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Will the Doha Round Lead to Preference Erosion?

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This paper assesses the effects of reducing tariffs under the Doha Round on market access for developing countries. It shows that for many developing countries actual preferential access is less generous than it appears because of low product coverage or complex rules of origin. Thus, lowering tariffs under the multilateral system is likely to lead to a net increase in market access for many developing countries, with gains in market access offsetting losses from preference erosion. Furthermore, comparing various tariff-cutting proposals, the research shows that the largest gains in market access are generated by higher tariff cuts in agriculture. [JEL F13, F17]
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A key issue in the Doha Round, especially for developing countries, is whether multilateral tariff reductions will adversely affect their market access to developed countries.[1] In large part, this concern stems from the fact that developing countries were given nonreciprocal preferential access to developed countries' markets in the 1970s. These preferences entitle developing countries to export their products to developed countries at

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[1]Other issues, such as loss in tariff revenue, are not addressed in this paper.

lower tariff rates than those applied to other World Trade Organization (WTO) members and, in some cases, at zero tariff rates. If tariff cuts were to be granted to all WTO members under the Doha Round, then the relative advantage of developing countries' exports to developed countries would be reduced owing to the erosion of these "preference margins"—the difference between the tariff rate for all WTO members and their own under their preferential access. However, offsetting these losses are the gains in market access owing to tariff cuts on goods that do not receive preferences. The question is whether the gains outweigh the losses.

Using detailed trade, tariff, and preference information for the United States and the European Union (EU), this paper assesses the likely effects of reducing tariffs under the Doha Round on market access for developing countries. A key feature of this study is the use of data on preference schemes, for different products exported to the U.S. and EU markets. This information is essential in assessing the size of preference erosion because many tariff lines are not eligible for preferences under the generalized system of preferences (GSP), and in many cases countries do not apply for preferences they are entitled to and end up paying the most-favored-nation (MFN) rate because of complex rules governing the use of preferences. Thus, studies that assume 100 percent utilization rates are likely to overestimate the costs of preference erosion.

We estimate changes in market access by simulating changes in U.S. and EU import demand following cuts in their bound tariff rates under three different policy scenarios.[2] First, we assume that they cut all their tariffs by a uniform rate of 40 percent. Second, we allow the United States and the EU to exclude sensitive products from tariff cuts. Third, we assume a higher than 40 percent tariff cut in agriculture, and a 40 percent tariff cut in manufacturing. These different scenarios are meant to reflect likely outcomes that have been discussed in the Doha negotiations.

To simulate changes in import demand requires some assumptions about demand and supply elasticities. We assume the elasticity of substitution across different varieties of products is equal to 6, as in Romalis (forthcoming).[3] Throughout the analysis, the supply elasticity for developing countries is assumed to be infinite. This enables the focus to be on the change in demand from the EU and the United States for developing countries' products as a way to measure changes in market access. If, instead, a finite elasticity were assumed, then trade volume responses would be

[2]A bound tariff is the maximum tariff that a country can set, as agreed under WTO negotiations. The MFN tariff is the tariff rate applied to all WTO member countries that do not receive special preferences.

[3]Simulations with alternative elasticity of substitution assumptions are also presented to show robustness of the results.

smaller but there would be terms of trade effects from which some developing countries would benefit. The infinite elasticity of supply assumption delivers the maximum export revenue effect, for both revenue gains and losses, but is unlikely to cause a misidentification of winners and losers.[4]

The results highlight that preferences granted to developing countries are not as generous as they appear. Some developing countries actually pay higher average tariffs than developed countries under current preference schemes. For example, the average tariffs imposed by the United States on non-African least developed countries' (LDCs) exports is 13.1 percent compared with only 1.2 percent imposed on developed countries' exports. Similarly in the EU, the average tariff on non-African LDCs is higher, at 5.1 percent, than that on developed country exports, at 2.9 percent.

Because a large share of developing countries' exports do not actually enjoy preferences in practice, lowering tariffs under the multilateral system is likely to lead to a net increase in market access. That is, the gains in market access from lower MFN tariffs offset the losses owing to preference erosion for many developing countries. A simulated uniform cut in tariffs of 40 percent in both the United States and the EU leads to an increase in import demand of 2.1 percent averaged across all countries, although the gains are not uniform across countries or regions. Non-African LDCs enjoy higher-than-average increases in demand for their products, of 8.5 percent, and African LDCs experience a loss of 0.1 percent in demand for their products. If the United States and the EU were to exclude sensitive products from tariff cuts, the gains in market access for all regional groupings would be smaller, on average, relative to the uniform cut. Simulations that assume a higher than 40 percent tariff cut in agriculture, using a tiered formula, together with a 40 percent cut in manufacturing, generate the largest gains for all groups of countries.

I. Research Strategy

To estimate changes in market access, we simulate changes in import demand by the United States and the EU following across-the-board tariff reductions. We assume a Cobb-Douglas utility function in the first tier at the product level, which implies an elasticity of substitution between goods equal to 1. Thus, the total share of expenditure on each product at the Harmonized System (HS) 10-digit level, for example shoes, is assumed to be constant. Within this shoe product group, each country will decide where to purchase

[4]This infinite supply elasticity assumption differs from that made in Subramanian (2003) and Alexandraki and Lankes (2004), which assume a supply elasticity of 1 and do not consider terms of trade effects. Their assumptions deliberately bias the results in favor of overstating losses from preference erosion in order to minimize the risk of overlooking individual countries that might face losses. In addition, they also assume 100 percent utilization of preferences.

different varieties, and each country is assumed to produce a different variety. The elasticity of substitution across these different varieties is assumed to equal 6, thus if the relative price of shoes in one country increases by 1 percent, relative demand for its shoes will fall by 6 percent. These assumptions are based on estimates from Romalis (forthcoming) and are consistent with other studies, such as Hummels (2001). Simulations with alternative elasticity of substitution assumptions are also presented to show robustness of the results. Each country's current share of EU and U.S. consumption is estimated from the detailed trade data and from the Organization for Economic Cooperation and Development's (OECD) STAN database. The full details of the estimation procedure are provided in Appendix I.[5]

We assume that the supply elasticity for developing countries is infinite. This enables us to focus on the change in demand from the EU and the United States for developing countries' products as a way to measure changes in market access.[6] This implies that all exporting countries will readily respond to the shifts in U.S. and EU demand stemming from tariff changes under the Doha Round. Of course, this is unlikely to be the case, notably owing to supply-side constraints such as impediments in infrastructure. Thus, some countries may not necessarily be able to take advantage of increase in demand for their products if there are infrastructure problems limiting export capacities. However, without detailed country information on supply constraints by commodity it would be impossible to incorporate these aspects. To determine how much trade in various commodities will change would require information on supply capacity and other factors that affect supply, which are outside the scope of this exercise. Nevertheless, an advantage of the infinite supply elasticity assumption is that the simulations provide an indication of changes in potential market access. Because one of the concerns surrounding the next Doha Round is loss in market access owing to preferences erosion, this seems the most appropriate assumption to make. If, instead, a finite elasticity were assumed, then trade volume responses would be smaller but there would be terms of trade effects from which some developing countries would benefit. The infinite elasticity of supply assumption delivers the maximum export

[5]Note that these numbers are likely to understate the potential gains in market access and the number of gaining countries because only the "intensive margin" of trade is modeled; that is, if there were no exports of a particular good from a particular country to the United States or EU before the tariff cut, there will also be no exports to those countries following the cut. This is particularly relevant for high-tariff goods where tariff cuts could lead to changes in the "extensive margin" that are not captured in these simulations.

[6]Romalis (forthcoming) finds high supply elasticities, but these estimates were not confined to developing countries. The effects of other proposals in the Doha Round such as cuts in export subsidies on agricultural products are not considered here. The focus is on changes in market access resulting from tariff cuts.

revenue effect, both for revenue gains and losses, but is unlikely to cause a misidentification of winners and losers.[7]

The relative change in a country's competitiveness owing to tariff cuts is explicitly modeled. When there are across-the-board tariff cuts, developing countries face two main effects. First, where developing country goods currently enter tariff-free, a reduction in bound tariffs must worsen the competitive position of those developing country exports because tariff reductions reduce the average tariff their competitors face in the U.S. and EU markets. Thus, the demand for these developing countries' exports falls. Second, where developing country goods enter U.S. and EU markets at the MFN rate, whether owing to the absence of a preference or an inability to utilize a preference, a reduction in MFN tariffs improves the competitive position of those developing countries' exports because it reduces the tariff imposed on goods where they have a comparative cost advantage. Their position also improves relative to U.S. and EU domestic producers and relative to exporters to the United States and EU that benefit from preferential trade agreements. The relative demand for developing country exports of these goods increases. The net effect depends on whether the losses in preference erosion from the first effect outweigh the gains from tariff cuts owing to the second effect.

II. Data

The study uses trade data under various preference schemes. The GSP is a set of trade preferences granted on a nonreciprocal basis by developed countries to developing countries. The system was negotiated over 1964–71; the first major scheme was implemented by the European Economic Community (EEC) in July 1971, with Japan following suit in August 1971 and the United States in January 1976 (Baldwin and Murray, 1977). All GSP schemes involve tariff concessions to a range of developing country exports. Under the current U.S. scheme, for example, out of a total of 15,467 articles listed in U.S. tariff lines, most developing countries may export 6,409 articles duty-free, whereas imports of the same article from most developed countries would attract a positive tariff (Ozden and Reinhardt, 2003). All countries that receive preferences from the United States or the EU or both are labeled LDC or developing in Table A.1.[8] Note that there are many preferences in

[7]Papers that assume finite supply elasticities also find small losses from preference erosion. In simulations following a 40 percent cut in MFN rates, Subramanian (2003) finds that losses from preference erosion for LDCs as a whole are very small and likely to be less than 2 percent of exports, and only two countries face losses greater than 10 percent of exports. Alexandraki and Lankes (2004) extend this analysis to middle-income developing countries and also find the overall impact to be small, between 0.5 and 1.2 percent of total exports, but it could be much higher for a subset of countries that are overwhelmingly dependent on a few export products, namely sugar, bananas, and to a lesser extent, textiles. Note, that there could also be further gains owing to productivity improvements caused by lower tariffs on inputs. See Amiti and Konings (forthcoming).

[8]The countries marked with an asterisk do not receive preferences from the United States. All EU members are labeled as "developed."

place other than the GSP, which are listed in Table A.2. Prominent examples include EU preferences for African, Caribbean, and Pacific (ACP) countries and U.S. preferences for African countries under the African Growth and Opportunity Act (AGOA).

It is important to use actual preference scheme data because many tariff lines are not eligible for preferences under the GSP, and in many cases countries do not apply for preferences they are entitled to and end up paying the MFN rate because of complex rules governing the use of preferences. Product coverage, defined as the ratio of imports that were eligible to enter under the GSP to total imports, was only 44 percent for LDC beneficiaries of the U.S. GSP scheme (dutiable imports in 2002 were $6.7 billion, of which $2.9 billion were covered by the GSP scheme).[9] Within this low product coverage, preference utilization rates (the ratio of imports that received preferences to total imports eligible for preferences) by LDC exporters to the United States are high, at 95.8 percent for the GSP (out of the $2.9 billion of imports eligible for GSP, $2.8 billion received preferential treatment) (UNCTAD, 2003).[10] In the EU, although product coverage is almost 100 percent, preference utilization rates are low. For LDC exporters to the EU, preference utilization rates average 76 percent for ACP countries and 57 percent for non-ACP countries (UNCTAD, 2003). Sometimes preferences are not utilized because there are other more beneficial preference schemes that developing countries can apply for. The preference utilization rates for AGOA were more than 80 percent in 2002; however, there were 16 countries that used less than 50 percent of the available AGOA preferences (Brenton and Ikezuki, 2004).[11]

Preferences that are due to be phased in over the next few years are assumed to have already taken place. This avoids counting gains and losses

[9]Product coverage is much lower when mineral products are excluded (HS Chapters 25–27, mostly oil), collapsing to 3.9 percent (1.5 billion out of 3.9 billion of dutiable imports).

[10]Previous studies have also identified limitations of GSP. For example, not all developing countries are included (Baldwin and Murray, 1977). Programs typically exclude products for which developing countries have the greatest comparative advantage (DeVault, 1996). Export eligibility ceilings are often binding (MacPhee and Rosenbaum, 1989). The programs impose strict rules of origin requirements (UNCTAD, 2001) and do not remove nontariff barriers. Up to 42 countries have temporarily dropped or have been permanently ''graduated'' by the United States at some time since 1976 (Ozden and Reinhardt, 2003). The United States has allowed the GSP to lapse on occasion, including one period in excess of a year, increasing uncertainty for exporters. Mattoo, Roy, and Subramanian (2002) highlight that the stringent rule of origin requiring exporters to source certain inputs from within Africa or the United States severely restricts the potential benefits from the preferences granted under AGOA.

[11]Brenton and Ikezuki (2004) also point out that products that are excluded from AGOA preferences are high-duty products, and the United States is not a major export destination for many AGOA country exports. These low utilization rates are likely due to high compliance costs, such as paperwork and red tape. Francois, Hoekman, and Manchin (2005) find a threshold preference margin of 4 percent below which preference margins are irrelevant because of these costs.

to LDCs that will come from the EU's phased elimination of tariffs for sugar, rice, and bananas under its Everything But Arms (EBA) program; the enhancement of the EU's GSP scheme for LDCs; and the phased elimination of EU tariffs on sugar, rice, and banana imports from ACP countries. It is assumed that LDCs already have tariff-free access to the EU for those exports. These tariffs will be reduced or eliminated regardless of the outcome of the Doha Round. Because the focus of this paper is whether a multilateral tariff reduction resulting from a successful Doha Round itself would lead to preference erosion, these earlier commitments are taken as given.

The tariff cuts in the policy experiments are applied to the bound rates, rather than directly on MFN rates, as will be the case in the Doha Round. If a tariff is not currently bound it is assumed to be bound at the current MFN rate, and tariff cuts are then applied.[12] If the new bound rate falls below the MFN rate, then the MFN rate is also reduced.[13] All tariff rates are at the most detailed product line available, which includes more than 10,000 different products—this is at the HS 10-digit level for the United States and HS eight-digit level for the EU.[14]

The study focuses on the effects of tariff cuts by the United States and the EU.[15] Although this does not capture the total effects of trade liberalization under the Doha Round, it does incorporate a sizable share.[16] The shares of LDCs' and other developing countries' exports to the United States and the EU markets combined are approximately 50 percent, as seen in Table 1. Individual country export shares to the EU and United States are provided in Table A.1.

III. Results

Current State of Play

There are many limitations to GSP programs that result in inferior access to developed markets for some developing countries. First, despite preferences given to LDCs and developing countries, the average tariffs paid are sometimes higher on developing country exports. This is due to different commodity composition and different preference schemes. Table 2 shows that products exported by non-African LDCs face higher tariffs (13.1

[12]Note that over 99 percent of U.S. and EU tariffs are bound (WTO, 2002).

[13]EU preferential tariffs for developing countries are reduced using the formulas in European Commission (2003).

[14]Approximately 10 percent of tariff lines include specific tariffs, which have been converted to ad valorem equivalent tariffs by the United Nations Conference on Trade and Development (UNCTAD) in the case of EU tariffs and by dividing actual duty paid by the value of imports in the case of the United States.

[15]The most recent available data for the United States is 2004 and for the EU it is 2003.

[16]Thus these results understate the gains from the Doha Round because the simulations do not take account of tariff cuts by other countries. Yang (2005) points out that African countries can increase their gains by also seeking greater market access in developing countries as well as making their own liberalization commitments.

Table 1. Export Shares, 2003

	Total Exports (US$ billions)	Share to United States (percent)	Share to EU-15 (percent)	Share to Other Developed Countries (percent)	Share to Developing Countries (percent)
African LDCs	26.5	24.70	29.92	11.26	34.12
Non-African LDCs	16.6	25.14	24.82	12.25	37.79
Other developing countries	1,870.0	23.34	20.20	27.65	28.80
Developed countries	5,480.0	13.98	41.82	21.69	22.51

Source: World Bank, World Integrated Trade Solution (WITS).

Notes: LDC = least developed country. EU-15 = Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and United Kingdom.

percent) than products exported to the United States by other developing countries (1.8 percent), which are in turn higher than tariffs on products exported by developed countries (1.1 percent). The African LDCs enjoy the lowest average tariffs into the U.S. market at 0.1 percent. For each product, defined at the U.S. tariff-line level, the average tariff is calculated as the value of collected duties divided by the value of imports. Similarly, in the EU,[17] non-African LDCs face the highest average tariffs but these are much lower at 5.1 percent than those paid in the United States. This difference arises because LDCs enjoy lower tariffs owing to the EU's EBA program and its program for ACP countries.

Second, on average, higher tariffs are paid on goods exported to the United States for which LDCs and developing countries have comparative advantage than on goods for which developed countries enjoy comparative advantage.[18]

[17]Note that total duties collected were unavailable for the EU. The estimated tariff paid on a product exported by a particular country is a weighted average of the EU MFN tariff for that product and the lowest tariff that product may be eligible for under various EU preference arrangements. The weight on the lowest tariff is the preference utilization rate for exports of that product from that country. Detailed preference utilization rates were obtained from the EU. Estimated average tariffs for a group of products and/or exporting countries are trade-weighted averages of the estimated tariffs for each product and exporting country.

[18]For each region, comparative advantage in each good is identified using the Balassa index of revealed comparative advantage, defined as $Bij = \frac{x_{ij}/x_j}{x_i/X}$, where x_{ij} is the industry i exports in region j, x_j the total exports by region j, x_i the total industry i exports in the world, and X is the total exports in the world. A number greater than 1 indicates revealed comparative advantage in that industry. Note that a country's comparative advantage is endogenous, and these are presented only for the purposes of illustrating why developing countries might be receiving inferior market access.

Table 2. Average Tariffs Are Higher on Non-African LDCs' Goods Exported to the United States and EU

Exporter	Average Tariff Paid on U.S. Imports	Average Tariff Paid on EU Imports
African LDCs	0.07	0.80
	(0.60)	(7.67)
Non-African LDCs	13.14	5.10
	(8.46)	(4.57)
Other developing countries	1.82	2.37
	(4.61)	(10.21)
Developed countries	1.15	2.89
	(2.96)	(6.29)

Sources: WITS; U.S. Census Bureau; and EU.

Notes: Tariffs are averaged across all goods. The standard deviation of tariffs is reported in parentheses.

Despite preferences, products in which LDCs and other developing countries enjoy a comparative advantage are still highly taxed in the United States. Table 3 shows average tariffs paid on each region's comparative advantage goods on world exports to the United States and EU. It shows that average tariffs on LDCs' comparative advantage goods exported to the United States are higher than average tariffs paid on developed countries' comparative advantage goods (3.8 for non-African LDCs and 1.8 percent for African LDCs compared with only 1 percent for developed countries). However, this is not the case on goods exported to the EU. The average tariff paid on African LDCs' comparative advantage goods exported to the EU market is on average lower (at 1.1 percent) than on non-African comparative advantage goods (at 2.3 percent). Other developing country comparative advantage goods exported to the EU attracted the highest average tariff of 2.9 percent.

Third, on goods where LDCs have comparative advantage, the average tariff paid by non-African LDCs is higher than other regional groupings. Table 4 presents average tariffs by country grouping for goods where the LDCs (both African and non-African) have comparative advantage, indicated by a Balassa index greater than one. Non-African LDCs, on average, pay higher average tariffs on these products in the United States and EU. In contrast, African LDCs enjoy the lowest tariffs on their comparative advantage goods in both the U.S. and EU markets. These differences can be explained by the different preference schemes. Non-African LDCs pay higher-than-average tariffs on their comparative advantage goods in the U.S. market mainly because the GSP in the United States applies to less than 50 percent of imports.[19] Conversely, African LDCs pay lower tariffs because

[19]See Dean and Wainio (2005) for detailed measures of size, utilization, and value of U.S. nonreciprocal trade preferences.

Table 3. Average Tariffs Are Higher on LDC and Developing Country Comparative Advantage Goods in the United States

Comparative Advantage	Average Tariff Paid on U.S. Imports of Each Country's Comparative Advantage Products ($B_{ij} > 1$)	Average Tariff Paid on EU Imports of Each Country's Comparative Advantage Products ($B_{ij} > 1$)
African LDCs	1.79	1.09
Non-African LDCs	3.82	2.34
Other developing countries	2.64	2.90
Developed countries	0.97	2.78

Sources: WITS; U.S. Census Bureau; and EU.

Note: The average tariff reported for each region's comparative advantage goods is the trade-weighted-average tariff paid on all U.S. or EU imports of those goods from all countries.

Table 4. Non-African LDC Countries Enjoy No Special Access for Their Comparative Advantage Goods Relative to Developed Countries

Exporter	Average Tariff Paid on U.S. Imports of LDCs' Comparative Advantage Products (LDC $B_{ij} > 1$)	Average Tariff Paid on EU Imports of LDCs' Comparative Advantage Products (LDC $B_{ij} > 1$)
African LDCs	0.06	0.94
Non-African LDCs	13.53	5.35
Other developing countries	3.96	2.35
Developed countries	2.80	1.56

Sources: WITS; U.S. Census Bureau; and EU.

Note: The average tariff reported for LDC comparative advantage goods is the trade-weighted average tariff paid on U.S. or EU imports of LDC comparative advantage goods from each of the four exporting regions.

they enjoy special preferences, such as AGOA, and because their exports comprise a higher proportion of lower-taxed minerals.

Effects of U.S. and EU Tariff Reductions on All Goods

We conduct three policy experiments to assess the change in import demand arising from tariff cuts: (1) a uniform tariff reduction of 40 percent on bound rates;[20] (2) exclusion of special products (countries will negotiate the number of tariff lines that will be allowed to be excluded from tariff cuts, and they will be able to choose which tariff lines to exclude. Because it is unclear which

[20]It is impossible to know exactly what the tariff cut will be under the next Doha Round. This number is based on cuts in previous rounds and pre–Doha Round informal discussions.

product lines will be chosen, an exclusion list of 3 percent of the highest tariff lines is assumed for this simulation); and (3) a tiered formula for agriculture. The current proposal is for five bands for developed countries, with different tariff cuts to be applied to different levels of tariffs. Because the actual details have yet to be negotiated, the simulations here are based on the Harbinson proposal (WTO, 2003), with a 40 percent cut in tariffs under 20 percent, 50 percent cut in tariffs between 20 and 80 percent, and 60 percent cut for tariffs above 80 percent, with a 100 percent cap.[21] No tariff lines are excluded in this simulation.

The results show that gains in market access to the United States and EU under a successful conclusion of the Doha Round are likely to more than offset any losses owing to preference erosion for many LDCs and other developing countries.[22] Table 5 shows that on average all country groupings, except African LDCs, enjoy an increase in combined market access to the United States and EU following a 40 percent cut in tariffs. African LDCs experience a small loss of 0.1 percent on average. Non-African LDCs enjoy the largest percentage increase in access to the combined U.S. and EU markets under all policy scenarios presented. The gains in market access for all country groupings are reduced if exclusion of the highest tariff lines is allowed. The largest gains for all countries occur with a tiered formula in agriculture (which results in an average tariff reduction of 50 percent in the case of EU tariffs and 47 percent in the case of U.S. tariffs).

A closer look within the LDC regional group in Table 6 and within the developing country group in Table 7 reveals that some countries experience net losses in market access under all policy experiments. For example, Haiti experiences large losses owing to losses in clothing exports. (See also Table A.3, for individual country results.) Sub-Saharan African countries experience a loss in the U.S. market owing to losses in mineral exports, mainly crude petroleum.[23] Some countries experience net gains under all

[21]Jean, Laborde, and Martin (2005) also base their numbers on the Harbinson proposal, with some variations, arguing that although the proposal was not adopted its transition points are likely to reflect a great deal of deliberation.

[22]These results are consistent with Francois, Hoekman, and Manchin (2005), which shows the potential magnitude of preference erosion is reduced owing to the high compliance costs of obtaining preferences. In their policy experiment, all OECD members abolish all trade distorting policies.

[23]U.S. tariffs on petroleum are 5.25 cents per barrel for light crude oil, 10.5 cents per barrel for heavier grades of crude oil, and 52.5 cents per barrel for more refined products such as gasoline. Preferences (zero tariffs) are given to most developing countries (but not to most OPEC (Organization of Petroleum Exporting Countries) members) and to partners of free trade agreements. So the preference is small, but because oil is by far the biggest export from African LDCs to the United States, it plays a large part in the simulation results. However, it is unlikely that African LDCs would suffer falls in aggregate petroleum exports in the short term. What is more likely to happen is that U.S. tariff reductions for other suppliers cause a redirection of petroleum exports because the direction of commodity trade tends to minimize transport costs plus taxes.

Table 5. Improved Market Access for Developing Countries Under the Doha Round Assuming 40 Percent Uniform Tariff Cut by Region

Exporter	No Exclusions			Exclusion of Highest 3 Percent Tariff Lines			Tiered Formula in Agriculture		
	Change in import demand by								
	EU	U.S.	EU + U.S. combined	EU	U.S.	EU + U.S. combined	EU	U.S.	EU + U.S. combined
African LDCs	0.64	−1.01	−0.15	0.17	−0.75	−0.27	0.83	−1.01	−0.04
Non-African LDCs	4.14	13.90	8.54	4.08	10.64	7.04	4.16	13.90	8.55
Other developing countries	2.84	1.86	2.28	2.12	1.63	1.83	3.19	1.88	2.43
Developed countries	2.97	1.59	1.98	2.41	1.47	1.72	3.27	1.60	2.08
All	2.89	1.73	2.14	2.26	1.55	1.79	3.21	1.74	2.27

Source: Authors' calculations.

Notes: The tiered formula is based on the Harbinson proposal: 40 percent cut in tariffs under 20 percent, 50 percent cut in tariffs between 20 and 80 percent, and 60 percent cut in tariffs above 80 percent, with a 100 percent cap.

Table 6. LDCs by Region

Exporter	No Exclusions			Exclusion of Highest 3 Percent Tariff Lines			Tiered Formula in Agriculture		
	Change in import demand by								
	EU	U.S.	EU + U.S. combined	EU	U.S.	EU + U.S. combined	EU	U.S.	EU + U.S. combined
Sub-Saharan African LDCs	0.64	−1.01	−0.15	0.17	−0.75	−0.27	0.83	−1.01	−0.04
South Asia LDCs	3.53	14.94	7.82	3.50	10.66	6.19	3.54	14.94	7.82
Haiti	1.63	−4.87	−4.61	1.63	−2.99	−2.81	1.64	−4.87	−4.61
Other LDCs	6.32	16.66	12.13	6.15	13.86	10.48	6.38	16.66	12.16

Source: Authors' calculations.

Note: The tiered formula is based on the Harbinson proposal: 40 percent cut in tariffs under 20 percent, 50 percent cut in tariffs between 20 and 80 percent, and 60 percent cut in tariffs above 80 percent, with a 100 percent cap.

Table 7. Developing Countries by Region

Exporter	No Exclusions			Exclusion of Highest 3 percent Tariff Lines			Tiered Formula in Agriculture		
	Change in import demand by								
	EU	U.S.	EU + U.S. combined	EU	U.S.	EU + U.S. combined	EU	U.S.	EU + U.S. combined
Sub-Saharan Africa	0.99	−0.28	0.43	0.84	−0.21	0.38	1.12	−0.28	0.51
South Asia	4.04	6.14	4.93	3.45	5.27	4.22	4.27	6.14	5.06
Caribbean and Latin America	5.77	1.10	2.71	2.04	0.98	1.35	7.40	1.18	3.32
China	4.00	3.42	3.62	3.94	3.13	3.42	4.06	3.42	3.65
Mexico	0.79	−0.54	−0.48	0.77	−0.43	−0.38	0.80	−0.54	−0.48
Other developing countries	1.87	2.69	2.18	1.38	2.08	1.64	2.14	2.69	2.35

Source: Authors' calculations.

Note: The tiered formula is based on the Harbinson proposal: 40 percent cut in tariffs under 20 percent, 50 percent cut in tariffs between 20 and 80 percent, and 60 percent cut in tariffs above 80 percent, with a 100 percent cap.

policy experiments, with non-African LDC gains driven by South Asian and other LDC countries, which experience large gains in clothing exports. Within the developing country grouping, presented in Table 7, Mexico experiences net losses mainly because of its free trade agreement with the United States; further tariff cuts by the United States for other countries will reduce its relative advantage. China and South Asian countries gain from further tariff cuts because they derive relatively little benefit from existing preferences.

Changing the value of the elasticity of substitution between varieties does not change the overall message. Changes in market access under alternative demand elasticity assumptions are presented in Table 8. A higher demand elasticity results in larger gains in market access. The change in import demand by the EU and United States increases from 1.1 percent, when the elasticity of substitution is assumed to equal −3.5, to 4.6 percent when the elasticity of substitution is assumed to be −11. The effect of changing the elasticity of substitution is to proportionally alter the gains and losses, but in most cases it is the same countries that experience gains or losses.

Whether a country loses market access following trade liberalization critically depends on how much of its exports currently benefit from existing preferences. The higher the current preference margin, the higher the loss from preference erosion, and hence the less likely that the gains will outweigh the losses. Figure 1 plots the predicted change in U.S. market access following a 40 percent cut in tariffs with the tiered formula applied to agriculture for each country against the current average ''preference margin,'' defined as the difference between the average tariff rates actually paid on those countries' exports to the United States and the MFN tariff rate applicable to those exports. The exporting country tends to lose market access from general tariff cuts whenever this average preference margin is 5 percent or above.

An alternative way to calculate average preference margins is to consider preferences relative to the domestic U.S. market. This gives an indication of the preferences that developing countries receive relative to all their competitors, which include U.S. domestic producers. When domestic production is taken into account, it becomes clear that effective preferences are actually quite small and only a small number of countries enjoy positive preference margins. As can be seen from Figure 2, average preferences measures that take account of domestic production imply negative preference margins for many countries. Figure 2 clearly shows that countries with positive preference margins stand to lose market access from across-the-board tariff cuts as a result of preference erosion. In contrast, countries with negative preference margins gain because as tariffs fall, the price of U.S. imports relative to domestic production also falls, making developing country exports more competitive.

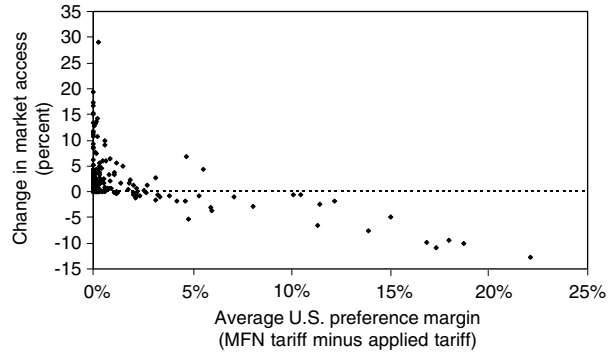
Once changes in access to the EU market are also included, Figure 3 shows more pronounced market access gains, as well as large projected losses for some countries. Malawi, Zambia, Barbados, Guyana, and Swaziland

Table 8. Change in Market Access with Alternative Demand Elasticity Assumptions Under the Doha Round Assuming a 40 Percent Uniform Tariff Cut by Region

No Exclusions									
Demand Elasticity	−3.5			−6.0			−11		
	Change in import demand by								
Exporter	EU	U.S.	EU + U.S. combined	EU	U.S.	EU + U.S. combined	EU	U.S.	EU + U.S. combined
African LDCs	0.36	−0.49	−0.05	0.64	−1.01	−0.15	2.11	−2.05	0.13
Non-African LDCs	2.03	6.85	4.12	4.14	13.90	8.54	8.63	28.31	17.49
Other developing countries	1.36	0.90	1.10	2.84	1.86	2.28	6.10	3.91	4.83
Developed countries	1.44	0.78	1.01	2.97	1.59	1.98	6.26	3.34	4.39
All	1.39	0.84	1.06	2.89	1.73	2.14	6.15	3.64	4.62

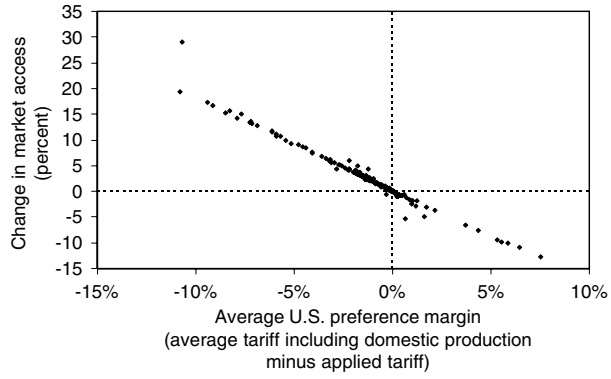
Source: Authors' calculations.

Figure 1. Average Preference Margin and Predicted Change in U.S. Market Access



Source: Authors' calculations.
Note: MFN = most favored nation.

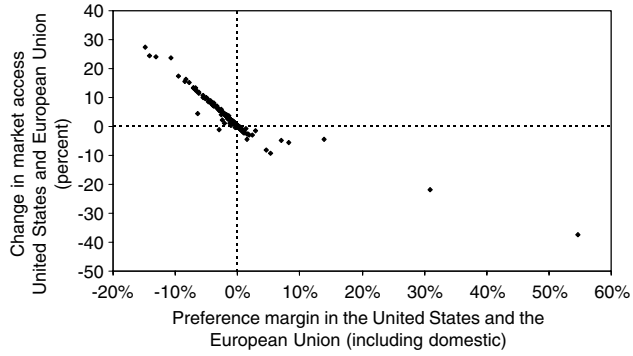
Figure 2. Change in Market Access and Average Preference Margin in the United States



Source: Authors' calculations.

show substantial market access gains in agricultural products, such as sugar, tobacco, and rice, once the EU market is included, whereas the simulations indicate either no gains or, in some cases, losses in market access to the United States. Gains in one market may offset losses in another. Argentina, Fiji, Mauritius, and New Zealand are also projected to win substantial gains in access to EU markets, again driven by agricultural products, such as corn, beef, sugar, lamb, fruit, and dairy products. The simulations show that two small countries, Dominica and St Lucia, experience large losses in combined market access to the United States and EU. Both these countries enjoy

Figure 3. Change in Market Access and Average Preference Margin in the United States and the European Union



Source: Authors' calculations.

exceptionally high preference margins owing to preferential arrangements for their banana exports to the EU. Banana exports from Dominica to the EU were $7.6 million in 2003, equal to 37 percent of its total exports to the EU and 32 percent of its total exports to the EU and U.S. markets—99 percent of Dominica's banana exports to the EU enter under preferential arrangements. These banana exports are reduced to $2.6 million following tariff cuts of 40 percent in the EU. Even more extreme is the effect on St Lucia, which exported bananas worth $23.7 million to the EU in 2003, equal to 89 percent of its aggregate exports to the EU and 58 percent of its combined exports to the EU and United States, with 100 percent of its banana exports to the EU entering under preferential arrangements. A 40 percent MFN tariff cut reduces its banana exports to the EU to just $8.1 million. In sum, those countries with the highest average preference margins in the United States and the EU stand to lose the most market access through preference erosion, whereas those with low or moderate average preference margins are likely to gain market access.

The breakdown of results by product groupings in Table 9 shows that the largest gains are likely to be in agriculture in the EU market and textiles in the U.S. market. The increase in market access to the EU market in agriculture for all countries is 13.05 percent; the increase in the U.S. market in textiles and clothing is 8.6 percent. However, these gains are not uniformly distributed. African LDCs lose 9.6 percent in market access to the U.S. market in textiles and clothing and 1.8 percent in the EU market, yet they experience a gain of 1.8 percent in agriculture in the combined U.S. and EU markets. The smallest gains for all countries are in minerals and other manufacturing categories. Exclusion of the highest 3 percent of tariff lines reduces the magnitude of the gains; however, the relative rankings of the product groupings remain unchanged. A tiered formula in agriculture inflates the gains for all country groupings.

Table 9. Improved Market Access for Developing Countries Under the Doha Round Assuming a 40 Percent Uniform Tariff Cut in Agriculture and Textiles

Exporter	No Exclusions			Exclusion of Highest 3 Percent Tariff Lines			Tiered Formula in Agriculture		
	Change in import demand by								
	EU	U.S.	EU + U.S. combined	EU	U.S.	EU + U.S. combined	EU	U.S.	EU + U.S. combined
Agriculture									
African LDCs	2.03	0.59	1.85	0.16	0.59	0.21	2.81	0.59	2.53
Non-African LDCs	4.91	0.01	2.84	3.94	0.01	2.28	5.30	0.01	3.06
Other developing countries	11.41	3.65	8.42	4.78	2.87	4.05	14.68	3.92	10.54
Developed countries	18.47	2.56	8.55	5.84	2.19	3.56	25.24	2.73	11.20
All countries	13.05	3.06	8.33	4.93	2.50	3.78	17.19	3.29	10.62
Minerals									
African LDCs	0.02	−0.03	−0.02	0.02	−0.03	−0.02			
Non-African LDCs	0.64	0.12	0.29	0.64	0.12	0.29			
Other developing countries	0.12	0.17	0.15	0.12	0.17	0.15			
Developed countries	0.05	0.22	0.16	0.05	0.22	0.16			
All countries	0.10	0.18	0.15	0.10	0.18	0.15			

Textiles and clothing						
African LDCs	−1.78	−9.59	−7.14	−1.78	−7.14	−5.46
Non-African LDCs	4.43	15.21	9.40	4.43	11.64	7.75
Other developing countries	5.54	7.80	6.76	5.54	6.30	5.95
Developed countries	7.93	10.90	9.94	7.93	7.58	7.69
All countries	5.76	8.62	7.36	5.76	6.68	6.28
Other manufacturing						
African LDCs	0.49	0.03	0.44	0.46	0.02	0.44
Non-African LDCs	−0.55	1.01	−0.16	−0.55	1.07	−0.14
Other developing countries	1.54	1.08	1.25	1.54	1.06	1.24
Developed countries	2.32	1.37	1.71	2.31	1.36	1.70
All countries	2.01	1.26	1.54	2.01	1.25	1.53

Source: Authors' calculations.

Note: The tiered formula is based on the Harbinson proposal: 40 percent cut in tariffs under 20 percent, 50 percent cut in tariffs between 20 and 80 percent, and 60 percent for tariffs above 80 percent, with a 100 percent cap.

IV. Conclusions

This paper assesses the likely gains in market access for LDCs and developing countries following proposals for tariff cuts under the Doha Round. This was analyzed by simulating changes in import demand by the United States and the EU, following cuts in the MFN tariff rates of about 40 percent. In contrast to other studies, our model incorporates preference utilization rates rather than assuming that preferences are fully utilized. Because preference utilization rates are as low as 50 percent for some countries, this is an important contribution in order to avoid overestimating losses from preference erosion. We take into account all available tariff, trade, and utilization information for all products.

The results show that a cut in MFN tariffs by the United States and the EU leads to improved access to their markets for many developing countries that more than offsets losses owing to preference erosion. The small numbers of developing countries that are likely to lose market access as a result of multilateral tariff cuts are the ones that receive very large benefits under existing preference schemes. This result can be explained by noting that currently many developing countries actually have inferior market access to developed countries: average tariffs on non-African LDCs' exports to the United States are higher than those on developed countries (13.1 percent compared with 1.2 percent). Our results also suggest that to maximize these net gains in market access, countries should minimize excluded tariff lines and opt for a tiered formula with higher-than-average tariff cuts in agriculture.

APPENDIX I

Technical Information

The detailed steps involved in calculating the change in market access and average preference margins are as follows.

Change in Market Access

Step 1 *Calculate total U.S. imports for each product i in the base period 0 (year 2003).*

Denote total imports in the base period $M_{0i} = \Sigma_j M_{0ijp}$, where M_{ijp} is U.S. imports of product i from country j that enters under tariff program p. This calculation is performed at the tariff-line level (10-digit level).

Step 2 *Estimate total U.S. consumption for each product i.*

Denote total consumption in the base period $C_{0i} = M_{0i}/m{:}c_i$, where $m{:}c_i$ is the estimated ratio of imports to consumption calculated from the OECD's STAN database of domestic production, imports, and exports. The STAN database includes data for approximately 30 primary and secondary industries and is concorded to each tariff line.

Step 3 *Calculate the new tariff rates $t_{1\text{ijp}}$ using existing tariff rates $t_{0\text{ijp}}$ as the base rates.*

The new tariff rates will include a 40 percent tariff cut as the benchmark. In the second set of simulations 3 percent of the highest tariff rates will be excluded, and in the third set of simulations a tiered formula will be applied to agriculture with no other exclusions.

Step 4 *Estimate new U.S. imports of each product i from each country j under each import program p.*

The utility function is assumed to be Cobb-Douglas, which implies an elasticity of substitution of 1 between different goods at the HS 10-digit level. Hence, a fixed proportion of income is spent on each good.

Within these 10-digit categories, countries produce different varieties. U.S. consumers allocate their demands across products *i*. The import quantity demanded for country *j* goods under program *p* is given by maximizing the utility function subject to the budget constraint

$$q_{0ijp} = p_{0ijp}^{1-\sigma}(1 + t_{0ijp})^{1-\sigma} P_i^{\sigma-1} Y_{0i}, \tag{A.1}$$

where p_{0ijp} is the free-on-board price, t_{0ijp} the tariff rate, P the price index of all substitute varieties, and C_{0i} is the expenditure on product i in period 0. Multiplying both sides by p gives the value of imports in period 0, M_{0ijp}. Analogously, the total quantity of imports demanded from each country can be written as follows:

$$M_{1ijp} = M_{0ijp}\left(\frac{1 + t_{1ijp}}{1 + t_{0ijp}}\right)^{\sigma-1}\left(\frac{C_{0i}}{\sum_j \sum_p M_{0ijp}\left(\frac{1+t_{1ijp}}{1+t_{0ijp}}\right)^{\sigma-1} + C_{0i} - M_{0i}}\right), \tag{A.2}$$

after substituting in for the price index and incorporating price changes from period 0 to period 1 that arise from changes in tariffs. Note that $C_{0i}-M_{0i}$ is expenditure on domestically produced goods. The elasticity of substitution between different "varieties," σ, is assumed to be 6. A "variety" is defined as the interaction of country *j* product and import program *p*.

Step 5 *Calculate the change in "market access."*

The change in market access is defined as the change in U.S. demand for imports from each country as $\Delta MA_j = 100\,(\Sigma_{ip} M_{1ijp}/\Sigma_{ip} M_{0ijp} - 1)$. It is assumed that the export elasticity is infinite, thus the exporting country does not change its export prices exclusive of tariffs.

Step 6 *Repeat the process for EU imports, with some modifications.*

These modifications were necessary because the EU data on preference utilization, though detailed, is not as comprehensive as the U.S. data.

(1) Information on total imports in the base period, M_{0ij}, for the EU is available, but not the imports under different preference programs, M_{0ijp}. Detailed EU preference utilization data were obtained from the EU, indicating by eight-digit product and by exporting country the value of imports that were covered by a tariff preference and

the value that actually entered under a preference. The exact preference scheme was not provided, only whether the applicable tariff under that preference was zero or positive. It is always assumed that trade entering under a preference always enters under the most favorable scheme. Thus M_{0ijp} is estimated from M_{0ij} using this utilization data.

(2) The analysis assumes that the tariff reductions for sugar, bananas, and rice for LDCs under the EU EBA program has already been implemented to avoid counting these changes as gains or losses in market access arising from the Doha Round. This requires a prior adjustment of import values for sugar, bananas, and rice in the base period using a formula equivalent to Equation (A.2).

Average Preference Margin and Average Preference Margin Including Domestic Production

The "average preference margin" enjoyed by country j in the United States (EU) is simply a weighted average difference between the tariffs paid on U.S. (EU) imports from country j and the MFN tariff applicable to such imports, where the weights are given by country j's trade with the United States (EU):

$$\frac{\sum_i \sum_p ((t_{0iMFN} - t_{0ijp}) M_{0ijp})}{\sum_i \sum_p M_{0ijp}}, \tag{A.3}$$

where t_{0iMFN} is the MFN tariff applicable to product i and all other variables are defined in the "Change in Market Access" section above.

The "average preference margin including domestic production" enjoyed by country j takes account of preferential access enjoyed by other producers and the zero tariff paid on U.S. output sold in the United States and EU output sold in the EU:

$$\frac{\sum_i \sum_p ((t_{0i\_AVERAGE} - t_{0ijp}) M_{0ijp})}{\sum_i \sum_p M_{0ijp}}, \tag{A.4}$$

where $t_{0i\_AVERAGE}$ is the tariff revenue collected on U.S. (EU) imports of product i divided by U.S. (EU) consumption of product i:

$$t_{0i\_AVERAGE} = \frac{\sum_j \sum_p (t_{0ijp} * M_{0ijp})}{C_{0i}}. \tag{A.5}$$

Identifying the Elasticity of Substitution in Demand

The estimation approach was developed in a paper by John Romalis (forthcoming). Demand elasticities are identified by examining where the U.S. and the EU source their imports of different products before and after the implementation of the Canada-U.S. Free Trade Agreement and the North American Free Trade Agreement (collectively referred to as NAFTA). Changes in U.S. import sources are explained using changes in the tariff preference afforded to products of North American origin. The idea is that where North American output is afforded no new preference (where the MFN tariff rate is zero, for instance), NAFTA's only impact should come through a general equilibrium

effect on output prices, or through reductions in "border effects" owing to NAFTA provisions that go beyond tariff liberalization. When NAFTA causes a new preference to open up for North American goods, the preference should have an additional effect causing U.S. consumers to substitute toward newly preferred goods and away from other sources of supply. This strategy can be derived from a simple model.

Model description

Firms produce products under perfectly competitive conditions. Trade is driven by preference for variety and by products being differentiated by country of origin. Countries may impose ad valorem tariffs on imports. Countries may then enter into preferential trading agreements whereby each country in the agreement lowers tariffs on imports from partner countries but need not adjust the tariff on imports from other countries. This causes consumers to substitute toward the output of preferred countries and away from all other sources of supply, including domestic production. Factor supplies are not explicitly modeled. The model assumptions are set out in detail below.

1. Products and industries are indexed by i, countries are indexed by j, and time by t.
2. In each country j, every industry i produces a product i using an industry-specific factor under conditions of perfect competition with marginal cost $c(q^s_{ijt})$ (henceforth often denoted as c_{ijt}), where q^s is the industry production. Note that marginal cost depends on the quantity produced and may vary across producing country and time.
3. In every period, consumers in each country are assumed to maximize Cobb-Douglas preferences over their consumption of the output of each industry, Q_{ijt}, with the fraction of income spent on industry i being b_{ij} (equation (A.6)). Expenditure shares for each industry are therefore constant for all prices and incomes.

$$U_{jt} = \sum_i b_{ij} \ln Q_{ijt}, \quad \sum_i b_{ij} = 1. \tag{A.6}$$

4. The output of each industry is not a homogeneous good. Although firms in the same country produce identical goods, production is differentiated by country of origin. Q_{ijt} can be interpreted as a subutility function that depends on the quantity of each variety of i consumed. We choose the constant elasticity of substitution (CES) function with elasticity of substitution $\sigma > 1$. Let $q_{ijj't}$ denote the quantity of product i consumed in country j that was produced in country j'. Q_{ijt} is defined as

$$Q_{ijt} = \left(\sum_{j'} q^D_{ijj't} \frac{\sigma - 1}{\sigma} \right)^{\frac{\sigma}{\sigma - 1}}. \tag{A.7}$$

5. There are transport costs for international trade. Transport costs are introduced in the convenient "iceberg" form; $g_{ijj't}$ units must be shipped from country j' for one unit to arrive in country j; $g_{ijj't} = 1$, $\forall_j$.
6. For tariffs, $\tau_{ijj't} - 1$ is the ad valorem tariff imposed on product i imported by country j from country j'; $\tau_{ijj't} = 1$, $\forall_j$.

Equilibrium

In equilibrium, consumers maximize utility and firms maximize profits. Because of the assumption of perfect competition, prices (exclusive of tariffs and transport costs) are

equal to marginal cost, c_{ijt}. Consider the consumers in country 1, which we will call the United States. Tariffs and transport costs raise the price paid by U.S. consumers for goods imported from country j to $c_{ijt}g_{i1jt}\tau_{i1jt}$. Let Y_{1t} denote U.S. income. U.S. consumers maximize utility subject to expenditure being equal to income in every period:

$$\sum_j q^D_{i1jt} c_{ijt} g_{i1jt} \tau_{i1jt} = b_{i1} Y_{1t}. \tag{A.8}$$

Differentiating the Lagrangian for the consumers' constrained optimization problem with respect to consumption levels of each product, we find that tariffs on imported goods cause domestic consumers to substitute away from higher-taxed varieties. The amount of substitution depends on the level of the tariff and on the elasticity of substitution between varieties:

$$\forall_i, \forall_j, \forall_t, \quad \frac{q^D_{i1jt}}{q^D_{i1j't}} = \left(\frac{\tau_{i1j't}}{\tau_{i1jt}}\right)^{\sigma} \left(\frac{c_{ij't}}{c_{ijt}}\right)^{\sigma} \left(\frac{g_{i1j't}}{g_{i1jt}}\right)^{\sigma}. \tag{A.9}$$

Equilibrium conditions for all other countries are symmetric, which will be exploited by the empirical work to control for the effect of unobserved movements in marginal cost that may be correlated with tariff movements.

Results

We use Equation (A.9) to derive estimating equations for demand elasticities. Equivalent equations exist for every other country; specifically, let country 2 be the aggregate of the 12 countries that were always members of the EU for the sample period 1989–99:

$$\forall_i, \forall_j, \forall_t, \quad \frac{q^D_{i2jt}}{q^D_{i2j't}} = \left(\frac{\tau_{i2j't}}{\tau_{i2jt}}\right)^{\sigma} \left(\frac{c_{ij't}}{c_{ijt}}\right)^{\sigma} \left(\frac{g_{i2j't}}{g_{i2jt}}\right)^{\sigma}. \tag{A.10}$$

Using Equations (A.9) and (A.10) we can eliminate the marginal cost terms:

$$\ln \frac{q^D_{i1jt}}{q^D_{i1j't}} - \ln \frac{q^D_{i2jt}}{q^D_{i2j't}} = \sigma\left(\ln \frac{\tau_{i1j't}}{\tau_{i1jt}} - \ln \frac{\tau_{i2j't}}{\tau_{i2jt}}\right) - \sigma\left(\ln \frac{g_{i1j't}}{g_{i1jt}} - \ln \frac{g_{i2j't}}{g_{i2jt}}\right). \tag{A.11}$$

Elimination of the unobserved marginal cost terms is important because relative costs will shift following trade liberalization. Equation (A.11) can be transformed into an equation for c.i.f. import values, to match how EU trade data are collected:

$$\begin{aligned} &\ln \frac{c_{ijt} g_{i1jt} q^D_{i1jt}}{c_{ij't} g_{i1j't} q^D_{i1j't}} - \ln \frac{c_{ijt} g_{i2jt} q^D_{i2jt}}{c_{ij't} g_{i2j't} q^D_{i2j't}} \\ &= \sigma\left(\ln \frac{\tau_{i1j't}}{\tau_{i1jt}} - \ln \frac{\tau_{i2j't}}{\tau_{i2jt}}\right) - (\sigma - 1)\left(\ln \frac{g_{i1j't}}{g_{i1jt}} - \ln \frac{g_{i2j't}}{g_{i2jt}}\right). \end{aligned} \tag{A.12}$$

As long as we examine only countries j and j' for which the EU does not change its relative tariffs, $\ln \frac{\tau_{i2j't}}{\tau_{i2jt}}$ is simply a product fixed effect. Because we do not have detailed transport cost data for EU trade, to identify σ we assume that relative transport costs of shipping products to the U.S. and the EU, $\ln \frac{g_{i1j't}}{g_{i1jt}} - \ln \frac{g_{i2j't}}{g_{i2jt}}$, is the sum of a product fixed

effect, a year fixed effect, and an error term that is orthogonal to U.S. tariffs. This produces the basic estimating Equation (A.13) based on c.i.f. import values, where D_i and D_t are full sets of product and year dummies respectively, while $\varepsilon_{ijj't}$ is a random disturbance term:

$$\ln \frac{c_{ijt} g_{i1jt} q^D_{i1jt}}{c_{ij't} g_{i1j't} q^D_{i1j't}} - \ln \frac{c_{ijt} g_{i2jt} q^D_{i2jt}}{c_{ij't} g_{i2j't} q^D_{i2j't}} = D_i + D_t + \sigma \ln \frac{\tau_{i1j't}}{\tau_{i1jt}} + \varepsilon_{ijj't}. \quad \text{(A.13)}$$

Now consider country j to be Canada or Mexico and country j' to be any other country. NAFTA's increase in the U.S. tariff preferences for Canadian and Mexican goods, $\ln \frac{\tau_{i1j't}}{\tau_{i1jt}}$, will increase the share of those goods in U.S. consumption relative to their share of EU consumption. The size of the increased share in an arbitrary industry i depends positively on the size of the increased U.S. tariff preference, and positively on the elasticity of substitution σ between varieties of i. The EU was chosen as country 2 for two main reasons. First, its detailed trade data are available electronically. Second, the EU is a relatively large trading partner for Canada and Mexico, which maximizes the number of products that can be used to estimate demand elasticities and increases the precision of the estimates.

Data

International trade data for almost the entire world is now collected according to the HS, a schedule that is standard across countries at the six-digit level, or approximately 5,000 products. The U.S. International Trade Commission (USITC) maintains a database at the 10-digit level (15,000 products) of U.S. imports classified by product, country of origin, import program, month, and port of arrival. Eurostat maintains a similar database for the EU.

Tariff data are based on either tariff schedules or detailed data on import duties collected. U.S. tariff schedules for 1997 to the current year are available from the USITC. We extracted U.S. tariff data for 1989–96 from USITC files. U.S. tariffs are almost invariably set at the HS eight-digit level (10,000 products). Tariffs are aggregated from the HS eight-digit level to the six-digit level in two different ways: by taking simple averages or by taking trade-weighted averages. There are several limitations to using tariff schedules to calculate tariffs. One limitation is the effect of the maquiladoras (export assembly plants that use imported inputs located near the United States-Mexico border) on Mexican exports to the United States. Under "production-sharing" provisions, duty does not have to be paid on the U.S.-sourced content of many exports to the United States, while the full value of those transactions is recorded in U.S. trade data. The tariff schedule will therefore often overstate the NAFTA preferences. A second limitation of the tariff schedule is that preferential tariff arrangements are often circumscribed by restrictive rules of origin that need to be satisfied to qualify for the tariff preference. To partly address these limitations we also calculate tariffs using data on actual import duty paid. The drawback of this approach is that tariff rates can only be observed when there is trade. Where there is no trade, we revert to the tariff schedule for that item. This alternative set of eight-digit "applied" tariffs are also aggregated to the six-digit level using simple averages and trade-weighted averages. This gives a total of four measures of tariffs at the HS six-digit level.

Quantitative restrictions on imports of many textile, clothing, and footwear products under the Multi-Fibre Agreement and of many agricultural products provide a further

complication. Many of these restrictions are binding, although a large number are not (Evans and Harrigan, 2004). They are extremely difficult to account for, because many restrictions encompass many HS products and most apply bilaterally. The existence of binding quotas will tend to bias downward the estimated substitution elasticities. Eliminating products subject to quotas did not, however, lead to higher substitution elasticity estimates.

Elasticity of substitution estimates

The mean elasticity of substitution is estimated using Equation (A.13). We use HS six-digit trade and tariff data from 1989–99. Later years are omitted because the Mexico-EU free trade agreement commenced in 2000. Country j is alternatively Canada or Mexico, country j' is the aggregate of all countries that did not substantially change their preferential trade relations with either the United States or the EU between 1989 and 1999. A list of these countries is provided in Table A.4. Four different measures of tariffs are used; depending on whether the tariff schedule or actual duty paid are used to calculate tariffs at the eight-digit level, and on whether tariffs were aggregated to the six-digit level using simple averages or trade weights.

Results are reported in Tables A.5 and A.6. Table A.5 reports results based on changes in the destination of Canadian exports and Table A.6 reports results based on the destination of Mexican exports. Reasonably precise estimates of the mean elasticity of substitution range between 6 and 11. Moving across the columns, the estimates are slightly sensitive to the choice of tariff measure—the estimates using Canadian exports are lower when the tariff schedule is used. The estimates based on Mexican exports tend to be higher than those based on Canadian exports. The estimates are very similar whether the "control" countries j' are limited to those listed in Table A.4 or include all non-NAFTA countries. The estimates are similar in magnitude to elasticities estimated by Clausing (2001) and Lai and Trefler (2002). For the purposes of estimating the market access effects of proposed multilateral trade liberalization under the Doha Round, we choose to use the more conservative substitution elasticity estimate of 6. Note that in Table 8 we compare how sensitive these results are to choice of demand elasticity, using the higher estimate of 11 and an arbitrarily lower estimate of 3.5.

APPENDIX II

Table A.1. Total Exports

Country/Region	Total Exports (US$ millions)	Share to U.S. (percent)	Average U.S. Tariff	Share to EU-15 (percent)	Average EU Tariff
African LDCs					
Angola	9,326.90	48.31	0.00	13.79	0.04
Benin	304.1	0.22	0.46	14.87	1.01
Burkina Faso	218.6	0.43	1.45	23.30	1.59
Burundi	49.3	13.27	0.00	50.65	0.11
Cape Verde	23.6	25.22	1.11	71.75	0.33
Central African Republic	65.7	0.34	0.05	91.13	0.07
Chad	99.4	24.81	0.03	44.28	0.33
Comoros	37.7	10.90	0.05	69.05	0.94
Congo, Dem. Rep. of	1,026.30	17.86	0.01	76.76	0.06
Djibouti	83.2	0.76	2.87	6.34	1.23
Equatorial Guinea	2,770.70	34.75	0.01	36.07	0.02
Eritrea	6.6	1.26	1.21	36.05	0.92
Ethiopia	512.7	4.43	0.01	29.60	1.00
Gambia, The	5.1	0.79	1.67	67.60	1.79
Guinea	829.5	10.52	0.07	44.82	0.43
Guinea-Bissau	76.7	2.76	0.00	11.57	0.07
Lesotho	432.3	97.07	0.32	0.79	0.84
Liberia*	1,049.60	5.91	0.02	66.24	0.08
Madagascar	2,454.20	26.20	0.24	41.69	1.77
Malawi	457	12.72	1.57	35.30	4.40
Mali	229.4	1.15	0.40	28.22	0.28
Mauritania	598.5	0.16	0.02	61.89	0.19
Mozambique	985	0.94	0.59	77.40	2.89
Niger	209.1	4.56	0.57	43.89	0.08
Rwanda	50.4	0.13	0.00	8.56	0.13
São Tomé and Príncipe	6.6	2.90	2.59	93.93	0.72
Senegal	1,151.20	0.70	0.29	29.80	0.73
Sierra Leone	215.1	3.13	2.53	81.07	0.47
Somalia	84.4	0.23	1.91	2.46	1.02
Sudan	2,480.60	0.12	0.00	9.22	0.81
Tanzania	1,218.40	0.93	0.40	52.91	0.46
Togo	494.6	2.11	0.10	24.34	0.17
Uganda	164.6	3.09	0.01	33.53	1.41
Zambia	727.8	1.77	0.01	17.98	8.72
Non-African LDCs					
Afghanistan, Islamic Republic of	211.3	29.69	0.10	11.87	2.00
Bangladesh	5,809.40	33.70	14.31	49.84	4.84
Bhutan	58.2	0.90	0.76	1.78	1.52
Cambodia	2,118.30	53.28	15.15	19.94	4.87
Haiti	376	90.81	2.03	3.60	1.20
Kiribati	27	7.37	0.03	1.86	7.47

Table A.1 *(continued)*

Country/Region	Total Exports (US$ millions)	Share to U.S. (percent)	Average U.S. Tariff	Share to EU-15 (percent)	Average EU Tariff
Lao People's Democratic Republic*	306.2	1.45	33.07	48.53	4.52
Maldives*	113	32.28	9.00	15.60	3.69
Myanmar*	2,759.60	10.70	n.a.	15.43	10.07
Nepal	652.7	29.07	11.33	9.54	1.94
Samoa	87.1	13.04	0.36	5.73	0.67
Solomon Islands	123.2	1.17	0.05	2.86	0.16
Timor-Leste	6	2.42	0.00	42.28	1.08
Tuvalu	2.1	0.36	0.44	52.51	5.50
Vanuatu	85.8	1.11	0.00	4.55	0.17
Yemen, Republic of	3,779.30	1.91	0.08	2.05	1.51
Other Developing Countries					
Albania	447.1	0.51	4.03	93.32	6.43
Algeria*	24,600.00	19.91	0.12	59.07	0.15
Anguilla	7.1	19.14	0.15	68.10	0.68
Antigua and Barbuda	412.6	3.27	0.34	92.20	0.35
Argentina	29,600.00	10.60	1.15	19.70	8.48
Armenia	670.5	8.20	2.47	38.90	1.07
Aruba*	82.2	9.18	0.19	50.68	3.05
Azerbaijan*	2,591.70	2.46	0.62	65.65	0.10
Bahamas, The*	1,373.30	36.41	0.37	29.62	0.20
Bahrain	6,631.60	4.28	7.13	1.68	2.69
Barbados	249.8	14.43	0.14	14.88	14.25
Belarus*	9,945.60	1.03	2.53	22.91	2.14
Belize	202.8	56.33	0.59	28.32	13.02
Bermuda*	465.9	3.34	0.36	42.03	0.01
Bolivia	1,650.70	14.29	0.20	6.74	0.19
Bosnia and Herzegovina	1,244.90	1.01	1.80	64.89	5.34
Botswana	2,155.30	0.66	0.02	85.89	0.06
Brazil	73,100.00	23.13	1.80	24.82	5.26
British Indian Ocean Ter.	4.1	31.61	5.79	11.28	0.91
British Virgin Islands	384	9.53	1.55	38.98	0.07
Brunei Darussalam*	4,144.30	7.75	10.73	0.33	3.07
Bulgaria	7,540.20	4.47	5.25	56.53	2.17
Cameroon	2,245.80	7.53	0.07	63.82	2.31
Cayman Islands*	734.9	1.65	0.05	94.00	0.01
Chile*	20,100.00	17.78	0.44	24.32	2.14
China*	438,000.00	21.14	2.85	16.46	3.37
Christmas Island	20.95	1.82	2.48	1.62	2.22
Cocos (Keeling) Islands	2.2	12.80	2.42	3.11	1.63
Colombia	13,100.00	47.05	0.35	14.39	22.61
Congo, Rep. of	2,708.20	16.88	0.02	9.74	0.40
Cook Islands	8.5	27.23	0.29	2.01	4.26
Costa Rica	5,800.40	47.12	0.39	18.24	24.21
Côte d'Ivoire	5,493.40	7.09	0.01	54.89	1.64
Croatia	6,186.60	2.65	0.98	54.99	0.95
Cuba*	1,221.70	0.03	0.00	25.88	3.89

Table A.1 *(continued)*

Country/Region	Total Exports (US$ millions)	Share to U.S. (percent)	Average U.S. Tariff	Share to EU-15 (percent)	Average EU Tariff
Dominica	39.3	6.32	0.60	24.92	0.06
Dominican Republic	5,308.10	85.87	1.14	7.48	7.98
Ecuador	6,038.50	40.60	0.24	17.18	48.77
Egypt	6,160.70	8.45	6.06	32.84	0.83
El Salvador	1,254.90	19.42	4.17	6.11	1.68
Falkland Islands	153.6	3.38	0.00	89.18	0.34
Fiji	503	24.53	6.51	22.18	32.90
French Polynesia*	151.4	14.56	1.74	16.17	0.11
French Southern and Antarctic Lands*	8.2	0.84	1.05	49.23	5.31
Gabon	319.9	2.21	0.00	40.26	0.13
Georgia	465.3	3.30	0.59	16.71	0.94
Ghana	2,324.30	2.91	0.06	54.04	0.27
Gibraltar	173.2	1.67	1.92	78.01	2.42
Greenland*	489.5	2.94	0.00	70.04	0.72
Grenada	38	29.00	0.02	34.37	0.51
Guam	n.a.				9.45
Guatemala	2,634.70	30.02	6.74	5.43	1.33
Guyana	472.1	19.91	0.07	33.85	28.24
Honduras	992.3	41.85	2.35	17.88	5.34
India	63,000.00	18.05	3.36	21.79	4.46
Indonesia	61,100.00	12.10	5.48	13.05	4.04
Iran, Islamic Republic of*	33,800.00	0.41	0.62	14.85	0.35
Iraq	8,942.70	54.94	0.13	18.74	0.35
Jamaica	1,631.50	32.12	0.64	31.16	2.60
Jordan	3,081.60	21.51	0.37	2.90	1.28
Kazakhstan	12,900.00	0.76	1.54	15.28	0.66
Kenya	2,551.10	1.60	0.36	27.78	0.83
Korea, Dem. People's Republic of	942.8	0.01	80.60	6.63	4.16
Kuwait*	20,200.00	12.28	0.29	10.17	0.32
Kyrgyz Republic	581.7	1.12	8.91	3.03	3.93
Lebanon	1,523.90	4.34	1.12	9.42	0.96
Libya*	14,600.00	2.10	0.18	84.56	0.25
Macao SAR*	2,822.68	50.67	17.82	28.68	10.43
Macedonia, former Yugoslav Rep. of	1,363.20	5.34	9.45	54.65	0.84
Malaysia*	105,000.00	19.58	0.84	12.11	1.67
Marshall Islands*	178.6	15.59	0.01	24.93	0.04
Mauritius	1,862.10	17.47	4.80	65.90	8.74
Mexico*	165,000.00	88.89	0.27	3.38	1.16
Micronesia, Federated States of*	85.7	18.04	n.a.	0.16	0.48
Moldova	790.3	4.26	13.81	23.35	4.69
Mongolia	615.9	23.21	14.99	7.26	3.63
Montserrat	1.8	34.30	3.77	7.90	1.85
Morocco	8,777.20	2.80	2.66	75.71	1.17
Namibia	1,303.70	2.70	0.21	29.87	0.56

Table A.1 *(continued)*

Country/Region	Total Exports (US$ millions)	Share to U.S. (percent)	Average U.S. Tariff	Share to EU-15 (percent)	Average EU Tariff
Nauru*	30.8	1.00	1.34	3.25	1.51
Netherlands Antilles*	1,377.00	46.92	0.37	10.09	7.78
New Caledonia*	729	1.43	0.92	35.78	0.07
Nicaragua*	605.2	36.50	7.06	10.71	0.79
Nigeria	24,100.00	38.26	0.00	21.84	0.06
Niue	3.6	3.36	6.47	1.71	4.00
Norfolk Island	3	53.92	0.18	11.03	0.00
Northern Mariana Islands*	10.5	n.a.	n.a.	12.89	11.30
Oman	11,400.00	1.16	4.86	1.93	1.83
Pakistan	12,700.00	23.17	10.30	29.14	3.78
Palau*	16.8	10.91	0.64	0.37	5.40
Panama	798.7	52.03	0.14	23.21	51.25
Papua New Guinea	2,260.20	2.64	0.06	11.03	0.59
Paraguay	1,241.50	3.62	2.12	6.87	2.95
Peru	8,749.40	26.50	0.12	25.35	0.60
Philippines	36,200.00	20.07	4.05	16.25	1.41
Pitcairn	3.6	13.55	0.88	61.00	0.50
Qatar*	13,400.00	1.68	3.08	2.09	0.56
Romania	17,600.00	3.51	3.21	67.88	1.01
Russian Federation	134,000.00	2.30	0.63	25.92	0.79
Saint Helena	21.1	27.26	0.15	34.53	0.68
Saint Pierre and Miquelon*	4.8	56.08	0.02	21.26	3.16
Saudi Arabia*	89,000.00	21.95	0.28	15.27	0.46
Serbia and Montenegro	2,455.00	0.64	1.37	59.62	10.20
Seychelles	273.8	0.81	0.22	76.99	0.49
South Africa	31,600.00	12.15	0.19	35.57	1.41
Sri Lanka	4,867.80	36.45	13.39	29.35	6.46
St. Kitts and Nevis	48.3	78.48	0.04	17.23	10.52
St. Lucia	62.3	19.55	2.30	33.16	0.05
St. Vincent and the Grenadines	38.1	13.23	0.16	30.23	0.09
Suriname	550.6	26.84	0.01	36.69	2.57
Swaziland	599	28.96	0.62	21.19	16.39
Syrian Arab Republic*	5,730.70	3.70	1.76	57.07	1.42
Tajikistan*	559.3	1.38	9.28	18.11	4.09
Thailand	80,300.00	17.02	2.81	14.72	6.41
Tokelau	33.6	20.33	4.40	35.54	4.41
Tonga	30.6	49.28	0.04	4.81	30.19
Trinidad and Tobago	5,241.30	54.85	0.01	7.84	0.94
Tunisia	7,354.40	0.66	4.01	79.92	1.76
Turkey	47,300.00	7.94	5.17	51.82	2.02
Turkmenistan*	934.1	8.72	10.11	29.16	0.64
Turks and Caicos Islands	33.8	18.88	0.01	47.88	1.92
Ukraine*	20,900.00	1.48	1.48	19.27	2.86
United Arab Emirates*	47,100.00	2.57	4.09	8.40	1.44
Uruguay	2,198.00	11.40	11.77	22.91	13.62

Table A.1 *(continued)*

Country/Region	Total Exports (US$ millions)	Share to U.S. (percent)	Average U.S. Tariff	Share to EU-15 (percent)	Average EU Tariff
Uzbekistan	1,904.00	4.60	3.03	15.77	0.85
Venezuela	25,000.00	44.35	0.15	12.56	1.15
Vietnam*	21,800.00	22.50	9.96	25.25	5.98
Wallis and Futuna Islands	1.3	0.70	4.77	24.45	2.19
Zimbabwe	1,592.80	3.79	1.83	33.31	4.44
Developed Countries					
Andorra	83.3	0.35	1.06	88.07	7.43
Australia	70,200.00	8.76	1.55	14.21	2.31
Austria	88,700.00	5.21	1.58	58.66	
Belgium	255,000.00	6.71	1.01	72.57	
Canada	272,000.00	85.78	0.04	5.09	3.28
Cyprus	922.9	1.92	1.42	56.30	
Czech Republic	48,700.00	2.44	1.49	69.83	
Denmark	64,600.00	5.71	0.95	60.60	
Estonia	5,622.50	2.33	1.28	58.25	
Faeroe Islands	595.5	2.16	0.08	79.02	2.80
Finland	52,500.00	7.90	0.71	51.39	
France	358,000.00	6.95	1.12	62.78	
Germany	749,000.00	9.17	1.67	54.23	
Greece	13,700.00	6.42	2.16	47.32	
Hong Kong SAR	229,000.00	18.24	8.51	13.68	3.66
Hungary	42,300.00	3.14	1.04	73.85	
Iceland	2,380.50	9.45	0.34	72.07	1.14
Ireland	93,000.00	20.60	0.11	61.27	
Israel	31,800.00	38.04	0.10	26.50	1.22
Italy	300,000.00	8.27	3.23	54.19	
Japan	472,000.00	24.90	1.73	15.35	3.84
Korea, Republic of	196,000.00	19.55	2.24	14.10	3.48
Latvia	2,893.70	2.89	0.67	61.80	
Liechtenstein	n.a.	n.a.	1.94	n.a.	0.29
Lithuania	7,162.10	2.80	1.61	42.06	
Luxembourg	9,986.10	2.42	1.66	82.44	
Malta	2,467.10	14.46	1.07	44.28	
Monaco	362.7	n.a.	1.31	1.14	
Netherlands	227,000.00	5.31	0.93	72.03	
New Zealand	16,500.00	14.51	2.48	15.35	32.47
Norway	67,900.00	8.64	0.35	75.62	0.33
Poland	53,500.00	2.20	2.21	68.35	
Portugal	31,800.00	5.70	2.70	79.35	
San Marino	n.a.	n.a.	1.52	n.a.	3.81
Singapore	144,000.00	14.26	0.47	13.37	1.99
Slovak Republic	22,000.00	5.26	2.70	60.67	
Slovenia	12,800.00	3.64	1.77	58.41	
Spain	158,000.00	4.10	2.33	71.10	
Sweden	102,000.00	11.48	1.00	53.99	
Switzerland	101,000.00	11.30	1.52	59.40	0.98

Table A.1 *(concluded)*

Country/Region	Total Exports (US$ millions)	Share to U.S. (percent)	Average U.S. Tariff	Share to EU-15 (percent)	Average EU Tariff
Taiwan Province of China	151,000.00	17.67	2.41	12.51	1.85
United Kingdom	320,000.00	15.02	0.96	53.42	
United States	724,000.00			20.84	2.10

Sources: WITS; Eurostat; and USITC.

Note: Asterisk indicates a developing country/region that does not receive GSP from the United States.

Table A.2. EU and U.S. Preferential Trade Arrangements

(1) European Union Preferential Trade Arrangements Used in Simulation

GSP (Generalized System of Preferences) rates
GSP rates for LDC
ACP (Africa, Caribbean, and Pacific) rates
Preference for European Economic Area
Preference for Overseas Countries and Territories
Preference for Countries Fighting Drug Trafficking
Preference for Albania
Preference for Algeria
Preference for Andorra
Preference for Bosnia and Herzegovina
Preference for Bulgaria
Preference for Taiwan Province of China
Preference for Croatia
Preference for Cyprus
Preference for Czech Republic
Preference for Egypt
Preference for Estonia
Preference for Faroe Island
Preference for West Bank and Gaza
Preference for Hong Kong SAR
Preference for Hungary
Preference for Iceland
Preference for Israel
Preference for Jordan
Preference for Lebanon
Preference for Latvia
Preference for Lithuania
Preference for Macedonia, former Yugoslav Republic of
Preference for Malta
Preference for Mexico
Preference for Morocco
Preference for Myanmar
Preference for Norway
Preference for Poland
Preference for Romania
Preference for Serbia and Montenegro

Table A.2 *(concluded)*

Preference for Slovak Republic
Preference for Slovenia
Preference for South Africa
Preference for Switzerland
Preference for Syrian Arab Republic
Preference for Tunisia
Preference for Turkey

(2) U.S. Preferential Trade Arrangements Used in Simulation
GSP rates
GSP rates for LDC
Africa Growth and Opportunity Act (AGOA)
Andean Trade Preference Act (ATPA)
Andean Trade Promotion and Drug Eradication Act (ATPDEA)
Caribbean Basin Initiative (CBI)
Caribbean Basin Trade Partnership Act (CBTPA)
Preference for Canada
Preference for Chile
Preference for Israel Special Rate (duty-free treatment)
Preference for Jordan
Preference for Mexico
Preference for Singapore

Sources: Eurostat and USITC.

Table A.3. Change in Market Access Following a 40 Percent Tariff Cut (Proxied by Change in Import Demand by the European Union and the United States)

	No Exclusions			3 Percent Tariff Lines Excluded			Tiered Agricultural Formula		
Country/Region	EU	U.S.	EU + U.S. combined	EU	US	EU + U.S. combined	EU	U.S.	EU + U.S. combined
African LDCs									
Angola	0.04	−0.05	−0.03	0.04	−0.05	−0.03	0.04	−0.05	−0.03
Benin	1.43	0.42	1.39	1.35	0.42	1.31	1.69	0.42	1.64
Burkina Faso	2.22	2.06	2.22	0.30	2.06	0.33	2.99	2.06	2.98
Burundi	0.13	0.00	0.12	0.13	0.00	0.12	0.13	0.00	0.12
Cape Verde	−1.09	−10.86	−2.47	−1.10	−5.91	−1.78	−1.08	−10.86	−2.47
Central African Republic	0.06	−0.04	0.05	0.06	−0.04	0.05	0.06	−0.04	0.05
Chad	0.44	0.02	0.05	0.44	0.02	0.05	0.44	0.02	0.05
Comoros	1.38	0.05	0.81	1.38	0.05	0.81	1.38	0.05	0.81
Congo, Dem. Rep. of	0.08	−0.02	0.07	0.04	−0.02	0.03	0.09	−0.02	0.08
Djibouti	1.79	4.24	2.11	1.79	−0.03	1.54	1.79	4.24	2.11
Equatorial Guinea	−0.15	−0.02	−0.08	−0.15	−0.02	−0.08	−0.15	−0.02	−0.08
Eritrea	0.30	1.83	0.52	0.28	0.31	0.29	0.31	1.83	0.52
Ethiopia	1.22	−1.14	0.81	0.32	−0.20	0.23	1.58	−1.14	1.10
Gambia, The	1.94	1.44	1.92	1.94	1.44	1.92	1.94	1.44	1.92
Guinea	0.66	0.13	0.59	0.66	0.12	0.59	0.66	0.13	0.59
Guinea-Bissau	−1.70	−0.05	−0.45	−1.70	−0.05	−0.45	−1.70	−0.05	−0.45
Lesotho	0.32	−9.44	−9.31	0.40	−6.63	−6.53	0.29	−9.44	−9.31
Liberia*	0.12	0.03	0.11	0.12	0.03	0.11	0.12	0.03	0.11
Madagascar	0.44	−6.55	−2.67	−1.53	−5.51	−3.30	1.25	−6.55	−2.23
Malawi	6.53	−1.73	4.02	0.48	0.35	0.44	8.90	−1.73	5.67
Mali	0.25	0.54	0.27	0.25	0.54	0.27	0.25	0.54	0.27
Mauritania	−0.33	0.02	−0.32	−0.33	0.02	−0.32	−0.32	0.02	−0.32
Mozambique	2.51	−0.79	2.46	2.27	−0.40	2.23	2.61	−0.79	2.56

Niger	0.09	1.20	0.35	0.04	1.20	0.32	0.11	1.20	0.37
Rwanda	−0.27	0.00	−0.21	0.02	0.00	0.02	−0.35	0.00	−0.27
São Tomé and Príncipe	0.85	4.34	0.89	0.85	4.34	0.89	0.90	4.34	0.93
Senegal	−0.56	0.30	−0.55	−0.56	0.30	−0.55	−0.39	0.30	−0.38
Sierra Leone	0.60	2.31	0.74	0.60	0.65	0.60	0.60	2.31	0.74
Somalia	0.96	2.85	1.56	0.96	2.85	1.56	0.96	2.85	1.56
Sudan	0.96	0.00	0.95	0.32	0.00	0.31	1.16	0.00	1.15
Tanzania	−0.38	−0.74	−0.39	0.11	−0.58	0.09	−0.57	−0.74	−0.58
Togo	−0.72	0.15	−0.70	−0.76	0.15	−0.74	−0.69	0.15	−0.67
Uganda	1.61	−1.60	1.32	1.56	−1.44	1.29	1.63	−1.60	1.34
Zambia	12.91	−0.02	10.13	0.31	−0.01	0.24	17.94	−0.02	14.07
Non-African LDCs									
Afghanistan, Islamic Republic of	1.92	0.16	1.40	1.85	0.15	1.35	1.95	0.16	1.42
Bangladesh	3.66	15.33	7.88	3.66	10.66	6.19	3.67	15.33	7.89
Bhutan	2.14	1.31	1.89	2.14	1.31	1.89	2.14	1.31	1.89
Cambodia	2.49	17.33	13.30	2.30	14.42	11.13	2.56	17.33	13.32
Haiti	1.63	−4.87	−4.61	1.63	−2.99	−2.81	1.64	−4.87	−4.61
Kiribati	13.70	0.04	3.46	13.70	0.04	3.46	17.77	0.04	4.45
Lao People's Democratic Republic*	2.69	−6.21	2.47	2.68	−5.94	2.47	2.70	−6.21	2.48
Maldives*	2.81	11.82	9.82	2.81	11.82	9.82	2.64	11.82	9.78
Myanmar*	13.49	n.a.	13.49	13.27	n.a.	13.27	13.58	n.a.	13.58
Nepal	−1.11	13.14	7.39	−2.20	11.83	6.16	−0.68	13.14	7.56
Samoa	−3.45	0.54	−0.96	−3.45	0.54	−0.96	−3.44	0.54	−0.96
Solomon Islands	−0.10	0.07	0.00	−0.10	0.07	0.00	−0.10	0.07	0.00
Timor-Leste	1.48	0.00	1.44	1.48	0.00	1.44	1.48	0.00	1.44
Tuvalu	5.05	0.79	4.92	5.05	0.79	4.92	5.05	0.79	4.92
Vanuatu	−0.51	−0.01	−0.32	−0.51	−0.01	−0.32	−0.51	−0.01	−0.32
Yemen, Republic of	0.84	0.12	0.57	0.80	0.11	0.55	0.81	0.12	0.55
Other Developing Countries									
Albania	9.74	2.88	9.55	9.71	2.39	9.51	10.28	2.88	10.08
Algeria*	0.26	0.18	0.23	0.25	0.18	0.22	0.27	0.18	0.23

Table A.3 *(continued)*

Anguilla	0.58	0.14	0.25	0.58	0.14	0.25	0.58	0.14	0.25
Antigua and Barbuda	0.48	0.63	0.49	0.47	0.63	0.47	0.50	0.63	0.50
Argentina	12.20	2.49	8.67	3.76	2.20	3.19	15.51	2.59	10.81
Armenia	1.79	2.70	1.98	1.78	1.40	1.70	1.80	2.74	1.99
Aruba*	2.33	0.29	0.42	0.95	0.29	0.33	3.53	0.29	0.50
Azerbaijan*	0.14	1.05	0.17	0.14	1.01	0.17	0.16	1.05	0.18
Bahamas, The*	0.07	0.54	0.31	0.06	0.18	0.12	0.07	0.54	0.31
Bahrain	4.35	9.04	7.07	4.34	9.01	7.04	4.35	9.04	7.07
Barbados	20.44	0.12	12.54	0.47	0.14	0.34	28.39	0.11	17.41
Belarus*	3.17	2.91	3.11	3.05	2.42	2.92	3.21	2.91	3.15
Belize	−8.32	−0.71	−4.39	0.65	−0.22	0.20	−8.32	−0.93	−4.50
Bermuda*	0.01	0.71	0.03	0.01	0.04	0.01	0.01	0.95	0.03
Bolivia	−1.04	−1.86	−1.65	−0.11	−1.82	−1.38	−1.36	−1.86	−1.73
Bosnia and Herzegovina	7.83	1.62	7.74	6.89	1.08	6.81	8.50	1.63	8.40
Botswana	−0.36	−3.60	−0.49	−0.02	−1.54	−0.08	−0.54	−3.60	−0.67
Brazil	7.27	4.24	5.72	2.91	3.75	3.34	9.44	4.41	6.86
British Indian Ocean Ter.	−0.60	8.76	7.24	−0.60	1.38	1.01	−0.60	8.76	7.24
British Virgin Islands	0.10	1.55	0.21	0.10	1.10	0.18	0.10	1.55	0.21
Brunei Darussalam*	4.72	12.69	11.54	4.72	12.46	11.34	4.72	12.69	11.54
Bulgaria	1.48	5.67	1.94	−0.28	4.05	0.19	2.35	5.67	2.71
Cameroon	−5.74	0.06	−4.90	−0.11	0.04	−0.09	−7.23	0.06	−6.17
Cayman Islands*	0.01	0.08	0.01	0.01	0.08	0.01	0.01	0.08	0.01
Chile*	3.27	0.64	2.01	2.56	0.64	1.64	3.62	0.64	2.19
China*	4.00	3.42	3.62	3.94	3.13	3.42	4.06	3.42	3.65
Christmas Island	3.31	2.00	2.41	3.31	1.79	2.27	3.31	2.00	2.41
Cocos (Keeling) Islands	1.52	3.13	2.94	1.52	3.13	2.94	1.52	3.13	2.94
Colombia	3.00	−0.28	0.54	−0.07	−0.15	−0.13	3.80	−0.27	0.75
Congo, Rep. of	0.54	−0.03	0.14	0.05	−0.03	−0.01	0.74	−0.03	0.20
Cook Islands	1.28	0.47	0.58	0.85	0.47	0.53	1.39	0.47	0.58
Costa Rica	3.72	−0.95	1.15	0.45	−0.77	−0.22	4.59	−0.97	1.54
Côte d'Ivoire	−2.05	−0.01	−1.64	−0.06	−0.01	−0.05	−2.49	−0.01	−2.00

Croatia	−0.44	0.69	−0.34	−0.90	0.56	−0.76	−0.20	0.70	−0.12
Cuba*	5.48	0.00	5.48	3.24	0.00	3.24	6.55	0.00	6.55
Dominica	−24.99	0.76	−21.84	−0.88	0.76	−0.68	−31.38	0.76	−27.44
Dominican Republic	−5.20	−2.87	−3.04	1.16	−1.95	−1.71	−6.67	−2.86	−3.15
Ecuador	6.72	0.60	2.06	0.15	0.48	0.40	8.45	0.65	2.50
Egypt	0.45	7.68	2.32	0.41	6.89	2.10	0.50	7.68	2.36
El Salvador	1.67	−0.64	−0.48	1.53	0.15	0.25	1.72	−0.64	−0.47
Falkland Islands	−2.53	0.00	−2.42	−2.66	0.00	−2.53	−2.50	0.00	−2.38
Fiji	49.69	7.51	24.12	−0.01	7.47	4.52	69.52	7.51	31.93
French Polynesia*	0.09	3.15	0.54	0.09	3.15	0.54	0.09	3.15	0.54
French Southern and Antarctic Lands*	5.81	1.73	5.68	5.47	1.73	5.31	5.95	1.73	5.80
Gabon	−0.01	−0.05	−0.04	−0.01	−0.05	−0.04	−0.01	−0.05	−0.04
Georgia	2.16	0.53	1.83	2.16	0.53	1.83	2.22	0.53	1.88
Ghana	−0.24	−0.32	−0.25	−0.22	−0.32	−0.23	−0.28	−0.32	−0.29
Gibraltar	3.66	2.96	3.65	3.66	0.67	3.64	3.66	2.96	3.65
Greenland*	−1.15	0.00	−1.15	−1.15	0.00	−1.15	−1.31	0.00	−1.31
Grenada	−0.91	0.02	−0.67	0.51	0.02	0.39	−1.28	0.02	−0.95
Guam	12.28	n.a.	12.28	6.09	n.a.	6.09	14.41	n.a.	14.41
Guatemala	−0.18	4.38	3.98	0.21	4.28	3.93	−0.33	4.38	3.97
Guyana	43.12	−0.75	27.24	1.12	−0.14	0.66	59.72	−0.73	37.84
Honduras	1.87	−2.39	−2.04	1.33	−1.21	−1.00	1.98	−2.39	−2.03
India	5.83	3.76	4.78	5.06	3.23	4.13	6.11	3.76	4.92
Indonesia	5.10	5.90	5.49	5.10	3.57	4.34	5.13	5.90	5.51
Iran, Islamic Republic of*	0.40	1.26	0.41	0.40	1.16	0.41	0.43	1.30	0.44
Iraq	0.49	0.27	0.31	0.01	0.27	0.23	0.80	0.27	0.37
Jamaica	−1.87	−5.31	−3.01	−0.76	−5.04	−2.17	−1.99	−5.31	−3.08
Jordan	1.57	−9.79	−8.01	1.56	−6.77	−5.47	1.66	−9.79	−8.00
Kazakhstan	0.98	2.07	1.11	0.37	1.98	0.56	1.20	2.07	1.30
Kenya	0.52	−7.69	−1.80	0.35	−6.27	−1.52	0.59	−7.69	−1.75
Korea, Dem. People's Republic of	4.56	22.34	4.51	4.55	−2.72	4.54	4.56	−22.34	4.52
Kuwait*	0.35	0.46	0.41	0.35	0.44	0.41	0.35	0.46	0.41
Kyrgyz Republic	5.21	11.22	8.02	5.21	10.18	7.54	5.47	11.22	8.16

Table A.3 *(continued)*

Lebanon	0.91	1.31	1.02	0.72	1.25	0.86	0.99	1.31	1.08
Libya*	0.50	0.16	0.49	0.50	0.16	0.49	0.50	0.16	0.49
Macao SAR*	14.01	19.31	17.48	14.01	11.47	12.34	14.01	19.31	17.48
Macedonia, former Yugoslav Republic of	−1.50	10.77	−0.34	−1.25	7.19	−0.45	−1.59	10.78	−0.42
Malaysia*	2.15	1.11	1.47	2.14	0.95	1.37	2.16	1.11	1.48
Marshall Islands*	0.06	0.02	0.06	0.06	0.02	0.06	0.06	0.02	0.06
Mauritius	11.30	−0.71	9.53	−1.26	−0.46	−1.14	16.27	−0.69	13.77
Mexico*	0.79	−0.54	−0.48	0.77	−0.43	−0.38	0.80	−0.54	−0.48
Micronesia, Federated States of*	0.72	13.49	13.38	0.72	13.02	12.91	0.72	13.49	13.38
Moldova	7.32	15.64	8.31	7.22	14.26	8.06	7.49	15.64	8.46
Mongolia	4.33	16.69	15.52	4.33	13.43	12.57	4.33	16.69	15.52
Montserrat	2.37	5.13	3.61	−0.55	5.13	1.98	3.47	5.13	4.18
Morocco	−0.97	3.26	−0.65	−0.96	3.09	−0.67	−0.90	3.33	−0.59
Namibia	−1.86	−3.06	−2.19	−0.78	−2.92	−1.36	−2.33	−3.06	−2.53
Nauru*	1.04	2.23	1.22	1.04	2.23	1.22	1.04	2.23	1.22
Netherlands Antilles*	10.36	0.57	2.67	0.15	0.49	0.42	15.60	0.57	3.79
New Caledonia*	0.03	0.98	0.09	0.03	0.87	0.08	0.03	0.98	0.08
Nicaragua*	−0.39	6.87	6.32	0.19	7.33	6.80	−0.52	6.87	6.32
Nigeria	0.03	−0.05	−0.03	0.02	−0.05	−0.03	0.03	−0.05	−0.03
Niue	4.05	8.52	8.31	4.05	8.52	8.31	4.05	8.52	8.31
Norfolk Island	0.00	0.25	0.23	0.00	0.25	0.23	0.00	0.25	0.23
Northern Mariana Islands*	16.19	n.a.	16.19	16.19	n.a.	16.19	16.19	n.a.	16.19
Oman	2.02	6.00	4.53	2.02	5.33	4.10	2.06	6.00	4.54
Pakistan	2.41	13.67	7.57	0.98	12.97	6.47	2.91	13.67	7.84
Palau*	9.42	1.09	2.12	9.42	1.09	2.12	9.42	1.09	2.12
Panama	7.09	0.15	4.50	0.04	0.08	0.06	8.95	0.15	5.67
Papua New Guinea	0.08	0.11	0.09	0.08	0.11	0.08	0.22	0.11	0.21
Paraguay	4.33	4.78	4.40	0.34	4.28	0.88	5.96	4.92	5.82
Peru	0.34	−1.82	−0.95	0.12	−1.73	−0.99	0.41	−1.81	−0.91

Philippines	2.03	4.52	3.42	2.01	3.39	2.78	2.18	4.53	3.49
Pitcairn	0.54	1.28	0.71	0.54	1.28	0.71	0.54	1.28	0.71
Qatar*	0.79	3.74	1.59	0.79	3.68	1.58	0.79	3.74	1.59
Romania	−0.96	3.28	−0.69	−1.71	2.27	−1.46	−0.39	3.28	−0.16
Russian Federation	1.20	0.84	1.13	0.87	0.73	0.84	1.33	0.84	1.23
Saint Helena	0.75	0.23	0.51	0.75	0.22	0.50	0.74	0.23	0.49
Saint Pierre and Miquelon*	3.69	0.03	1.85	3.69	0.03	1.85	3.69	0.03	1.85
Saudi Arabia*	0.74	0.49	0.60	0.74	0.49	0.60	0.75	0.49	0.60
Serbia and Montenegro	16.20	2.48	15.35	8.90	2.44	8.50	19.48	2.48	18.43
Seychelles	−0.96	0.28	−0.93	−0.96	0.28	−0.93	−1.19	0.28	−1.16
South Africa	1.86	−0.18	1.31	1.82	−0.17	1.29	1.90	−0.18	1.34
Sri Lanka	8.67	14.31	11.85	8.64	10.43	9.65	8.69	14.31	11.86
St. Kitts and Nevis	8.97	−0.64	2.41	0.16	−0.64	−0.39	12.50	−0.64	3.53
St. Lucia	−58.73	1.58	−37.55	−0.04	1.31	0.43	−74.26	1.58	−47.63
St. Vincent and the Grenadines	−5.76	−0.73	−5.64	0.05	−0.73	0.03	−7.29	−0.73	−7.14
Suriname	3.63	0.01	2.15	1.35	0.01	0.80	4.47	0.01	2.64
Swaziland	23.52	10.08	−0.08	1.39	−4.80	−2.96	32.38	−10.07	2.56
Syrian Arab Republic*	1.64	2.32	1.69	−0.10	1.73	0.03	2.40	2.32	2.40
Tajikistan*	5.65	11.57	6.05	5.64	10.22	5.95	5.65	11.57	6.06
Thailand	9.24	3.23	5.69	6.54	2.58	4.20	11.15	3.23	6.48
Tokelau	6.27	5.67	5.98	6.27	4.88	5.60	6.27	5.67	5.98
Tonga	4.71	0.08	1.04	0.64	0.08	0.20	5.78	0.08	1.27
Trinidad and Tobago	−0.93	0.01	−0.06	0.52	0.01	0.05	−1.50	0.01	−0.10
Tunisia	−0.25	4.90	−0.10	−1.37	4.16	−1.20	0.14	4.90	0.28
Turkey	0.80	6.35	1.66	0.46	5.54	1.25	0.95	6.35	1.78
Turkmenistan*	0.78	14.96	4.28	0.78	14.92	4.27	0.78	14.96	4.28
Turks and Caicos Islands	−0.23	0.03	−0.15	−2.74	0.03	−1.86	0.59	0.03	0.41
Ukraine*	4.77	1.77	4.22	3.85	1.46	3.41	5.14	1.77	4.53
United Arab Emirates*	2.00	5.16	2.67	1.94	4.57	2.50	2.03	5.16	2.69
Uruguay	18.55	22.48	20.42	5.06	2.28	3.74	25.17	29.09	27.03
Uzbekistan	1.16	4.30	1.58	1.16	4.22	1.57	1.16	4.30	1.58
Venezuela	0.37	0.21	0.22	0.27	0.21	0.21	0.39	0.21	0.23

Table A.3 *(concluded)*

Vietnam*	7.34	10.76	9.05	7.32	8.05	7.69	7.36	10.76	9.07
Virgin Islands (U.S.)*	1.15	n.a.	1.15	1.12	n.a.	1.12	1.16	n.a.	1.15
Wallis and Futuna Islands	1.72	6.28	1.69	1.68	6.28	1.69	1.75	6.28	1.69
Zimbabwe	7.68	2.25	6.99	6.54	2.23	5.99	8.14	2.25	7.39
Developed countries									
Andorra	10.91	0.92	10.79	5.56	0.92	5.51	12.94	0.92	12.80
Australia	3.33	2.51	2.97	1.79	2.36	2.04	4.12	2.54	3.43
Austria		2.56	2.56		2.53	2.53		2.56	2.56
Belgium		1.67	1.67		1.63	1.63		1.68	1.68
Canada	4.70	−0.22	0.07	1.86	−0.20	−0.08	6.45	−0.22	0.17
Cyprus		1.72	1.72		1.29	1.29		1.72	1.72
Czech Republic		2.60	2.60		2.27	2.27		2.68	2.68
Denmark		1.59	1.59		1.48	1.48		1.64	1.64
Estonia		1.76	1.76		1.56	1.56		1.83	1.83
Faeroe Islands	3.72	0.15	3.67	3.72	0.15	3.67	4.31	0.15	4.26
Finland		1.18	1.18		1.18	1.18		1.18	1.18
France		1.71	1.71		1.60	1.60		1.75	1.75
Germany		2.53	2.53		2.49	2.49		2.53	2.53
Greece		4.04	4.04		3.59	3.59		4.04	4.04
Hong Kong SAR	5.01	9.37	7.07	4.97	6.94	5.90	5.03	9.37	7.08
Hungary		1.42	1.42		1.33	1.33		1.42	1.42
Iceland	−0.38	0.52	−0.27	−0.66	0.50	−0.51	−0.31	0.52	−0.20
Ireland		0.15	0.15		0.14	0.14		0.15	0.15
Israel	1.20	−0.23	0.28	1.14	−0.20	0.28	1.27	−0.22	0.31
Italy		4.20	4.20		3.93	3.93		4.21	4.21
Japan	4.90	2.74	3.52	4.87	2.74	3.51	4.91	2.74	3.53
Korea, Republic of	4.62	3.12	3.67	4.61	2.55	3.30	4.64	3.12	3.68
Latvia		1.09	1.09		1.04	1.04		1.09	1.09
Liechtenstein	−0.29	2.83	0.37	−0.29	2.83	0.36	−0.28	2.83	0.37
Lithuania		2.74	2.74		1.84	1.84		3.00	3.00
Luxembourg		2.79	2.79		2.36	2.36		2.79	2.79

Malta		1.57	1.57		1.01	1.01		1.57	1.57
Netherlands		1.70	1.70		1.67	1.67		1.70	1.70
New Zealand	42.84	5.12	24.19	5.70	3.11	4.42	61.27	5.97	33.92
Norway	0.11	0.56	0.17	0.09	0.56	0.14	0.15	0.56	0.20
Poland		3.57	3.57		2.85	2.85		3.65	3.65
Portugal		3.59	3.59		3.10	3.10		3.60	3.60
Singapore	2.15	0.43	1.30	2.07	0.37	1.23	2.19	0.43	1.32
Slovak Republic		3.52	3.52		3.34	3.34		3.52	3.52
Slovenia		2.49	2.49		2.34	2.34		2.49	2.49
Spain		3.70	3.70		3.59	3.59		3.70	3.70
Sweden		1.51	1.51		1.51	1.51		1.51	1.51
Switzerland	0.54	2.17	0.80	0.30	2.16	0.59	0.69	2.18	0.92
Taiwan Province of China	2.52	3.36	3.03	2.50	2.69	2.61	2.52	3.36	3.03
United Kingdom		1.45	1.45		1.40	1.40		1.45	1.45
United States	2.80			2.41			2.99		

Source: Authors' calculations.
Note: Asterisk indicates a developing country/region that does not receive GSP from the United States.

Table A.4. Countries with No Substantial Change in Preferential Trade Relations with the European Union

Afghanistan, Islamic Rep. of	Gabon	Nigeria
Angola	Gambia, The	Norfolk Island
Antigua and Barbuda	Ghana	Norway
Argentina	Greenland	Oman
Aruba	Grenada	Pakistan
Australia	Guatemala	Palau
Bahamas, The	Guinea	Panama
Bahrain	Guinea-Bissau	Papua New Guinea
Bangladesh	Guyana	Paraguay
Barbados	Haiti	Peru
Belize	Honduras	Philippines
Benin	Hong Kong SAR	Pitcairn
Bermuda	India	Qatar
Bhutan	Indonesia	Rwanda
Bolivia	Iran, Islamic Rep. of	Samoa
Botswana	Jamaica	Saudi Arabia
Brazil	Japan	Senegal
Brunei Darussalam	Kenya	Seychelles
Burkina Faso	Kiribati	Sierra Leone
Burundi	Korea, Dem. People's Rep. of	Singapore
Cambodia	Korea, Republic of	Solomon Islands
Cameroon	Laos	Somalia
Cape Verde	Lesotho	Sri Lanka
Cayman Islands	Liberia	St. Kitts and Nevis
Central African Republic	Libya	St. Lucia
Chad	Macao SAR	St. Vincent and the Grenadines
Chile	Madagascar	Sudan
China	Malawi	Suriname
Christmas Island	Malaysia	Swaziland
Cocos (Keeling) Islands	Maldives	Switzerland
Colombia	Mali	Taiwan Province of China
Comoros	Marshall Islands	Tanzania
Congo, Democratic Republic of	Mauritania	Thailand
Congo, Republic of	Mauritius	Togo
Cook Islands	Mongolia	Tonga
Costa Rica	Montserrat	Trinidad and Tobago
Côte d'Ivoire	Mozambique	Tuvalu
Cuba	Namibia	Uganda
Djibouti	Nauru	United Arab Emirates
Dominica	Nepal	Uruguay
Dominican Republic	Netherlands Antilles	Venezuela
Ecuador	New Caledonia	Vietnam
El Salvador	New Zealand	Yemen, Republic of
Equatorial Guinea	Nicaragua	Zambia
Ethiopia	Niger	Zimbabwe
Fiji		

Source: Romalis (forthcoming).

Table A.5. Substitution Elasticity Estimates Based on U.S. and EU Imports from Canada and Control Countries, 1989–99

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
σ	6.52	6.68	9.38	8.73	6.25	6.30	8.49	7.72
	(0.80)	(0.90)	(0.88)	(1.06)	(0.77)	(0.85)	(0.84)	(0.97)
Commodity fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control countries	Table A.4	Table A.4	Table A.4	Table A.4	All	All	All	All
Tariff measure	Schedule; import weighted	Schedule; simple average	Applied; import weighted	Applied; simple average	Schedule; import weighted	Schedule; simple average	Applied; import weighted	Applied; simple average
N	35,537	35,533	35,536	35,532	36,089	36,085	36,088	36,084
Commodities	4,631	4,631	4,631	4,631	4,694	4,694	4,694	4,694

Source: Authors' calculations.

Notes: Dependent variable is ln(U.S. imports from Canada/U.S. imports from control countries)—ln(EU-12 imports from Canada/EU-12 imports from control countries) by year and HS six-digit commodity. The substitution elasticity estimate comes from regressions of this variable on a measure of the tariff preference that the United States gives to goods of Canadian origin. The EU-12 includes the 12 countries that were members of the EU in 1989. When "All" countries are used as a control, this includes all countries (including intra-EU international trade) with the exception of NAFTA countries. Robust standard errors adjusted for clustering on each commodity are in parentheses. There is a small difference between the number of observations in columns for the same set of control countries because a small number of observations with extreme values for the calculated tariff preference (where ln(1 + preference) is greater than 0.5) are discarded.

Table A.6. Substitution Elasticity Estimates Based on U.S. and EU Imports from Mexico and Control Countries, 1989–99

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ó	9.90	10.15	10.90	9.59	9.88	10.04	10.88	9.61
	(1.02)	(1.15)	(1.19)	(1.25)	(1.00)	(1.08)	(1.16)	(1.20)
Commodity fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control countries	Table A.4	Table A.4	Table A.4	Table A.4	All	All	All	All
Tariff measure	Schedule; import weighted	Schedule; simple average	Applied; import weighted	Applied; simple average	Schedule; import weighted	Schedule; simple average	Applied; import weighted	Applied; simple average
N	19,335	19,335	19,334	19,333	19,414	19,414	19,413	19,412
Commodities	3,415	3,415	3,415	3,415	3,427	3,427	3,427	3,427

Source: Authors' calculations.

Notes: Dependent variable is ln(U.S. imports from Mexico/U.S. imports from control countries)—ln(EU-12 imports from Mexico/EU-12 imports from control countries) by year and HS six-digit commodity. The substitution elasticity estimate comes from regressions of this variable on a measure of the tariff preference that the United States gives to goods of Mexican origin. The EU-12 includes the 12 countries that were members of the EU in 1989. When "All" countries are used as a control, this includes all countries (including intra-EU international trade) with the exception of NAFTA countries. Robust standard errors adjusted for clustering on each commodity are in parentheses. There is a small difference between the number of observations in columns for the same set of control countries because a small number of observations with extreme values for the calculated tariff preference (where ln(1 + preference) greater than 0.5) are discarded.

REFERENCES

Alexandraki, Katerina, and Hans Peter Lankes, 2004, "The Impact of Preference Erosion on Middle-Income Developing Countries," IMF Working Paper 04/169 (Washington, International Monetary Fund).

Amiti, Mary, and Jozef Konings, forthcoming, "Trade Liberalization, Intermediate Inputs, and Productivity: Evidence from Indonesia," *American Economic Review*.

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

Brenton, Paul, and Takako Ikezuki, 2004, "The Initial and Potential Impact of Preferential Access to the U.S. Market under the African Growth and Opportunity Act," Policy Research Working Paper No. 3262 (Washington, World Bank).

Clausing, K.A., 2001, "Trade Creation and Trade Diversion in the Canada-United States Free Trade Agreement," *Canadian Journal of Economics*, Vol. 34 (August), pp. 677–696.

Dean, Judith M., and John Wainio, 2005, "Quantifying the Value of U.S. Tariff Preferences for Developing Countries," Policy Research Working Paper No. 3977 (Washington, World Bank).

DeVault, James, 1996, "Competitive Need Limits and the U.S. Generalized System of Preference," *Contemporary Economic Policy*, Vol. 14 (October), pp. 58–66.

European Commission, 2003, "User's Guide to the European Union's Scheme of Generalised Tariff Preferences" (Brussels), Available via the Internet: http://europa.eu.int/comm/trade/issues/global/gsp/gspguide.htm.

Evans, Carolyn L., and James Harrigan, 2004, "Tight Clothing: How the MFA Affects Asian Apparel Exports," NBER Working Paper No. 10250 (Cambridge, Massachusetts, National Bureau of Economic Research).

Francois, Joseph, Bernard Hoekman, and Miriam Manchin, 2005, "Preference Erosion and Multilateral Trade Liberalization," CEPR Discussion Paper No. 5153 (London, Centre for Economic Policy Research).

Hummels, David, 2001, "Toward a Geography of Trade Costs," (unpublished; West Lafayette, Indiana, Krannert School of Management, Purdue University). Available via the Internet: http://www.mgmt.purdue.edu/faculty/hummelsd/research/toward/TGTC.pdf.

Jean, Sébastien, David Laborde, and Will Martin, 2005, "Consequences of Alternative Formulas for Agricultural Tariff Cuts," Chapter 4 in *Agricultural Trade Reform and the Doha Development Agenda*, ed. by Kym Anderson and Will Martin (Washington, World Bank).

Lai, Huiwen, and Daniel Trefler, 2002, "The Gains from Trade with Monopolistic Competition: Specification, Estimation, and Mis-Specification," NBER Working Paper No. 9169 (Cambridge, Massachusetts, National Bureau of Economic Research).

MacPhee, Craig, and David I. Rosenbaum, 1989, "The Asymmetric Effects of Reversible Tariff Changes Under the United States GSP," *Southern Economic Journal*, Vol. 56 (July), pp. 105–125.

Mattoo, Aaditya, Devesh Roy, and Arvind Subramanian, 2002, "The Africa Growth and Opportunity Act and Its Rules of Origin: Generosity Undermined?" IMF Working Paper 02/158 (Washington, International Monetary Fund).

Ozden, Çaglar, and Eric Reinhardt, 2003, ''The Perversity of Preferences: The Generalized System of Preferences and Developing Country Trade Policies, 1976–2000,'' Policy Research Working Paper No. 2955 (Washington, World Bank).

Romalis, John, (forthcoming), ''NAFTA's and CUSFTA's Impact on International Trade,'' *Review of Economics and Statistics*.

Subramanian, Arvind, 2003, ''Financing of Losses from Preference Erosion,'' paper prepared by IMF staff for the World Trade Organization, WT/TF/COH/14/14, Geneva.

United Nations Conference on Trade and Development (UNCTAD), 2001, *Improving Market Access for Least Developed Counties*, UNCTAD/DITC/TNCD/4. Available via the Internet: http://www.unctad.org/en/docs/poditctncd4.en.pdf.

United Nations Conference on Trade and Development (UNCTAD), 2003, *Trade Preferences for LDCs: An Early Assessment of Benefits and Possible Improvements*, UNCTAD/ITCD/TSB/2003/8 (New York and Geneva). Available via the Internet: http://www.unctad.org/en/docs/itcdtsb20038_en.pdf.

World Trade Organization, 2002, ''Market Access: Unfinished Business—Post-Uruguay Round Inventory and Issues,'' Special Studies No. 6 (Geneva). Available via the Internet: http://www.wto.org/english/res_e/booksp_e/special_study_6_e.pdf.

———, 2003, ''Negotiations on Agriculture: First Draft of Modalities for the Further Commitments,'' TN/AG/W/1Rev.1, March 18 (Geneva). Available via the Internet: http://www.wto.org/English/tratop_e/agric_e/negoti_mod2stdraft_e.htm.

Yang, Yongzheng, 2005, ''Africa in the Doha Round: Dealing with Preference Erosion and Beyond,'' IMF Policy Discussion Paper No. 05/8 (Washington, International Monetary Fund).