino, A. and A. P. Thirlwall (2004): The Impact of Trade Liberalisation on Exports, Imports and the Balance of Payments of Developing Countries, *The Economic Journal*, 114, pp. F50–F72.

Sapir, A. (1981): Trade Benefits Under The EEC Generalized System of Preferences, *European Economic Review*, 15(3), pp. 339–355.

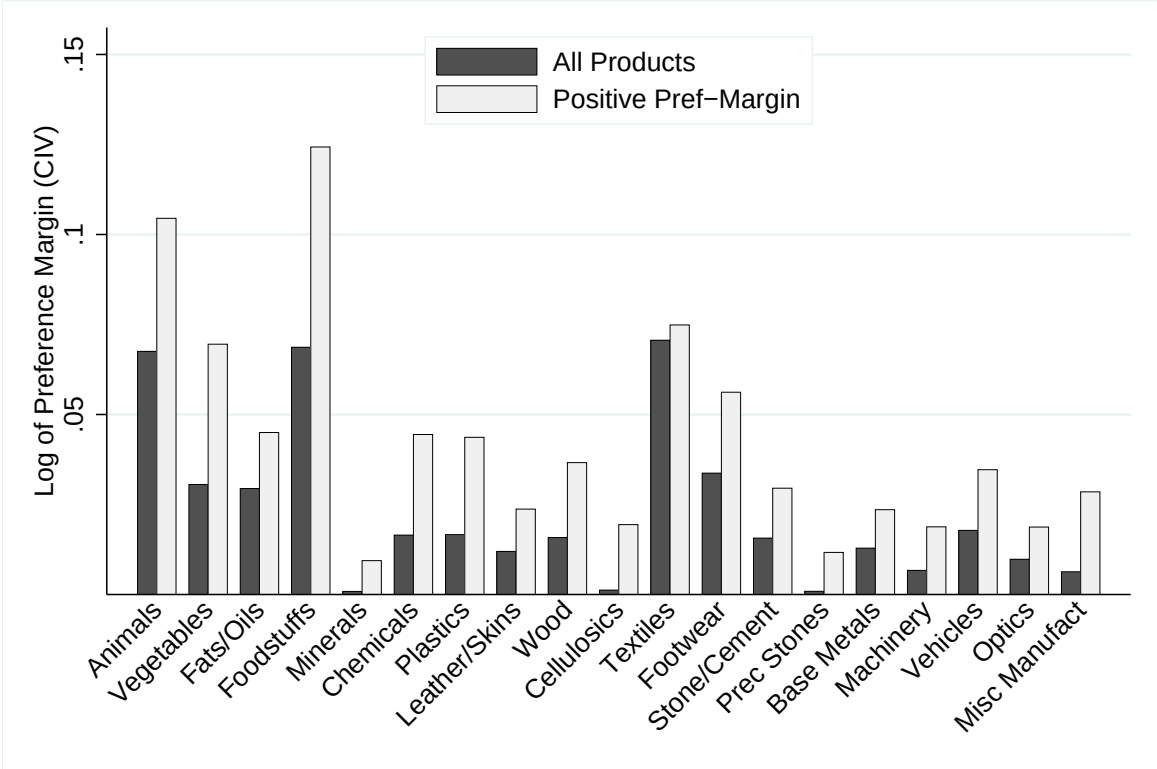
UNCTAD (2001*a*): Duty and Quota Free Market Access for LDCs: An Analysis of Quad Initiatives, Technical Report UNCTAD/DITC/TAB/Misc.7, United Nations Conference on Trade and Development, Geneva.

UNCTAD (2001*b*): Improving Market Access for Least Developed Countries, Technical Report UNCTAD/DITC/TNCD/4, United Nations Conference on Trade and Development, Geneva.

UNCTAD (2003): Trade preferences for LDCs: An early assessment of benefits and possible improvements, Technical Report UNCTAD/ITCD/TSB/2003/8, United Nations Conference on Trade and Development, Geneva.

Tables and Figures

Figure 1: GSP Preferential Disadvantage towards ACP, by Sector



Notes: Abbreviated sector labels refer to the 21 HS Sections, with sectors 19 (arms and ammunition) and 21 (art and antiques) being omitted. Aggregation of tariff rates from HS 8-digit level by simple averages. Values in the upper graph are time averages.

Table 1: Descriptive Statistics

	Mean	**Std.Dev**	**Min**	**Max**
Dep. variable	-1.659	2.507	-18.32	9.631
EU GSP tariff	.0288	.0359	0	.224
EU ACP tariff	.0016	.01	0	.2701
EU MFN tariff	.0486	.0369	0	.1672
US GSP tariff	.0481	.0862	0	1.189
US MFN tariff	.0458	.0471	0	.3185
US MEX tariff	.0067	.0189	0	.2624

Notes: Descriptive Statistics are shown for the entire sample and the manufacturing subsample, respectively, which are pooled over countries. Values shown are in logarithms, tariffs take the form $\ln(1+\tau)$.

Table 2: Between and Within Variation of EC Tariff Rates

	Std. Deviation		**Ratio**	**Share of**
	between	**within**	**(b/w)**	**constant Obs.**
Brazil	.0308	.0089	3.478	.3609
China	.032	.0088	3.627	.3832
India	.0328	.0082	4.013	.3378
Thailand	.0356	.0071	4.987	.3278
Vietnam	.0427	.0078	5.489	.2882
Colombia	.039	.0062	6.3	.2916
Tunisia	.0436	.0048	9.166	.2375
ACP	.0617	.0247	2.502	.8375

Notes: Statistics originate from the manufacturing subsample.

Table 3: Trade Diversion, GSP Countries, 1996–2001

	Agro	Manufac	Chem/Plast	Mach/Equip	All
EU GSP tariff	0.8032	–3.0050***	–2.1114	–7.2565***	–0.4265
	(1.013)	(0.990)	(1.841)	(2.232)	(0.860)
EU ACP tariff	–1.2312	2.9092***	4.4715*	5.3892*	0.0788
	(0.809)	(1.091)	(2.631)	(3.048)	(0.702)
EU MFN tariff	6.3466**	1.5582	–0.3965	2.7565	2.2029
	(2.878)	(1.810)	(4.731)	(2.743)	(1.567)
US GSP tariff	–0.1577	3.9819***	6.4332***	4.2749**	3.6164***
	(1.321)	(0.584)	(1.848)	(1.955)	(0.553)
US MFN tariff	0.9756	–0.9261	–9.2318**	–0.2887	–0.6309
	(2.309)	(1.014)	(3.844)	(2.279)	(0.939)
US Mex tariff	6.1488	2.5537***	–4.3163	5.1720	2.7417***
	(6.243)	(0.934)	(4.386)	(4.104)	(0.914)
Constant	–2.3711***	–1.4233***	–0.8926***	–1.5696***	–1.5675***
	(0.272)	(0.109)	(0.263)	(0.104)	(0.099)
N	5071	55059	9263	18403	60130
R^2	.057	.053	.062	.046	.053
$log\mathcal{L}$	–7584	–89692	–15246	–30003	–97379

Notes: Dependent variable is $\ln\left(\frac{M_{EC}(z_j)}{M_{US}(z_j)}\right)$, with $M(z_j)$ denoting European (US) imports of product z originating from country j. Pooled fixed effects panel estimation over 7 GSP countries, time dummy variables included but not reported. Robust standard errors, allowing for correlation within cross-sectional units. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Trade Diversion, Selected GSP Countries

	Brazil		China		Vietnam	
	Manuf	Tex/Cloth	Manuf	Tex/Cloth	Manuf	Tex/Cloth
EC GSP tariff	–5.2440*	–5.4590	–2.7047**	–2.2046	–5.6126	–3.7284
	(2.725)	(5.263)	(1.184)	(2.039)	(5.518)	(4.787)
EC ACP tariff	7.4077**	8.7765	3.3261**	0.3202	14.7448**	19.9418**
	(3.300)	(6.200)	(1.535)	(2.054)	(6.213)	(8.404)
EC MFN tariff	9.3205**	–1.9096	–0.8286	1.3757	–8.5809	0.5858
	(4.671)	(28.210)	(2.636)	(12.357)	(15.261)	(39.707)
US GSP tariff	7.0400***	3.2333*	1.2145	0.2899	3.3390***	3.8262***
	(1.762)	(1.913)	(1.472)	(2.611)	(0.798)	(0.832)
US MFN tariff	–0.3533	–7.8728	–1.9674	0.9279	13.4311**	18.3207**
	(3.224)	(6.390)	(1.691)	(2.233)	(6.794)	(7.379)
US Mex tariff	8.2372**	7.6039	–3.1793**	–0.5204	–6.2870	–10.5009*
	(3.263)	(5.046)	(1.450)	(2.061)	(4.667)	(6.148)
Constant	–2.3111***	–0.8595	–1.3189***	–1.2929	0.5215	–0.5828
	(0.236)	(2.578)	(0.150)	(1.148)	(1.241)	(4.089)
N	9933	1653	17852	3922	1778	912
R^2	.047	.075	.057	.035	.093	.132
$log\mathcal{L}$	–18020	–2978	–26590	–5733	–2791	–1494

Notes: see Table (3). Detailed results for three GSP countries and select sectors.

Table 5: Most Traded Product Categories

Rank	HS Chap	Volume	Sublines
1)	85	72016273408	1143
2)	84	56461922304	1571
3)	62	43022950400	691
4)	95	28904214528	201
5)	64	23138717696	155
6)	42	22812508160	133
7)	61	22808842240	546
8)	71	15531491328	197
9)	94	14395513856	201
10)	39	13629872128	455
11)	90	12428760064	564
12)	29	9915683840	614
13)	26	9161824256	33
14)	73	8236248064	419
15)	63	7497201152	264
16)	27	6954802688	62
Total		468719960064	

Notes: Breakdown of most traded product categories in terms of HS 2-digit chapters. Trade volumes in column 3 are pooled over countries and years. Column 4 indicates richness of product variety by listing the number of tariff lines below the HS 2-digit level in any given category.

Table 6: Estimated Forgone Trade Volume, in US$, 1996–2001

GSP Country	**Total Loss**	**Share**	**Products**
Brazil	287,473,932	4.3	1427
China	3,249,144,393	8.1	2194
India	750,116,950	10.8	1795
Thailand	431,013,136	6.6	1349
Vietnam	446,804,006	21.4	404
Colombia	15,412,200	2.2	583
Tunisia	461,524,627	25.5	330
All countries	5,641,489,247	8.7	

Notes: Column 2: estimate of total trade volume diverted for non-agricultural products during 1996–2001. Column 3 expresses forgone exports as a percentage share of total actual exports in those products that also entered the main regression in Table 3. Column 4 indicates the number of cross-sectional units (products) on which those estimates are based upon (since product lines with zero preferences margins are excluded, this figure often is substantially smaller than the number of products reported in the last column of Table 1). *Pro memoria*, the value of the elasticity on EU ACP preferential tariffs which is used to construct counterfactual trade volumes equals 2.91 (see Table 3).

Appendix

Table 7: Trade Diversion, GSP Countries, LDC Preferential Tariff Wedge

	Agro	Manufac	Chem/Plast	Mach/Equip	All
EU GSP tariff	0.3637	–2.6855***	–1.3024	–6.9099***	–0.4857
	(1.075)	(0.967)	(1.747)	(2.121)	(0.858)
EU LDC tariff	0.0419	3.0277*	2.2361	7.3128	0.1800
	(0.534)	(1.712)	(3.141)	(4.555)	(0.457)
EU MFN tariff	6.6036**	1.2820	1.0469	1.9344	2.0686
	(2.903)	(1.825)	(4.957)	(2.750)	(1.577)
US GSP tariff	–0.1472	4.0246***	6.4140***	4.1169**	3.6444***
	(1.335)	(0.591)	(1.853)	(1.970)	(0.560)
US MFN tariff	1.1602	–0.7755	–9.6046**	0.5998	–0.5001
	(2.346)	(1.031)	(3.869)	(2.409)	(0.955)
US Mex tariff	6.8310	2.6136***	–4.2141	6.2457	2.8051***
	(6.399)	(0.938)	(4.370)	(4.328)	(0.917)
Constant	–2.4258***	–1.4335***	–0.9546***	–1.5739***	–1.5739***
	(0.272)	(0.112)	(0.277)	(0.107)	(0.102)
N	4944	53857	9057	17810	58801
R^2	.054	.053	.062	.045	.052
$log\mathcal{L}$	–7404	–87635	–14872	–29021	–95131

Notes: see Table (3).

Table 8: Estimated Forgone Trade Volume, LDC Wedge

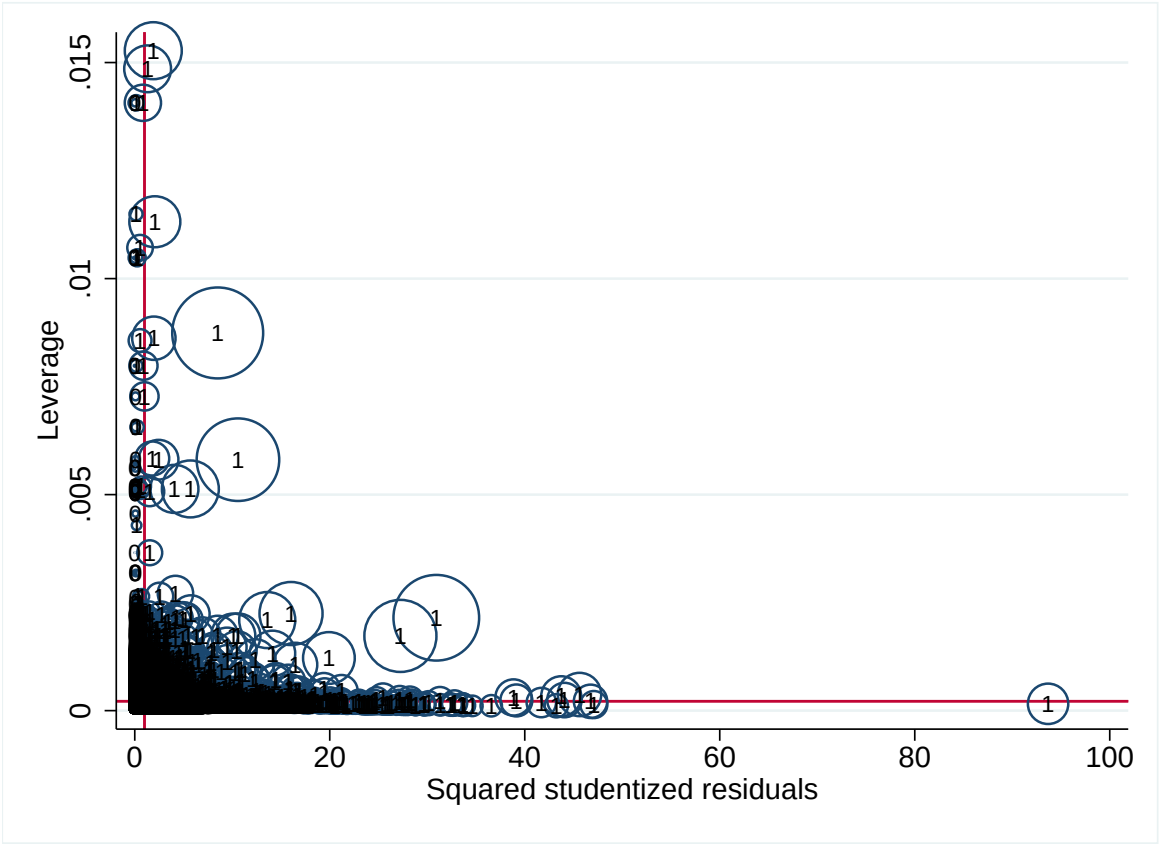
GSP Country	**Total Loss**	**Share**	**Products**
BRA	271,792,829	4.1	1512
CHN	3,404,233,368	8.7	2304
IND	790,383,619	11.7	1899
THA	450,099,364	7.2	1446
VNM	467,778,428	22.6	416
COL	16,310,161	2.4	610
TUN	484,073,683	26.8	340
All countries	5,884,671,454	9.3	.

Notes: see Table (6). The value of the elasticity on EU LDC preferential tariffs which is used to construct counterfactual trade volumes equals 3.03.

Figure (2) below further illustrates the robustness checks of section 4.4 by plotting observations' leverage against their squared studentized residuals, with lines indicating the mean values of the variables on either axis. Additionally, the size of the circles reflect the respective observation's value of Cook's D, with a '1' in the center if its value exceeds the cutoff of $4/N$, a threshold that is sometimes considered for critical values of this statistic, and '0' otherwise. In particular, entries that are plotted in the North-East of such a graph potentially give rise to concern as they exhibit both unusual values of the preference margin as well as a high deviation from fitted values. Generally, there are only very few such influential data points far off the axes.

Nonetheless, observations that figure high on either one of the two dimensions only could also exert an undue influence on the estimates, especially those with a high leverage. Therefore, the pooled estimations for ACP preferential tariffs have been rerun on subsamples in which critical observations that exhibit critical values in terms of Cook's D are removed. Table (9) below first reproduces the main regression and then shows the results when the top one percent with the highest Cook's D statistic are removed, and when all critical values ($> 4/N$) are removed. The results are very robust to this exclusion exercise.

Figure 2: GSP Preferential Disadvantage towards ACP, by Sector



Notes: Graph plots 'leverage' against squared studentized residuals; observations originate from the manufacturing subsample estimation.

Table 9: Influential Observations

	(1)	(2)	(3)
	pooled	No-1pc	No-all
EU GSP tariff	–3.0050***	–2.8998***	–2.3532***
	(0.990)	(0.869)	(0.709)
EU ACP tariff	2.9092***	2.7654***	2.4830***
	(1.091)	(0.757)	(0.629)
EU MFN tariff	1.5582	0.8260	0.6503
	(1.810)	(1.668)	(1.348)
US GSP tariff	3.9819***	3.1598***	3.3133***
	(0.584)	(0.419)	(0.350)
US MFN tariff	–0.9261	–0.9072	–1.1082
	(1.014)	(0.857)	(0.718)
US MEX tariff	2.5537***	1.5280*	2.0180***
	(0.934)	(0.787)	(0.628)
Constant	–1.4233***	–1.3417***	–1.3913***
	(0.109)	(0.101)	(0.080)
N	55059	54508	51679
R^2	.0531	.0564	.0806
$log\mathcal{L}$	–89692	–84951	–68513

Notes: Re-estimation of the main regression in Table (3) without influential observations. Model (1) reproduces the manufacturing sample result for comparison purposes, model (2) has the top one percent of most influential observations deleted, and model (3) has all observations removed whose value of Cook's D exceeds the critical cutoff of $4/N$.