No.87/August 2005

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IIIS Discussion Paper No. 87

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July 2005

Abstract: Because of concern that OECD tariff reductions will translate into worsening export performance for the least developed countries, trade preferences have proven a stumbling block to developing country support for multilateral liberalization. We examine the actual scope for preference erosion, including an econometric assessment of the actual utilization, and also the scope for erosion estimated by modeling full elimination of OECD tariffs and hence full MFN liberalization-based preference erosion. Preferences are underutilized due to administrative burden—estimated to be at least 4 percent on average—reducing the magnitude of erosion costs significantly. For those products where preferences are used (are of value), the primary negative impact follows from erosion of EU preferences. This suggests the erosion problem is primarily bilateral rather than a WTO-based concern.

Keywords: preference erosion, GSP, WTO, Doha Round, trade and development

JEL codes: F13.

1. Introduction

Non-reciprocal trade preferences have been long granted by developed countries to various developing countries. Early in the post-World War II history of the GATT system, the pattern of these preferences reflected past colonial trade ties. In 1968, the UN Committed for Trade and Development (UNCTAD) recommended the creation of a 'Generalized System of Preferences' (GSP) under which industrialized countries would grant trade preferences to all developing countries on a non-reciprocal basis. While UNCTAD has addressed a wider spectrum of issues in international economic relations, in the area of international trade its primary goal was to modify the most-favored-nation (MFN) clause underpinning the GATT by (partially) exempting developing countries from this obligation, while at the same time encouraging developed countries to discriminate in favor of imports from developing countries. A key principle was (and is) the idea that such "special and differential treatment" be granted on the basis of "non-reciprocity", reflecting the premise that "treating unequals equally simply exacerbated inequalities" (UNCTAD, 2004).

The jury remains out on whether trade preferences have actually made a substantive difference in terms of enhancing the welfare of recipient countries. The developing countries that were granted the fewest preferences at its inception in the 1960s, those in East Asia, have subsequently grown the fastest. Conversely, those granted the deepest preferences, including sub-Saharan African least developed countries (LDCs), have not managed to increase their per capita incomes or diversify their export bundles significantly in the last 40 years. (See Figure 1.) To a large extent both developments—rapid and sustained growth in Asia and the absence thereof in much of Africa—are not due to OECD trade policies, but rather reflect domestic policies and institutions. Most would agree that the major constraint on export diversification and expansion in Africa is on the supply side.

Whatever the intended and actual impacts of trade preferences, they are a central issue in ongoing efforts to negotiate further multilateral trade liberalization. Middle-income countries are increasingly concerned about the discrimination they confront in OECD markets as a result of the better access granted in these markets to other industrialized countries—because of free trade agreements—and to poorer or "more preferred" developing countries. Conversely, preferences are used as an argument by the LDCs and African countries against a general liberalization of trade and removal of

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trade-distorting policies in agriculture. These countries worry about the potential negative effects of an erosion of their preferential access. [1]

In this paper, we explore the economic relevance of trade preferences in the context of WTO-based multilateral liberalization—the ongoing Doha Round of trade negotiations. This involves both an econometric assessment of the extent to which preference schemes are actually used (*de facto* as opposed to *de jure* preferences) as well as a numerical assessment of the dollar magnitude of potential preference erosion associated with further WTO-based, nondiscriminatory tariff reductions. In this analysis we assume that the principle of non-reciprocity continues to prevail—i.e., we model the effects of OECD liberalization while assuming that the developing countries benefiting from preferential access do not reduce their own protection. Many have argued that non-reciprocity has allowed many developing countries these countries to self-marginalize themselves in GATT/WTO negotiations, as they received market access benefits without having to actually engage in the process of negotiating concessions. Whatever one's views on this question, from the perspective of quantifying the magnitude of potential preference erosion non-reciprocity is an appropriate constraint to impose, as what matters is to assess the loss of benefits stemming from the removal of an explicit development-motivated policy that has been put in place *by OECD countries*. From this perspective it is not relevant that developing countries might benefit as well from their own liberalization or that of other developing countries, or that such potential benefits may be quite substantial.

The plan of the paper is as follows. We start in Section 2 with a brief review and summary of the major existing preference programs. In Section 3 we assess econometrically the magnitude of the preference margins that are implied by current programs, by estimating the threshold preference margin (the difference between MFN and preferential treatment) below which preference programs are irrelevant because of compliance costs (paperwork, red tape, documenting origin, etc.). This threshold is about 4 percent—implying that preferences can only matter for those products where the difference between MFN and preferential tariffs is higher than this—a relatively small

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[1] They are also concerned about the potential negative terms of trade effects of multilateral liberalization insofar as this raises the price of their imports, especially of goods that currently benefit from subsidies and protection in OECD markets, by more than the price/quantity of their exports. Both types of fears have been supported by many NGOs, who argue that LDCs have little to gain from the current round of multilateral trade negotiations, and may have more to lose. See Limão (2005) for a theoretical analysis of the incentives for a coalition of preference providers and recipients to seek to limit MFN reforms, and evidence for the EU and US that preferential trade arrangements do have a constraining impact on multilateral liberalization.

set. In Section 4 we quantify an upper bound for the potential aggregate magnitude of erosion, assuming OECD members abolish all trade-distorting policies. As part of this analysis, we integrate the results of the analysis of compliance costs as identified in Section 3. We find that such costs imply that the potential benefits of trade preferences for developing countries are likely to be substantially offset, thus reducing the potential magnitude of preference erosion. Section 5 concludes.

2.   Preferences in the GATT/WTO System

In 1971, a waiver to the most-favored-nation clause was approved by the contracting parties to General Agreement on Tariffs and Trade (GATT) to permit GSP schemes. In 1979 they adopted the so-called 'Enabling Clause' in 1979, which established the legal framework for the GSP. Although Japan, Canada, Australia and several other countries implemented national GSP programs in favor of developing countries, the schemes of the EU and the US have been and continue to be the most important given the size of the two markets concerned.[2]

The first GSP preference scheme of the EU was implemented in 1971 for a ten-year period and has been renewed periodically. The scheme provides nonreciprocal preferences with lower tariffs or completely duty-free access for imports from 178 developing countries and territories into the EU market. GSP preferences are not part of contractual agreements with the recipient countries.[3] The general arrangements cover roughly 7,000 products, of which 3,250 are classified as non-sensitive and 3,750 are classified as sensitive products. The tariff preferences offered by the general arrangements differ according to the sensitivity of the products concerned: non-sensitive products enjoy duty free access to the EU market, while sensitive products benefit from a tariff reduction. These arrangements provide, as a rule, for a reduction of MFN *ad valorem* duties by a flat rate of 3.5 percentage points. These products comprise around 36% of tariff lines (EC Council Regulation No.2501/01, 10 December 2001). As sensitive products are generally the ones with high MFN rates, the proportionate impact of the preference can be rather small. An important exception to this rule of a flat rate reduction is granted to the textiles and clothing sectors which enjoy a percentage

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[2] See Hoekman and Özden (2005) for a review of the extensive literature in this area on which what follows draws upon.

[3] A new GSP regulation (Council Regulation No. 2501/2001 as amended by Council Regulation No. 2211/2003) implements the current scheme from 1 January 2002 to 31 December 2005. New guidelines for the next 10-year cycle 2006-15 are currently being prepared.

reduction of 20%. For specific duties a percentage reduction of 30% is the general rule. Where duties include *ad valorem* and specific duties, only the *ad valorem* duties are reduced.

Country eligibility for the EU GSP program is determined on the basis of "indices" that combine the development and specialization level of the country:

$$I = \frac{\ln(Y_i / Y_{EU}) + \ln(X_i / X_{EU})}{2} \tag{1}$$

where Y_i (Y_{EU}) is the GDP per capita in the beneficiary country (EU) and X_i (X_{EU}) is the manufactured exports of the beneficiary country (EU) to the EU (beneficiary country). The index increases in value as the beneficiary country becomes more developed and/or runs a surplus in manufactured goods trade with the EU. It has a value of zero, for example, if the beneficiary country has the same GDP per capita as the EU and has balanced trade. If the country has GDP per capita above $8,210 and the index has a value greater than -1, it is automatically removed from the GSP program. South Korea, Singapore and Hong Kong, among others, were removed from the GSP program on the basis of these criteria.

A second graduation criterion is country/sector-specific and is based on the extent of specialization: the relationship between the proportion of the imports in a given sector from a given country to the total EU imports in that sector and this country's share of total EU imports. A higher specialization index indicates that the county's exports to the EU are more concentrated in that category. As a result of this criterion, Brazil, India, China, Argentina and many other countries have lost eligibility for a wide range of product categories.

In 2001, the EU adopted new graduation criteria. All countries designated as high-income by the World Bank lose eligibility for all products automatically. A country can lose sectoral eligibility under two circumstances. First, the country in question has a development index I greater than -2 and it supplies more than 25% of EU total imports. Second, the country (i) has development index I larger than -2, (ii) has sectoral specialization index higher than a threshold level (depending on the actual development index) and (iii) it supplies more than 2% of EU total imports.

The EU GSP program has a safeguard clause that allows preferences to be suspended for certain products/countries if imports "cause or threaten to cause serious

difficulties to a Community producer."[4] The EU has also instituted "special incentive arrangements" that reward compliance with International Labor Organization Conventions, protection of environment and combating drug production and trafficking. Countries that benefit from these special arrangements receive additional preferences on certain products in the sensitive list. Finally, human right violations, money laundering, corruption and violation of various international conventions on the environment may result in withdrawal of preferences.

A special arrangement under the Everything but Arms (EBA) initiative, which is incorporated into the GSP preference scheme, is provided for the 49 UN-defined least developed countries (LDCs). The EBA scheme provides duty-free access for all products covered and originating in the beneficiary country, with the exception of imports of fresh bananas, rice, and sugar.[5] Tariffs on these items will be reduced gradually to zero by 2006 for bananas and by 2009 for rice and sugar, with tariff quotas for rice and sugar increased annually during the transition. A key feature of the EBA is that, in contrast to the 'general' GSP, preferences are granted for an unlimited period and are not subject to periodic review.

In addition to the GSP, the EU has another preference program, which is limited to African, Caribbean and Pacific (ACP) countries under what is now the Cotonou convention. This scheme is less generous in terms of duty reduction than the EBA scheme. However in some other aspects, such as cumulation rules, it is more generous. The first agreement between the European Economic Communities (EEC) and the ACP countries dates back to 1963 when the "Yaoundé Agreements" were signed. These were in effect during 1963-75. The objective was to foster economic cooperation between the EU and ACP countries, including through development assistance. A significant amount of resources was directed towards francophone Africa to build up infrastructure during the decolonization period. After the United Kingdom joined the EEC, the Lomé I Agreement was signed (in force between 1975-80) covering 46 ACP countries and the EEC Member States. At this time the developing country signatories joined together to form the ACP (in the Georgetown Agreement). The Lomé Agreement introduced trade preferences for most ACP exports to the EEC, including special trade protocols for

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[4] The US program, in effect, has the same rule in place: any US producer can petition the USTR for GSP privileges to be revoked due to real or potential injury.
[5] For a detailed discussion on the impact of EU preferences for LDCs under Everything But Arms see Brenton (2003).

sugar, bananas, beef and veal.[6] These trade preferences and protocols were extended for further periods under successive Lomé Conventions: Lomé II (1980-85), Lomé III (1985-90) and Lomé IV (1990-2000).

After the expiration of Lomé IV a new Partnership Agreement with the ACP states was signed in Cotonou in 2000. Key objectives include poverty reduction and bringing more stability in the ACP: "Focusing on poverty reduction as its principal objective, to be achieved through political dialogue, development aid and closer economic and trade cooperation, this agreement will shape a significant part of the European Union's dealings with the rest of the world."[7] Cotonou will change the trade relationship between EU and ACP partners. During 2000-07, the prevailing regime with its preferences and protocols on sugar, banana, and beef and veal was to be maintained in a modified form. During this time, non-LDC ACP members were to negotiate economic cooperation agreements under which the one-way EU trade preferences would be replaced by reciprocal market access commitments, i.e., more standard free trade agreements. These new trade arrangements were to enter into force by January 1, 2008, with the transition to a full implementation of the negotiated agreements to be spread over at least 12 years.

ACP countries are granted preferences that often exceed those available under the GSP. Most industrial products have duty and quota free market access whereas the preferences are less comprehensive for agricultural products. In 2000 duties were still applied to 856 tariff lines (837 of which were agricultural products). Of these, 116 lines were excluded from the Cotonou Agreement. An additional 301 tariff lines were eligible for reduced duties, subject to specific quantitative limits (tariff quotas) set for the ACP countries as a group. The remaining 439 products were eligible for reduced duties without quantitative limits.

Preferences are equally complex in the United States, which offers non-reciprocal trade preferences the GSP as well as through the Caribbean Basin Initiative (CBI) (as amended), the Andean Trade Promotion Act (ATPA), and the African Growth and Opportunity Act (AGOA). The US GSP program was introduced in 1976. It divides eligible countries into two groups based on their income levels – all developing countries and the subset of LDCs. At the time of writing, all eligible countries pay zero tariffs on

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[6] The banana protocol gives duty-free entry for specific quotas of bananas into the EU market. Under the sugar protocol, EC annually buys a fixed quantity of sugar from ACP producers at its internal sugar price.
[7] Press release IP/00/640 Brussels, 21 June 2000, "The European Community and its Member States sign a new Partnership Agreement with the African, Caribbean and Pacific states in Cotonou, Benin."

around 4,650 tariff lines; LDCs have duty-free market access for an additional 1,750 lines. The 1974 Trade Act allows the President to confer GSP eligibility on any country except those that (a) do not offer reasonable and equitable market access for American goods, (b) do not adequately and effectively protect US intellectual property rights, (c) do not reduce trade-distorting investment policies and export practices, (d) harbor international terrorists, (e) nationalize American property without compensation, (f) are members of a commodity export cartel causing "serious disruption to the world economy," or, are (g) communist states (except those that have been granted permanent normal trading status). The law stipulates other criteria that may be used in eligibility decisions, such as (a) level of economic development, (b) protection of workers' and human rights and (c) whether the country receives preferences from other countries. Certain articles are prohibited from receiving GSP treatment. These include most textiles, watches, footwear, handbags, luggage and certain apparel.

One of the key features of the GSP program is that a country *may* lose eligibility for a specific product if its exports exceed a certain "competitive need limit," at the time of writing $110 million per tariff line. If the country in question has a market share larger than 50 percent of total US imports in that category, it may also lose the GSP eligibility.[8] GSP eligibility can be removed at the country, product, or country-product level. The President has discretion over when and how to apply these criteria. In practice, an Assistant US Trade Representative chairs an interagency committee which makes eligibility and graduation decisions after reviewing petitions from interested parties (the country in question, import-competing domestic firms, labor unions, other firms, human rights/environmental NGOs, etc.). Hudec (1987) concludes that a consequence is that import-competing lobby groups have made GSP a bastion of unregulated protectionism in the United States. Since the program first entered into force in 1976, 36 of the 154 eligible countries have "graduated" from the GSP program (including Singapore, Hong Kong, Taiwan, Korea, Malaysia, Mexico, and Botswana). Major countries remaining eligible include Brazil, India, Russia, Indonesia, Turkey, South Africa, and Thailand.

The AGOA initiative came into effect in 2000 with the aim to boost US bilateral trade with sub-Saharan African (SSA) countries. Currently 37 countries are eligible for preferential treatment under the AGOA. The preferential treatment consists of duty-free and quota-free access to the US markets for all products covered by GSP plus 1800 new

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[8] However, there is a *de minimis* waiver. The President has the discretion to waive the Competitive Need Limit if total US imports in that category from all countries (both GSP eligible and ineligible) does not exceed $16.5 million (in 2003).

items. Furthermore, AGOA entrenches the current preferences available under the GSP by guaranteeing benefits until September 2008. It also eliminates the GSP competitive need limitation for African countries and offers less restrictive rules of origin to eligible African countries, allowing them to import more of their inputs from third countries such as China.[9]

The Andean Trade Preference Act was enacted in 1991 to combat drug production and trafficking in the Andean countries: Bolivia, Colombia, Ecuador and Peru. The program offers trade benefits to help these countries develop and strengthen legitimate industries. ATPA was expanded under the Trade Act of 2002, and is now called the Andean Trade Promotion and Drug Eradication Act. It provides duty-free access to U.S. markets for approximately 5,600 products.

The CBI is intended to facilitate the economic development and export diversification of the Caribbean Basin economies. Initially launched in 1983 through the Caribbean Basin Economic Recovery Act (CBERA), and substantially expanded in 2000 through the U.S.-Caribbean Basin Trade Partnership Act (CBTPA), the CBI currently provides 24 beneficiary countries with duty-free access to the U.S. market for most goods. CBTPA entered into force in 2000 and will be in effect until 2008.

This summary overview indicates that (i) preference programs differentiate between developing countries and (ii) that there is significant "conditionality" associated with eligibility, including in non-trade areas and in terms of criteria that must be satisfied to benefit from preferential access. To assess the magnitude of potential preference erosion associated with further MFN liberalization these factors need to be taken into account.

3.   Administrative Burden and the Utilization of Preferences

A key question when evaluating the benefits arising from trade preferences to the beneficiaries is the costs of obtaining the preferences. When traders request preferences they have to comply with administrative and technical requirements. The most important requirements are related to compliance with rules of origin. These define the conditions that a product must satisfy to be originating from the exporting country that has been granted the preferential access. The main justification for rules of origin is to prevent

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[9] See further details on AGOA in Brenton and Ikezuki (2004). The African Growth and Opportunity Acceleration Act (AGOA III) extends the general timeframe for AGOA preferences until 2015 and the third-country fabric manufacturing provision for least developed AGOA beneficiary countries until 2007.

trade deflection, whereby products from non-participating countries destined to the free trade area partner are redirected through the other free trade partners to avoid the payment of customs duties.[10] When products are produced in a single stage then the origin of the products should be relatively easy to establish. For all other cases the rules of origin define the methods by which it can be determined that the product has been sufficiently processed in the free trade partner to qualify for preferential access. The specification of rules of origin has become especially important in recent years as technological progress and globalization have led to the increasing fragmentation of the production process into different stages or tasks which are undertaken in different locations. Administration costs reduce effective preference margins. In order to assess to what extent preference schemes can deliver gains to the beneficiary countries in this section we examine the importance of the preference margin on the uptake of preferences.

In an early seminal paper, Herin (1986) argues that the costs of documentation and the administration of origin rules applied by the EEC imposed costs on exporters located in EFTA countries equivalent to some 3 percent of the value of the goods traded. Carrère and de Melo (2004) provide non-parametric estimates for compliance costs of rules of origin based on the average rate of tariff preference for NAFTA members. The authors conclude that average total compliance costs for 2001 were 6.2%. When using double-censored tobit estimation techniques the authors obtain a compliance cost estimate of 3.9% for products where the utilization rate is below 100%.[11] For developing countries these costs are expected to be even higher, due to information disadvantages, institutional weaknesses, etc.

3.1   The Estimating Framework

We use a threshold technique to estimate what is the minimum preference margin (difference between preferential and non-preferential tariff) needed under which traders have no incentive to ask for preferences because the costs of obtaining these exceeds their benefits. We limit the analysis to the preferential trade relations of non-least developed African, Caribbean and Pacific (ACP) countries and the EU under the Cotonou agreement. Nevertheless, this quantitative assessment can provide a more

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[10] See Brenton and Manchin (2003); more generally on rules of origin, see Hoekman (1993).
[11] See also Anson et al. (2004).

general proxy for the costs traders from developing countries have to bear when requesting/obtaining preferential access.[12]

Since there may be other factors than preferential margin influencing the decision to ask for preferences we employ the technique recently developed by Hansen (2000) to endogenously determine any threshold in the relationship of interest, which allows one to control for such other factors. More specifically, this threshold estimation technique is ideal when data needs to be split into sub-samples in consideration of some relationship of interest. It takes the following form:

$$y_i = \boldsymbol{b}_1^{'} x_i + e_i, q_i \le \boldsymbol{g} \tag{2}$$

$$y_i = \boldsymbol{b}_2^{'} x_i + e_i, q_i > \boldsymbol{g} \tag{3}$$

In equations (2) and (3), q_i is the threshold variable and ? is the threshold parameter which splits the sample into two sub-samples. In our case q_i is the difference between preferential and third country tariffs, and ? is the threshold value under which traders have no incentives to request preferences. The threshold parameter can be determined endogenously by allowing the continuously distributed q_i to be an element of x_i. This model allows the regression parameters to differ depending on the value of q_i. The model can be re-written into a single equation:

$$y_i = \boldsymbol{b}^{''} x_i + \boldsymbol{d}_n^{'} x_i (\boldsymbol{g}) + e_i \tag{4}$$

In equation (4), $\beta = \beta_2$ and $x_i(\boldsymbol{g}) = x_i d_i(\boldsymbol{g})$, and $d_i(\boldsymbol{g}) = \{q_i \le \boldsymbol{g}\}$ is a dummy variable. The first step is to identify the threshold value ? and the other coefficients. This is done by using the algorithm provided by Hansen (2000), which searches through the values of ? until the splitting value is found (this is the value of ? which minimizes the concentrated sum of squared errors based on an OLS regression).

Most of the x_i variables included in our threshold regression are typical variables used in gravity models—probably the most robust empirical relationship explaining the volume of bilateral trade flows. To identify the threshold value in the preferential margin we estimate to following equation:

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[12] In the analysis in Section 4 below we take into account that for a subset of LDCs, AGOA has substantially reduced the costs of rules of origin.

$$\ln Y_{ijk} = a + b_1 \ln GDP_i + b_2 \ln POP_i + b_3 \ln GDP_j + b_4 \ln POP_j + b_5 \ln D_{ij} + \quad (5)$$
$$+ b_6 FrenchExcolony + b_7 NonFrenchExcolony_{ij} + b_7 Freedomindex_j +$$
$$+ b_7 SouthAfrica + b_{10} dutysmall_k + b_{11} dutyhigh_k + b_{12} quota_k +$$
$$+ b_{13} difference_k + b_{14} dutydifference_k + \sum_{ijk} g_{ijk} DUM_{ijk} + e_{ijk}$$

In equation (5), Y_{ijk} is the utilization rate of Cotonou preferences for product k, in other words the percentage of country $i's$ imports of product k from country j which requested preferential access. The data originates from Eurostat and contains import data at 8-digit level for the year 2001. $Dutydifference_k$ is the difference between MFN and preferential tariffs for product k. This is the variable (q_i) for which we identify a threshold value.

As a proxy for the trading countries' *income* and *size* the GDP (GDP_i is the level of income in country i) and population (POP_i is the population in country i) of both partner countries are included in the regression. GDP and population data are taken from the World Development Indicators database. D_{ij} is the distance between the partner countries and is a proxy for *trading costs*. Previous empirical results showed that distance had an important negative impact on trade. The further away the trading partners are located from each other the higher the costs will be for transporting the products. Distance is expected to have a significant and negative impact on preferential trade. The distance data originates from the CEPII distance database and calculated following the great circle formula, which uses latitudes and longitudes of the capital cities.

To investigate the importance of the quality of economic environment in a given exporting ACP country an *indicator of economic freedom* was used (*Freedomindex*). The index was obtained from the Freedom House "Freedom in the World Countries" database. [13] This is a database containing an annual comparative assessment of the state of political rights and civil liberties in 192 countries and 18 related and disputed territories. The lower is the index the more economic freedom the country has. We expect that countries with greater economic freedom are more open and more likely to trade.

To capture *historical linkages* between trading partners two zero-one type dummy variables were included in the regression. *FrenchExcolony_{ij}* and *NonFrenchExcolony_{ij}* take the value of 1 if the exporting country (i) was a colony of France or other partner country(j). Colonial links often reflect not only historical ties but also that the traders of the two

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[13] For details on the index see:
http://www.freedomhouse.org/research/freeworld/2003/methodology.htm.

partner countries can speak the same language. If a country was an ex-colony of its trading partner trade between the two countries would probably necessitate lower transaction costs thus more trade. A separate dummy is included for non-French ex-colonies and French ex-colonies because we expect that there might be differences in the intensities of the trade links for French ex-colonies.[14]

In many aspects, such as size of the economy or the level of development, South Africa differs from most of the other countries in our sample. In order to avoid having specificities of South Africa drive our results, a dummy taking the value 1 if the exporting country is South Africa is included in the regressions. DUM_{ijk} are a set of k dummy variables for agriculture, textiles, clothing, footwear, machinery and mineral products.[15]

$Quota_k$ is a dummy which takes the value 1 if the product was eligible for quota preferences and zero otherwise. The dummy for quota is included in the regression because it is likely that the circumstances for products entering under a preferential quota are different than for products entering without quota preferences; for example traders using the quota preferences are likely to be better informed. Furthermore, we include a dummy (called *difference*) for agricultural products for which the difference between preferential and MFN tariffs exceeds 30%. These agricultural products benefit from seasonal preferential duty reduction. Since we have yearly data it was not possible to exactly calculate the tariff reduction for these products, we calculated the yearly average tariffs, which might overestimate duty reductio n. Although these products only represent 0.8% of all observations, including a dummy for these products avoids that they inflate the threshold estimation.[16]

3.2 Estimation Results

In employing our threshold estimation, one cut-off value was identified. The 95% confidence interval for the threshold estimates indicates that the threshold obtained is between 48 and 52 percentiles. In terms of tariff difference, it is between 4 and 4.5%. Figure 2 plots the likelihood ratio sequence for percentiles in the sample ranked by tariff difference, and illustrates the clear break in the sample at this range of tariff differences. Thus, the preferential tariff must be 4-4.5 percentage points lower than third country tariffs for traders to request preferences. This confidence interval is plausibly tight, since

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[14] Only four countries were not colonies in our sample.
[15] From the 23,685 observations, 9,015 are not covered by any sectoral dummies. These observations belong to sectors such as metals, vehicles, optics, chemicals, plastics, stones, and glasses.
[16] The variables *dutysmall* and *dutyhigh* are discussed below.

it has only 341 observations out of 23,685 observations falling within the 48th and 52nd percentiles. To test the robustness of our results, we re-run the threshold regressions including country specific fixed effects instead of the country-specific gravity-type variables. We obtain the same threshold values for this specification as well: the preferential tariff must be lower than the MFN tariff by 4 percentage points.

In order to verify that the threshold value identified is correct, a probit regression was undertaken using the identified threshold value. The existence of the threshold implies that the relationship between duty reduction and utilization rates is constant among sub-sets of products but varies between products. For products for which the duty reduction is small, the utilization rate might not be significantly influenced by the preferences offered, while higher duty reduction should significantly increase utilization rates. Thus if the threshold value is correct, the duty reduction under the threshold should not significantly influence utilization rate. Table 1 shows the corresponding results of the probit regression. Two additional variables were included in order to test if the threshold was correctly identified. The variable *dutysmall* is a dummy variable that takes the value of one if the difference between MFN and preferential duty was smaller than the threshold. Similarly, the dummy variable *dutyhigh* takes the value of 1 if the difference between tariff rates is higher than the threshold. Both the results of equation (2) and (3) confirm the threshold value. The coefficient of the variable measuring duty reduction when it is below 4.5% (*dutysmall*) is negative and insignificant, while when the duty reduction is above the threshold (*dutyhigh*) it increases the probability of utilizing the preference scheme. These results confirm that the threshold value was correctly identified, in that there is a different relationship between tariff reduction above the threshold and the uptake of preferences.

What does this threshold imply for trade preferences? We will continue our focus on EU preferential trade as an example. Table 2 presents, for 2001, EU imports from LDCs. A further breakdown is provided in Tables 3 and 4. The tables provide estimates of the rate of MFN protection that would be applied to LDC exports to the European Union, and underlying trade flows, and the share of imports by sector reported as actually entering the EU duty free. The following points are worth making at this stage. First, for LDCs the most important exports are manufacturing, followed by mining products (which are generally duty-free anyway). This is despite the fact that the highest utilization of preferences in 2001, as proxied by duty-free-eligible imports, was in agriculture. It is obvious that, in the case of agriculture, rates of protection are generally

well above the threshold we have identified. In addition, it is much easier to prove origin for food (and mining) products.[17] It is therefore in manufacturing that we expect rules of origin, and related administration burdens, to be harder to overcome.[18] From Table 4, is it clear that on average, many EU tariffs in manufacturing are below the threshold we have identified. Yet at the same time, we can also see that there are peak rates that may still make utilization of preferences worthwhile. Hence, the pattern suggested in Table 4 will be a function of the underlying detailed composition of trade in specific products, and benefits will hinge on the margin of preference at the tariff-line level.[19]

The results presented in this section indicate that there exists a minimum preference margin needed for traders to request preferences. If the difference between preferential and third country tariff rates is less than a certain amount, there are no incentives for traders to request preferences, since the costs of obtaining the preferences are expected to be higher than the benefits from obtaining the preferences. We found this threshold for non-LDC ACP countries in their preferential trade with the EU to be between 4-4.5%. Although this figure was found looking at a specific group of developing countries, it provides an approximation of trade costs implied by preferential schemes for other countries as well, as the requirements are similar.

4.   The Scope for Preference Erosion

We next turn to a numerical assessment of preference erosion. Our goal here is to estimate the likely scope for any preference erosion if and when the OECD countries implement further multilateral tariff reductions. This involves the application of a global general equilibrium model, where preferences are included as part of the benchmark data, and where we gauge the impact of OECD tariff reductions on the preference-related gains from trade for the LDCs. We also integrate our assessment of the administration costs in the previous section, to identify how important this is for identifying the overall benefit of preferences, and hence for the impact of preference erosion.

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[17] See Stevens and Kennan (2004). Candau, Fontagné and Jean (2004) find that under-utilization of preferences is highest in textiles and garments (for EU imports under both the GSP and EBA programs). In the case of EBA, exporters in principle benefit from 100 percent duty-free access, but are found to pay up to 6.5 percent average tariffs.
[18] This is not to say agricultural preferences are not affected by administrative barriers. We would however expect these to be related more to prohibitive sanitary and phytosanitary regulations.
[19] Simple regression analysis of the data in Table 3 confirms that the share of duty-free trade, and hence the implicit utilization of preferences, is indeed significantly, positively correlated with the peak tariff rates in the table.

4.1 The mechanics of erosion

To examine the basic mechanics of preferences, and preference erosion, we start with Figure 3. In the figure, we have an archetype OECD country importing varieties of good X from two suppliers, indicated as S_{LDC} and $S_{non-LDC}$. Trade preferences are represented by a reduction in the tariff applied to imports from the LDC. The result is an increase in exports by the LDC supplier from $X_{LDC,0}$ to $X_{LDC,1}$. The benefit for the LDC exporter is represented by area A. At the same time, there will be a shift in demand away from imports from the non-preferential supplier. This results in a cost represented by area B, which represents the loss in exporter surplus. The magnitude of these costs and benefits depends on underlying supply and demand responsiveness to price changes, as well as the degree of substitution between preferential and non-preferential suppliers. The impact on the importer depends on a mix of effects – terms of trade, trade creation, and trade diversion. On net, trade preferences therefore involve a mix of benefits for preferential exporters, costs imposed on third-country exporters, and potential losses for the importer as well (Panagariya, 2000). Basically, trade preferences are a beggar-thy-neighbor type of foreign aid—robbing Peter to pay Paul. [20]

Starting from the picture of preferences in Figure 3, their elimination then involves a reversal of the process shown in the figure. The importer recovers tariff revenue, and potentially realizes terms of trade gains. Import demand shifts back to the non-preferential supplier, who recovers the exporter surplus B. The preferential supplier loses exporter surplus gains A.

Preference erosion is a similar process, but one involving the elimination of tariffs on the non-preferential supplier. This is shown in Figure 4. Elimination of the tariff on remaining third-country suppliers, given the duty free access already for preferential suppliers, means that third-country exporters see their exports increase from $X_{non-LDC,1}$ to $X_{non-LDC,2}$. There is a gain in exporter surplus of area E, which may be greater or less than the original loss of exporter surplus resulting from the preferences, area B in

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[20] Only if the (more) preferred developing country (countries) is (are) small in the sense of not at all affecting the internal price in the importing nation will there be no detrimental effect on third country competitors. If so, the preference only creates trade (expands imports), to the detriment of local suppliers in the preference granting country, but not to other foreign suppliers, as they continue to confront the same price. See Baldwin and Murray (1977) for an early discussion. Most empirical studies conclude however that preference programs are associated with negative terms of trade effects for excluded (less preferred) countries, i.e., there is trade diversion as well as trade creation. Much depends on having good estimates of the elasticities of substitution between foreign and domestic goods and between foreign products of different origin. Early studies assumed these elasticities were identical. General equilibrium studies—including the one undertaken later in this paper—by contrast tend to use Armington elasticities. For more discussion, see Brown (1987), Langhammer and Sapir (1987) and the references cited there.

Figure 3. The preferential supplier sees a drop in demand for his exports from $D_{LDC,1}$ to $D_{LDC,2}$. This results in a partial, though generally not full, loss of the benefits from the original preference scheme. This is represented by area C, which is shown as being less than area A in Figure 3. The reason the loss is not complete is that preferences include, in part, the benefits relative to the original tariff-ridden equilibrium from a non-discriminatory tariff reduction by the importer. We therefore have preference erosion generally yielding a partial, though not full, loss of the original benefits of the preference scheme. At the same time, third-countries recover some of the costs originally imposed by the preference scheme.

We should add a few caveats to the discussion at his stage. First, to the extent there is market power on the part of either importers (Francois and Wooton 2005) or the transport and logistics sector (Francois and Wooton 2001), we can expect the benefits of tariff reductions to be captured, at least in part, by those intermediaries with market power rather than the exporters themselves. There is evidence, based on the AGOA preference scheme, that the pass through of preference margins is indeed partial at best. Olarreaga and Özden (2005) find that the average export price increase for products benefiting from preferences under AGOA was about 6 percent, whereas the average MFN tariff for these products was some 20 percent. Thus, on average exporters received around one-third of the tariff rent. Moreover, poorer and smaller countries tended to obtain lower shares—with estimates ranging from a low of 13 percent in Malawi to a high of 53 percent in Mauritius.[21] In addition, based on our analysis in the previous section, we should expect administration costs related to these programs to also chew up some of the benefits. In the case of market power, the result is a simple redistribution of the benefits of preferences (rents) being transferred to importers. With administration costs, however, the share of the gains that is lost is not redistributed, but is really a deadweight loss. In both cases, the trade effects of preference programs will be less as well.

4.2 A numerical assessment

We now turn to a numerical assessment of the likely magnitudes involved. While there has been a great deal of political weight attached to this issue, this debate has largely been taking place in a vacuum of real information on the costs and benefits involved.

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[21] See Ozden and Sharma (2004) for a similar analysis of the CBI program. Tangermann (2002) also notes that exporters often do not capture all the rents.

Moreover, the exceptions have focused almost exclusively on the effects of preference erosion on the exports of beneficiary countries.[22] Our assessment uses a global, multi-region general equilibrium model of trade. The model includes 34 regions/countries and 24 sectors (Table 5). The social accounting data come from the GTAP database (http://www.gtap.org) and are benchmarked to 2001. These data include national production and international trade flows.

The import protection data are based on a thorough and careful effort to include use of preferences in a matrix of global import protection (Bouet et al. 2004). These data are the product of a joint effort between the UN International Trade Centre, the United Nations Conference on Trade And Development (UNCTAD), the World Trade Organization (WTO) and the Paris-based Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). An important contribution of this project has been an exhaustive coverage of preferential trade arrangements (PTAs) across the world, combined with calculation of the AVE of specific duties. Combined with differences in the bilateral composition of trade, the result is that protection varies by sector and partner for each importer. These data have in turn been integrated with the GTAP database for 2001. We have modified these data further to assume full utilization of the 2001 EU Everything but Arms (EBA) initiative as well as AGOA for those African countries benefiting from more liberal rules of origin, as this has been implemented over a period extending beyond the benchmark year of the original protection data. We have also imposed the elimination of ATC quotas on textiles and clothing on the benchmark, an event which occurred on January 1, 2005. This is of course an important dimension of preference erosion in its own right, insofar as the constraint on the most efficient producers under the ATC implied there was an "implicit" preference for the non- or less-constrained developing country exporters. The impacts of the ATC are assessed in greater detail in Francois, Spinanger, and Woertz (2005)—we return to the magnitude of the associated erosion in the concluding section.

The model itself is a relatively standard general equilibrium model, with Cobb-Douglas consumer demand over broad categories, and CES-based demand within product categories. For primary sectors, this is Armington-based trade (see the discussion in Francois and Reinert 1997), while other sectors are modeled as being monopolistically competitive. Scale elasticity estimates are based on Antweiler and Trefler (2002) and

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[22] See e.g., IMF (2003), Alexandraki and Lankes (2004), Brenton and Ikezuki (2004). Earlier efforts at quantifying the value of preferential access for LDCs such as Ianchovichina at al. (2003) did not have access to accurate information on preferences for these countries.

Francois (2001).[23] Factor supplies are fixed nationally, and are allocated between sectors through factor markets.

The experiment itself is relatively straightforward. We eliminate, on a multilateral basis, all OECD import tariffs on all goods. This includes the ad-valorem equivalents (AVEs) of specific tariffs and tariff-rate quotas, and takes into account the prevailing preference programs as reported in CEPII. We also conduct a sub-experiment, where we eliminate these tariffs first for the EU alone. This gives us a chance to identify the full magnitude of preference erosion for a sample of least developed and low-income countries (conceptually represented by area C in Figure 3), and also to identify the share of these effects that are due to EU preferences. Finally, we then re-calculate our estimate of EU preference erosion after adjusting for the administrative cost threshold of 4 percent identified in the previous section. This has a substantial impact on the estimated scope for preference erosion.

Our estimates of the dollar impact of full preference erosion on real national income are shown in Table 6. We have included the impact on the LDCs in Sub-Saharan Africa, as well as other low-income countries in our sample (using the World Bank classification of countries by income). The tables reveal that EU preferences are very important, as a bilateral measure, for Sub-Saharan African countries. Given the current trade policy landscape, we estimate EU preferences to be potentially worth some $460 million annually to African LDCs. Asian countries benefit less, with the exception of Bangladesh ($100 million). These are therefore countries that stand to lose—all other things equal—from a move by the EU to lower MFN trade protection. Other developing country groups stand to gain—these are the "less preferred" in the overall hierarchy of preferences.[24] Although we are not convinced that the potential preference rents all actually accrue to the exporting countries (again, see Olarreaga and Özden 2005), our estimates provide a measure of what is at stake.[25]

Our welfare estimates cannot be compared directly to the results obtained in recent partial equilibrium-based analyses such as IMF (2003) and Alexandraki and Lankes (2004) as these focus solely on trade effects. The IMF estimates the potential export revenue loss from preference erosion resulting from a 40 percent cut in protection by

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[23] See Francois and Roland-Holst (1997) for details. The model is documented in Anderson, Francois, and Hoekman (forthcoming) and is available for download at http://www.intereconomics.com/francois.

[24] The income effects are mirrored in the trade effects in Table 4, which reveals that export reductions map to income reductions. This is fully consistent with our earlier discussion centered on Figures 2 and 3.

[25] As discussed further in the concluding section a case can be made that even if exporters do not get the rents they *should* get them. In any discussion that focuses on offsetting the loss from preference erosion one can argue that account should be taken of any "missing" rents.

Canada, the EU, Japan and the US at some $530 million. This assumes full utilization of preferences and that developing countries get all of the associated rents. Alexandraki and Lankes (2004), focusing on middle-income countries only, conclude that potential erosion impacts are less than 2 percent of total exports for the countries that are most "preference dependent".

Limão and Olarreaga (2005) are to our knowledge the only paper to undertake an analysis of the welfare effects of complete preference erosion. They calculate what the income transfer to LDCs would need to be that would be equivalent in to the transfer implied by existing preference programs. They conclude that for LDCs the figure is $266 million. This is a one-year, short-run effect—all else equal the net present value is argued to be several times higher. Their results are in line with ours, assuming away the compliance costs associated with preference programs (which they do).

If we view the issue of preference erosion in the broader context of potential tariff reduction by all OECD countries, not just EU members, the magnitude of the total losses is reduced. In part this is because the EU has been the most aggressive in using preferences as a tool for development assistance—such programs in other OECD countries have tended to be subject to greater exceptions (an example has been the non-inclusion of apparel in US GSP programs). Thus, the gains associated with non-EU MFN tariff reductions will partially offset losses due to EU liberalization. In the case of Sub-Saharan Africa our estimates suggest that overall losses will be reduced by a factor of four—to $110 million. In addition, low-income countries in Asia stand to gain a lot from other OECD tariff reductions.

What are the implications of taking into account our threshold estimates of compliance costs? In Table 7 we report a second set of estimates for preference erosion tied to EU preferences. Recall from Table 6 that the EU preferences are the dominant issue at play. The estimates in Table 7 are based on our earlier estimate of the compliance cost for EU trade preferences being some 4% of the value of the goods exported. We eliminate these costs as part of the experiment in Table 7. In other words, we assume that with zero tariffs, the need to enforce rules of origin becomes moot. Moreover, we make this adjustment for goods that (1) are classified as manufactured goods (reflecting the observation in the literature that utilization rates are high for non-manufactures in the case of African exports), and (2) offer a potential preference margin of at least 4 percentage points (Table 4). Another way to view this is that we adjust downward the

potential benefit of preferences by the value of the margin, up to 4 percent points of the total value of a tariff concession.

We find that the magnitude of preference erosion changes somewhat overall, with the change varying across countries. For Bangladesh, which is specialized in high tariff categories like clothing that are subject to restrictive rules of origin, the magnitude of potential erosion is cut by half. For Madagascar, potential losses turn into potential gains. The reason for these results is that the compliance costs associated with implementing preference programs biases upward estimates of the value of preferences. For countries specialized in agriculture – Malawi and Zambia for example – the effects of accounting for compliance costs are much smaller due to our assumption—based on other studies (Stevens and Kennan, 2004; Candau et al. 2004)—that compliance costs are not a big issue.[26] Overall, allowing for rules compliance costs, we no longer have any real losses for African LDCs in total, though we do for individual countries. What this says then is that on net, EU preferences do not really offer benefits to African LDCs. To the extent individual countries benefit, blocking multilateral reductions to maintain these benefits really involves hurting some (neighboring) countries, with no real net benefits for the region as a whole. It also points to the need for country-by-country analysis and assessments of the potential impacts of preference erosion.[27]

The results from Tables 6 and 7 imply that the magnitude of any transfer needed to offset (or compensate for) the effect of erosion is much smaller in a context where all OECD countries liberalize than in a bilateral EU context. LDCs do stand to lose from tariff reductions in sectors or products where preferences matter. However, they also stand to benefit from improved access to OECD markets; a process that at least partially, and often substantially, offsets the more direct losses on a bilateral basis from erosion of preference margins. We should note that this offset is most likely to be an underestimate, because of the assumption that developing countries themselves do not liberalize. Independent of the welfare economic implications of this assumption, as noted previously, it is an appropriate constraint to impose given the political economy-cum-

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[26] We can note in passing that this implies that the compliance cost estimate obtained in Section 3 will in fact be higher than 4 percent on average for manufactures. This also biases upward our calculation of the potential value of erosion.

[27] IMF (20003) concludes that individual LDCs may suffer more than average due the concentration of their exports in products that enjoy deep preferences. Of the LDCs, Cape Verde, Haiti, Malawi, Mauritania, and São Tomé and Príncipe are found to be the most vulnerable to preference erosion. Alexandraki and Lankes (2004) conclude that six middle-income countries—Belize, Fiji, Guyana, Mauritius, St. Kitts and Nevis, St. Lucia—would also be significantly affected, with predicted export declines ranging from 11.5 percent for Mauritius to 7.8 percent for Fiji.

negotiating context in which the preference erosion question is placed. The issue at hand is the magnitude of erosion of benefits that stem from removal of an explicit development-motivated policy that has been put in place by OECD countries. From this perspective it is not relevant that there are other sources of offsetting market access and/or terms of trade gains—be it from liberalization by other developing countries or own liberalization.

Finally, it is informative to place our estimates in the context of ongoing changes in the trading system. Table 8 compares our estimates of preference erosion to a set of estimates (based on the application of the same basic computational model by Francois Spinanger and Woerz, 2005), of the impact of the January 1, 2005 elimination of remaining textile and clothing quotas for developing countries. This was the final stage of implementing the 1994 WTO Agreement on Textiles and Clothing (ATC). These restrictions were another form of beggar-thy-neighbor trade preferences, as they (implicitly) favored smaller, higher-cost developing country suppliers at the expense of exports from China. The reason of course is that by restricting the most competitive suppliers, incentives were created for importers to source from other developing countries. As can be seen in Table 8, for sub-Saharan Africa the negative effects of the ATC are significant, although they are smaller than for Asian countries such as India and Vietnam. These losses reflect a combination of greater competition from China and loss of quota rents.

For Africa, the ATC-induced negative impact is smaller than our estimates of the potential magnitude of Doha Round preference erosion if no account is taken of compliance costs. However, if account is taken of compliance costs, the potential trade preference losses are a less important issue than those associated with lifting of ATC textile and clothing quotas.[28] From a practical perspective this conclusion is bolstered by the fact that the ATC effect is "here and now," whereas additional Doha Round-based erosion will only occur in the future and thus needs to be discounted appropriately.[29]

As other recent studies of this issue (like the IMF 2003) focus on trade effects, in Table 9 we report on export effects. These map to the income effects reported in Table 8. Again, for some countries, like Botswana, Mozambique, and Madagascar, there is a

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[28] Note that strictly speaking this comparison cannot be made as the textiles and clothing erosion estimates assume zero compliance costs. However, as the ATC was based on quotas with associated rents that were equivalent to tariffs well above our threshold value of compliance costs, overall such costs are not likely to have had major effects in relative terms.

[29] As mentioned previously, the ATC effects noted here have been incorporated into the baseline scenario, i.e., it is assumed that the associated effects have already played themselves out.

significant drop in exports with full preference erosion. However, these preference-based export gains are, in a sense, at the expense of other countries in the region. Overall, it is clear the region would benefit overall from MFN-based tariff reductions by the OECD, despite the erosion of preferences.

5.   Concluding Remarks

Because of concern that OECD tariff reductions will translate into worsening export performance for the LDCs, trade preferences may be a stumbling block to obtaining broad-based support for deep liberalization by OECD countries in the Doha Round. In this paper we have examined the magnitude of potential preference erosion, based on an econometric assessment of the actual utilization of preferences, and the scope for erosion estimated by modeling full elimination of OECD tariffs and hence full erosion. We find strong evidence that preferences are underutilized due to administrative burdens. This presumably reflects rules of origin and similar hurdles placed in the way of actually utilizing trade preferences. The implication is that the actual value of preferences is reduced quite substantially. In addition, in US dollar terms we find that the primary negative impact of erosion follows from the removal of EU trade barriers. This suggests that the erosion problem is primarily a bilateral, not a WTO-based concern. Indeed, multilateral liberalization by all OECD countries can serve to substantially reduce the aggregate amount of erosion losses.

What are the policy implications of our analysis? Preferences can only have an impact if there is a nonzero tariff in the importing market. Two-thirds of the major items Africa exports to Canada, for example, face zero MFN tariffs; and 69% of EU imports from Africa (by value) in 2000 were in items facing zero MFN duties (Stevens and Kennan, 2004). Raising trade barriers in order to increase the value of preferential access would be globally welfare reducing, although it is sometimes suggested. More common is the argument used by vested interests in the OECD that preferred developing countries should not lose any more preferential access to their (highly distorted) markets. The result is the potential for status quo bias reflecting a "bootlegger-Baptist" coalition between protectionist interests and development NGOs in the North and developing country governments in the South. This would impose a significant opportunity cost from a global efficiency perspective.

One solution would be to agree to compensate developing countries for preference erosion (Page, 2004). Given the systemic downsides, limited benefits, and

historical inability of many poor countries in Africa and elsewhere to use preferences, a decision to shift away from preferential "trade as aid" toward more efficient and effective instruments to support poor countries could both improve development outcomes and help strengthen the multilateral trading system (Hoekman, 2004). More effective integration of the poorest countries into the trading system requires instruments aimed at improving the productivity and competitiveness of firms and farmers in these countries. Supply constraints are the primary factors that have constrained the ability of many African countries to benefit from preferences.[30] This suggests that the main need is to improve trade capacity and facilitate diversification. In part this can be pursued through a shift to more (and more effective) development assistance that targets domestic supply constraints as well as measures to reduce the costs of entering foreign markets.

The additional transfers associated with a decision to compensate countries for lost preferences are not large relative to existing aggregate official development assistance—currently in the $65 billion range. As noted the issue is to a large extent a bilateral one, in that most of the prospective loss is generated by MFN liberalization by the EU. We would argue that the amount needed should be based on our bilateral analysis, as that generates the best measure of the value attached to the preference program. That is, even though compliance costs are very important determinants of the value of preferences, from a compensation perspective they should be ignored—after all, they imply that recipients are less able to use the programs.

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[30] Page (2004), Stevens and Kennan (2004).

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Table 1: Results of the endogenous threshold regression

	(1)	(2)
Ldist	0.077	-0.424
	(4.11)**	(6.43)**
lgdp	0.035	
	(12.69)**	
lpop	0.007	
	(2.03)*	
lgdpdecl	-0.215	
	(13.10)**	
lpopdecl	0.279	
	(16.67)**	
freedomidicator	-0.006	
	(2.21)*	
Frenchcolony	0.075	
	(4.14)**	
NONfrenchcolony	0.008	
	(0.92)	
SouthAfrica	-0.316	
	(17.57)**	
DUMagri	0.285	0.331
	(26.87)**	(29.26)**
DUMtext	0.237	0.219
	(13.93)**	(13.04)**
DUMfoot	0.131	0.129
	(5.36)**	(5.35)**
DUMmach	-0.199	-0.163
	(21.56)**	(19.42)**
DUMwood	0.449	0.447
	(22.16)**	(20.05)**
DUMmineral	0.047	0.114
	(0.87)	(2.13)*
DUMcloth	0.243	0.219
	(18.53)**	(16.29)**
dutysmall	-0.455	-0.450
	(1.39)	(1.43)
dutyhigh	0.609	0.479
	(8.46)**	(6.50)**
Hightariff	-0.252	-0.190
	(7.38)**	(4.66)**
Quota		-0.094
		(2.76)**
Country fixed effects		included
LR	$\chi2(19) =6279.82$, Prob>,0.00	$\chi2(57) =9706.34$ Prob>,0.00
Pseudo R2	0.2074	0.3209
Log likelihood	-12001.857	-10270.878
Observations	23684	23641

Absolute value of z statistics in parentheses
* significant at 5%; ** significant at 1%

Table 2
EU imports from the least-developed countries, 2001

	total EU15 imports '000$US	duty free imports '000$US	sector share of LDC total	duty-free share of sector total	share subject to specific duties
Agriculture	905,722	611,791	7.6	67.5	14.0
Forestry, Fisheries	258,714	174,782	2.2	67.6	0.0
Mining	3,982,709	3,973,127	33.5	99.8	0.0
Processed foods	1,035,968	32,188	8.7	3.1	4.2
Other manufactures	5,720,632	394,087	48.1	6.9	1.4
TOTAL	11,903,744	5,185,974	100.0	43.6	2.1

Source: WTO integrated database

Table 3
Composition of EU15 processed food imports from LDCs

	total EU15 imports '000$US	free imports (no duty applied) '000$US	free import share of category total	share of total processed food imports	EU average rate of protection, all extra-EU trade
Animal products	92	0	0.0	0.0	16.0
Vegetable oils and fats	104,029	26,506	25.5	10.0	37.7
Dairy products	99	0	0.0	0.0	18.4
Processed rice	1,176	0	0.0	0.1	38.6
Sugar	37,818	0	0.0	3.7	36.7
Food producs nec	891,547	5,287	0.6	86.1	11.6
Beverages and tobacco	1,208	394	32.6	0.1	20.3
TOTAL	1,035,968	32,188	3.1	100.0	15.2

source: WTO integrated database (trade) and GTAP database (protection)

Table 4
Composition of EU15 manufactures imports from LDCs, 2001

	total EU15 imports '000US$	free imports (no duty applied) '000US$	free import share of category	share of total manu-factures imports	EU MFN tariffs, weighted by LDC trade	Maximum tariff
Textiles	1,838,393	39,012	2.1	32.1	11.5	12.6
Clothing	1,977,100	164	0.0	34.6	12.2	12.6
Leather	325,254	38	0.0	5.7	7.4	17.0
Wood products	104,170	24,665	23.7	1.8	1.7	10.0
Paper products	6,926	2,709	39.1	0.1	1.7	9.8
Petroleum and coal products	27,544	0	0.0	0.5	3.9	4.7
Chemicals, rubber, plastics	84,751	29,399	34.7	1.5	3.7	12.8
Non-metalic minerals	21,430	176	0.8	0.4	9.7	12.0
Iron and steel	6,364	4,218	66.3	0.1	0.7	5.7
Non-ferrous metals	640,473	251,514	39.3	11.2	3.5	10.0
Fabricated metal products	7,671	2,166	28.2	0.1	2.3	8.5
Motor vehicles and parts	3,120	143	4.6	0.1	6.8	22.0
Other transport equipment	587,053	78	0.0	10.3	1.4	15.0
Electrical machinery	16,766	15,003	89.5	0.3	0.6	14.0
Other machinery	41,592	9,546	23.0	0.7	1.6	8.0
Other manufactures	32,025	15,258	47.6	0.6	1.4	9.0
TOTAL	5,720,632	394,087	6.9	100.0	9.0	22.0

source: WTO integrated database

Table 5: Country-Region and Sectoral Disaggregation in the Model

Basic sectoring scheme

Regions	Sectors
1 EU25	1 Rice
2 Turkey	2 Wheat
3 Russia	3 Other cereals
4 Other Europe	4 Horticulture
5 Middle East	5 Sugar
6 North Africa	6 Meats
7 Botswana	7 Beef
8 Madagascar	8 Dairy
9 Malawi	9 Cotton
10 Mozambique	10 Other agriculture
11 Tanzania	11 Processed foods
12 Uganda	12 Textiles
13 Zambia	13 Clothing
14 South Africa	14 Leather
15 Other sub-Saharan Africa	15 Mining
16 Canada	16 Chemicals
17 United States	17 Metals
18 Mexico	18 Motor Vehicles
19 Central America	19 Mechinery
20 Caribbean	20 Other industry
21 Argentina	21 Construction
22 Brazil	22 Trade
23 Other South America	23 Transport
24 Japan	24 Business
25 Other high income Asia	25 Other services
26 China	
27 Vietnam	
28 Other Southeast Asia	
29 Bangladesh	
30 India	
31 Sri Lanka	
32 Other Central Asia	
33 Oceania	
34 Australia & New Zealand	

Sectors 1-10 are Armington sectors (national differentiation).
Others are modeled with firm-level differentiation.

Table 6
Income Effects of Full Preference Erosion

	change in annual national income, $US million		
	Effects of EU MFN trade liberalization	Effects of other OECD trade liberalization	Total preference loss
African LDCs	*-458.3*	*347.8*	*-110.5*
Botswana	0.2	16.3	16.4
Madagascar	-7.1	16.9	9.8
Malawi	-22.6	15.6	-7.0
Mozambique	-27.3	13.0	-14.3
Tanzania	4.6	-3.1	1.5
Uganda	-5.9	1.7	-4.3
Zambia	-18.9	-2.4	-21.3
Other Sub-Saharan Africa LDCs	-381.2	289.9	-91.3
Asia/other LDCs	*93.4*	*-180.9*	*-87.4*
Bangladesh	-101.0	-37.2	-138.2
Other Central/South Asia LDCs	194.4	-143.6	50.8
Other Low-income	*587.4*	*1463.1*	*2050.5*
India	174.0	101.8	275.8
Vietnam	413.4	1361.3	1774.8
TOTAL	222.5	1630.1	1852.6

LDC and low-income classification is based on World Bank designations.

Table 7
Preference Erosion with Adjustment for Compliance Costs

	Change in annual national income, $US million			
	Effects of EU liberalization, unadjusted	Effects of EU liberalization, adjusted for compliance costs	Total preference loss, unadjusted	Total preference loss, adjusted
African LDCs	*-458.3*	*-341.5*	*-110.5*	*6.3*
Botswana	0.2	-0.3	16.4	16.0
Madagascar	-7.1	0.1	9.8	17.0
Malawi	-22.6	-18.1	-7.0	-2.5
Mozambique	-27.3	-27.3	-14.3	-14.3
Tanzania	4.6	24.0	1.5	20.9
Uganda	-5.9	0.0	-4.3	1.6
Zambia	-18.9	-18.6	-21.3	-20.9
Other Sub-Saharan Africa LDCs	-381.2	-301.3	-91.3	-11.4
Asia/other LDCs	*93.4*	*155.8*	*-87.4*	-25.1
Bangladesh	-101.0	-40.0	-138.2	-77.2
Other Central/South Asia LDCs	194.4	195.8	50.8	52.2
Other Low-income	*587.4*	*507.3*	*2050.5*	1970.5
India	174.0	166.1	275.8	267.9
Vietnam	413.4	341.3	1774.8	1702.6
TOTAL	222.5	321.6	1852.6	1951.7

LDC and low-income classification is based on World Bank designations.
note: adjustments relate to rules of origin and other compliance costs for EU preferences.

Table 8
Income Effects,
MFN Liberalization-based Preference Erosion and the ATC Phaseout

	change in annual national income, $US million		
	Total preference loss, unadjusted	Total preference loss, adjusted	Total ATC quota elimination
African LDCs	*-110.5*	*6.3*	*-71.8*
Botswana	16.4	16.0	0.2
Madagascar	9.8	17.0	-7.0
Malawi	-7.0	-2.5	0.0
Mozambique	-14.3	-14.3	-1.7
Tanzania	1.5	20.9	3.2
Uganda	-4.3	1.6	-0.3
Zambia	-21.3	-20.9	1.7
Other Sub-Saharan Africa LDCs	-91.3	-11.4	-68.0
Asia/other LDCs	*-87.4*	*-25.1*	*-661.9*
Bangladesh	-138.2	-77.2	-205.1
Other Central/South Asia LDCs	50.8	52.2	-456.8
Other Low-income	*2050.5*	*1970.5*	*-274.1*
India	275.8	267.9	-478.5
Vietnam	1774.8	1702.6	204.4
TOTAL	1852.6	1951.7	-1007.9

Source: Table 7, and Francois, Spinanger, and Woerz (2005).

Table 9
Export Effects,
MFN Liberalization-based Preference Erosion and the ATC Phaseout

	change in exports, percent		
	Total preference loss, unadjusted	Total preference loss, adjusted	Total ATC quota elimination
African LDCs	*3.7*	*4.2*	*-0.1*
Botswana	-4.2	-4.2	-0.2
Madagascar	7.7	11.2	-1.9
Malawi	12.5	16.0	-0.3
Mozambique	-6.0	-7.8	-1.4
Tanzania	2.2	6.3	0.0
Uganda	0.0	1.5	0.0
Zambia	-1.7	-1.6	0.3
Other Sub-Saharan Africa LDCs	4.4	4.8	-0.1
Asia/other LDCs	*7.3*	*7.6*	*0.7*
Bangladesh	6.0	10.2	-8.2
Other Central/South Asia LDCs	7.5	7.3	1.8
Other Low-income	*6.6*	*6.1*	*1.4*
India	2.5	2.4	1.4
Vietnam	22.9	20.7	1.5
TOTAL	6.0	6.0	0.7

Source: Model estimates, and Francois, Spinanger, and Woerz (2005).

Figure 1

GDP per capita of Sub-Saharan Africa and NIEA(8), 1960
(Measured at 1987 prices and exchange rates)

Dollars

Average annual growth 1960-99	
Sub-Saharan Africa	
NIEA(8)	**0.5**
	4.7
Chinese Taipei	
Hong Kong	6.6
Indonesia	5.3
Korea, Rep. of	3.6
Malaysia	5.9
Philippines	3.9
Singapore	1.1
Thailand	6.4
	4.6

NIEA(8)

Sub-Saharan Africa

Note: NIEA(8) (Newly Industrialized Economies in Asia) consist of Chinese Taipei, Hong Kong China, Indones
Rep. of Korea, Malaysia, Philippines, Singapore and Thailand.
Source: WTO and the World Bank, World Development Indicators 2000.
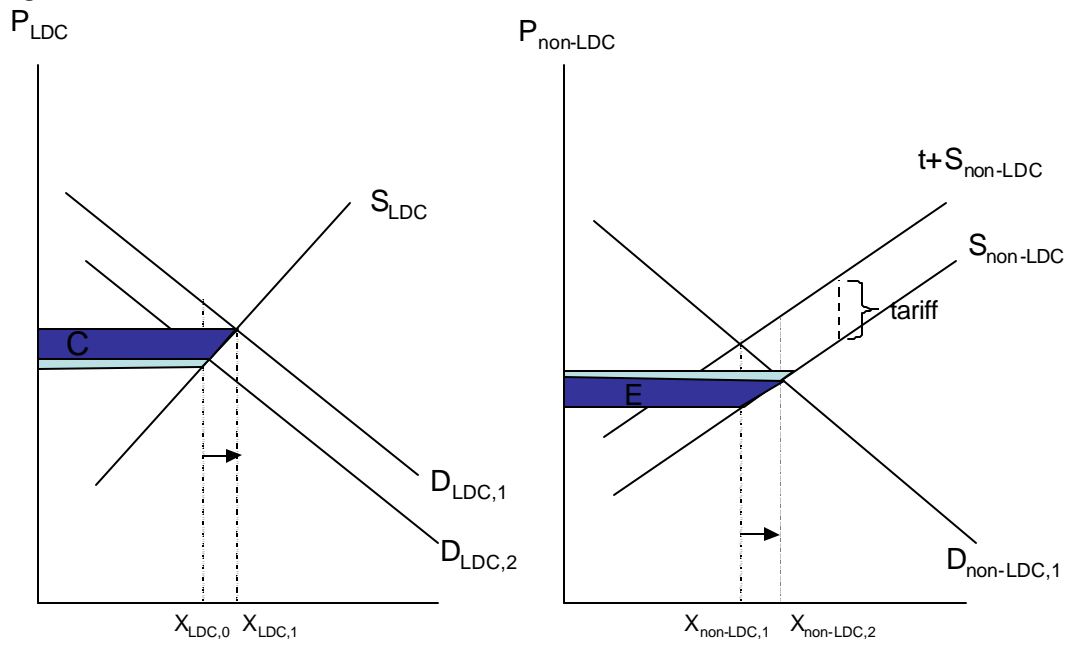
Figure 2
Likelihood ratio sequence

Figure 3

Figure 4