3

Industrial-Country Protection and the Impact of Trade Liberalization on Global Poverty

The scope for reducing global poverty through improved trade policies depends importantly on the extent to which industrial-country protection remains high enough to pose a major obstacle to developing-country exports, terms of trade, and growth.[1] This chapter seeks to identify the levels of this protection and to gauge the corresponding impact that might be obtained through its liberalization. The previous chapter focused on special market access arrangements for the poor, "at-risk" countries (heavily indebted poor countries, or HIPCs; least developed countries, or LDCs; and sub-Saharan Africa, or SSA). Although these countries account for about one-fourth of the poor globally (chapter 1), they represent only about 7 percent of combined imports of the United States, European Union, and Japan from developing countries (chapter 2). Such middle-income nations as Brazil, Mexico, and South Korea, along with China in particular (a low-income but not at-risk economy) and many others, bulk far larger in total trade magnitudes. This chapter examines market access for all developing countries. Once again, however, the focus will be on industrial-country protection, rather than that maintained by the developing countries themselves.

In broad terms, protection in industrial countries is concentrated in textiles and apparel and agricultural goods. In contrast, successive rounds of multilateral trade negotiations have reduced tariffs on nontextile manu-

1. This chapter draws in part upon Cline (2002b).

factures to modest levels. "Contingent" protection (antidumping, countervailing duties, and safeguards) nonetheless is also a significant factor in a number of manufacturing sectors (e.g., steel).

Tariffs on Manufactured Goods

It is generally recognized that for manufactured goods (at least outside textiles and apparel), tariffs are relatively low. Thus, Finger and Schuknecht (1999) estimate that the post–Uruguay Round average most-favored-nation (MFN) tariff of industrial countries on imports of manufactures from developing countries is only 3 percent. They note, however, that this level is about twice the corresponding average for imports from industrial-country suppliers.

The Organization for Economic Cooperation and Development (OECD 2000) provides tariff and trade data for member countries at the 6-digit Harmonized Tariff System, or HTS, level (about 4,600 categories). These data comprise import values and two alternative sets of MFN tariffs: those actually applied as of 1998, and post–Uruguay Round "bound" rates after full implementation of negotiated tariff cuts.[2] Table 3.1 reports average tariffs calculated from the OECD data for the "Quad" industrial-country importers: the United States, European Union, Japan, and Canada. The averages across the tariff-line categories are either simple (unweighted), import weighted, or "adjusted-import weighted." The latter concept, developed in appendix 3A, seeks to overcome the usual concern about import weighting: that high tariffs will suppress imports and hence be underrepresented in import-weighted averages. The approach is to weight by "adjusted" import values, based on an average between the actual and hypothetical free trade import value. As argued in the appendix, moreover, because of the arbitrariness of category width, the alternative of unweighted "simple" tariff averages may give more distorted results than weighting by import value.

All manufactured categories (HTS chapters 28–96) are included in the estimates.[3] Even though the relatively high-tariff textile and apparel sectors are included, the resulting averages are modest, especially for the bound (full-implementation Uruguay Round) levels as opposed to the 1998 applied levels. For example, on the preferred measure (adjusted-

2. For industrial products, Uruguay Round tariff cuts were phased in equally over five years from the beginning of 1995 to the beginning of 1999. By 2002, as a result, applied tariffs should generally have fallen fully to the new bound levels. Longer periods were given for agricultural liberalization (WTO 2002, 1).

3. The resulting aggregate imports of manufactures from developing countries in 1998 amounted to $276.6 billion for the United States (excluding from Mexico), $327.8 billion for the European Union, $83.7 billion for Japan, and $18.6 billion for Canada.

Table 3.1 Average tariffs on manufactured goods in industrial-country markets (percent)

Origin of imports	United States[a]		European Union		Japan		Canada[a]	
	1998	Bound	1998	Bound	1998	Bound	1998	Bound
From HIOECD								
Simple	5.02	3.44	5.40	4.01	3.31	2.49	7.30	5.71
Import weighted	3.18	2.20	5.11	3.91	1.44	1.16	5.18	4.05
Adjusted-import weighted	3.24	2.25	5.17	3.97	1.51	1.21	5.26	4.10
From developing countries								
Simple	5.02	3.44	5.40	4.01	3.31	2.49	7.30	5.71
Import weighted	4.95	3.71	5.67	4.58	3.64	2.88	7.30	5.59
Adjusted-import weighted	5.09	3.84	5.75	4.66	3.78	2.98	7.56	5.76

1998 = actual applied in 1998
Bound = levels after full implementation of Uruguay Round cuts, generally by 2000
HIOECD = high-income member of the Organization for Economic Cooperation and Development (excluding Czech Republic, Hungary, Mexico, South Korea, Poland, and Turkey)

a. Excluding Mexico from developing countries

Source: OECD (2000).

import weighting), the average bound US tariff is only 2.25 percent for imports from industrial countries ("HIOECD") and 3.84 percent for developing countries (all others except Mexico, which is omitted because of free trade owing to the North American Free Trade Agreement, or NAFTA).[4]

These estimates are for MFN tariffs. The differences between tariffs facing industrial- and developing-country partners thus stem not from different tariffs at the tariff-line level, but different product weightings.[5] This is evident in the fact that the "simple" average is identical for both supplying regions (for a given importer), but the averages are no longer equal when weighting by imports or adjusted imports. The estimates in table 3.1 suggest that tariffs tend to be higher on those products that are more important to developing countries. Whereas the import-weighted tariffs are considerably lower than the simple average tariffs for HIOECD suppliers, for developing-country suppliers the import-weighted and

4. HIOECD refers to OECD countries excluding the six middle-income OECD members (see table 3.1).

5. This means that the estimates abstract from preferential entry in such arrangements as the Generalized System of Preferences, Lomé Convention, US African Growth and Opportunity Act, Caribbean Basin Initiative, and US Andean Trade Preference Act. As shown in chapter 2, however, the actual tariff revenue forgone in these arrangements has been limited by product exclusions, rules of origin, administrative costs, and other factors; and in any event, the beneficiary countries in these arrangements are mainly the high-risk low-income countries, which account for only a small portion of total developing-country supply.

adjusted-import-weighted tariff averages tend to be higher than the simple averages, especially for bound tariffs. This further suggests that the major influence of import weighting is not to understate the average tariff but to capture the actual pattern of the relevant trade. That is, if the principal effect of import weighting were to understate the incidence of high tariffs, we would observe import-weighted tariffs for imports from developing countries that are also substantially lower than the simple tariff averages, rather than higher.

On the preferred adjusted-import weighting, and using bound rates, these results confirm Finger and Schuknect's (1999) finding of higher tariffs against developing than industrial countries. The ratio between the two levels stands at 1.7 for the United States, 1.2 for the European Union, 2.5 for Japan, and 1.4 for Canada. Rather than the higher relative level of tariffs against developing countries, however, the more salient feature of the estimates is that with Quad tariffs on imports of manufactures in the range of 4 to 5 percent, this protection is now at relatively low levels by historical standards.

Peak Tariffs: How Important Are They?

It is often suggested that low manufacturing tariffs are misleading because there are numerous tariff "peak" categories, so the protective effect is much greater than would be implied by a uniform tariff of the same average level. The typical threshold for considering a tariff peak is 15 percent or higher.

Table 3.2 considers high tariffs using a more stringent threshold of 10 percent (post–Uruguay Round bound rates). Even with a 10 percent threshold, the incidence of high tariffs is relatively limited. Thus, for the United States, 7.9 percent of tariff categories show a bound tariff of 10 percent or more, and only 2.1 percent have tariffs of 15 percent or more. Equally or more important, only 12.6 percent of manufactured imports from developing countries by value face US bound tariffs of 10 percent or more, and only 4.4 percent of import value is in categories with tariffs of 15 percent or more.[6]

The European Union and Japan show a higher incidence of categories and import values in the 10 to 14.99 percent tariff range, but lower inci-

6. Use of the OECD data requires the assumption that the incidence of peak tariffs using 6-digit HTS data is similar to that at the more detailed 8-digit level. Analysis of US tariff data at the 8-digit level shows that this is broadly true, depending on the thresholds considered. Manufacturing categories (HTS chapters 28–96) with applied tariffs of 10 percent and above account for 8.2 percent by category count at the 6-digit level and 8.7 percent at the 8-digit level. The proportionate divergence rises with the threshold, as follows (threshold percent, 6-digit categories, 8-digit categories): 15 percent: 2.8 percent, 4.1 percent; 20 percent: 0.6 percent, 1.6 percent; 25 percent: 0.3 percent, 1.1 percent.

Table 3.2 Incidence of high tariffs in manufactures for industrial-country imports from developing countries (percent)

Measure of incidence	Tariff range			
	10–14.99	15–19.99	20–24.99	25 or higher
Percent of tariff categories				
United States	5.8	1.3	0.5	0.3
European Union	6.8	0.4	0.0	0.1
Japan	2.9	0.3	0.2	0.4
Canada	8.7	7.3	0.2	0.1
Percent of import value				
United States	8.2	2.5	0.4	1.5
European Union	19.1	1.1	0.0	0.0
Japan	8.1	0.2	0.5	0.9
Canada	5.8	14.4	0.1	0.8
Average tariff, import weighted				
United States	12.4	17.2	22.1	27.0
European Union	11.8	16.7	20.7	33.9
Japan	11.0	17.1	20.6	33.1
Canada	13.2	17.6	20.0	25.0

Note: Rates refer to bound levels after full implementation of Uruguay Round cuts (2000).

Source: Calculated from OECD (2000).

dence for 15 percent and above. Canada has a somewhat more accentuated high-tariff structure. Fully 21.1 percent of the value of manufactured imports from developing countries is in categories with bound tariffs of 10 percent or higher, and 15.3 percent is in categories of 15 percent or higher tariffs.[7]

What is the resulting overall protective effect of tariffs on manufactures, after taking account of these high tariffs? One simple way to find out is to apply an assumed price elasticity of imports to the proportionate change in price that would be expected from complete removal of the tariff. The domestic market price includes the tariff, and is thus "$1 + t$" where t is the tariff (expressed as a fraction). Removal of the tariff would thus reduce the domestic price of the import by the proportion $t/(1 + t)$ at the most, and by less if the foreign supply from developing countries is less than infinitely elastic. The proportionate increase in imports from developing countries that could be expected from complete removal of manufacturing tariffs of 10 percent and higher, as a fraction of the existing level of manufactured imports, can thus be roughly approximated as $z = \beta(\Sigma\varphi_i[t_i/\{1 + t_i\}])$, where β is the (absolute) value assumed for the import price elasticity of demand, φ is the share of import value, t is the tariff level, and i refers to each of the tariff ranges considered.

7. The difference between the import and adjusted-import weighting is minimal in this range, so only the import-weighted results are shown.

Except for the import price elasticity, the elements of this calculation are straightforward. For its part, the price elasticity of import demand (β) can be inferred from the range of parameters used in leading computable general equilibrium (CGE) models of trade. Many of these models are built on a two-tier system that identifies one elasticity of substitution in demand between domestic goods and imports (σ_D) and a second elasticity for substitution among the various alternative sources of supply of imports (σ_M). The simple import price elasticity we seek is related to the first of these two substitution elasticities as follows: $\beta = \sigma_D (1 - \varphi_M)$, where φ_M is the share of imports in total use of the product ($\varphi_M = M/[M + C_D]$, where M is imports and C_D is consumption of the domestically produced good).[8]

A reasonable estimate for the ratio of imports to total domestic use of manufactures is $\varphi_M = 0.25$ (imports provide one-fourth of the domestic availability of manufactures).[9] As for the elasticity of substitution between the domestic goods and imports, "based on preferred estimates from the econometric literature with some upward adjustment," Dimaranan, McDougall, and Hertel (2002, 20-2, 20-12) place this elasticity in a range of 1.8 to 5.2 for manufactures, with a simple average of 3.1. The LINKAGE model used by the World Bank for its Global Economic Prospects applies a range of 3.9 to 4.9 for manufactures, with a simple average of 4.2.[10] The CGE model of Harrison, Rutherford, and Tarr (1997a), which is used in chapter 4 below, applies a uniform value of $\sigma_D = 4.0$. The average for manufactures in these three models is thus $\sigma_D = 3.77$. Together with the estimated import share, this yields an import price elasticity of $\beta = 2.8$.

Using the simple weighted-average formula noted above, table 3.3 presents back-of-the-envelope partial equilibrium estimates of the impact of

8. This follows from the definition of the elasticity of substitution, which is the percentage change in the ratio of imports to domestic goods for a 1 percent decline in the corresponding price ratio. Let x be the proportionate change in imports for a 1 percent fall in the import price (so $x \equiv \beta$). Let y (< 0) be the corresponding percent change in demand for the domestic good induced by a reduction in the price of the import. Then we have two unknowns and two equations. First: $x - y = \sigma_D$. This follows from the fact that the percent change in a ratio equals the percent change in the numerator minus the percent change in the denominator. Second: $x\varphi_M + y(1 - \varphi_M) = 0$. This arises from the fact that along the indifference curve between the import and the domestic good, total use of the good remains unchanged as one is substituted for the other. This equation states that, after weighting by base-period shares, the rise in imports is just offset by the decline in the domestic good. Solving, we have: $x = \sigma_D (1 - \varphi_M)$.

9. At the world level, Dimaranan and McDougall (2002, 3–4) estimate that for manufactures, exports (which must also equal imports globally) amount to \$4.16 trillion (1997 dollars) and gross output is \$15.06 trillion, placing φ_M at 0.276. The ratio will be somewhat higher for developing countries, which are less industrialized and have lower market exchange rates relative to purchasing power parity (PPP) exchange rates, and somewhat lower for industrial countries, suggesting a value of 0.25 for the latter.

10. Dominique van der Mensbrugghe, personal communication, February 10, 2004.

Table 3.3 Illustrative impact of elimination of tariffs on manufactured imports from developing countries (percent)

Measure of impact	United States	European Union	Japan	Canada
Categories with tariff lower than 10 percent				
Average tariff	2.02	2.70	1.73	2.62
Import impact	5.54	7.35	4.76	7.15
Share in manufactured imports	87.40	79.80	90.30	78.90
Weighted impact	4.85	5.86	4.30	5.64
Categories with tariff 10 percent and above				
Average tariff	15.42	12.03	13.57	16.69
Import impact	37.41	30.06	33.46	40.05
Share in manufactured imports	12.60	20.20	9.70	21.10
Weighted impact	4.71	6.07	3.25	8.45
Total manufactures				
Average tariff	3.71	4.58	2.88	5.59
Import impact	9.56	11.93	7.54	14.09
Share from tariff higher than 10 percent	49.30	50.90	43.00	60.00

Tariffs = bound rates

Import impact = percent increase assuming import demand price elasticity of –2.8 and infinite supply elasticity

Source: Author's calculations.

tariff removal for all manufactured imports into the main industrial countries from developing countries under extremely simplifying assumptions: a uniform import price elasticity of 2.8 (absolute value), infinite supply elasticity, an absence of quotas or other nontariff restraints, and abstraction from any indirect or general equilibrium effects. The table divides the effects into products with average tariffs below 10 percent and those 10 percent and above.

Two salient implications stand out in the table. First, the estimates suggest that the overall scope for import expansion from the removal of tariffs on manufactures is significant but nonetheless moderate, lying mainly in the vicinity of a 10 percent increase in these imports (or about $70 billion, against a base of $707 billion total manufactured imports by the Quad from developing countries in 1998).

Second, about half of this impact could be expected to arise from the removal of tariffs of 10 percent or more, even though goods in this group account for only one-eighth or less (United States and Japan) to one-fifth (European Union and Canada) of total imports of manufactures. This means that although the presence of high tariffs does not fundamentally alter the judgment that the protective effect of tariffs on manufactures is moderate, it does mean that a disproportionately large share of tariff liberalization benefits is to be found in eliminating the high tariffs.

These rough estimates might also suggest a simple but potentially powerful demand for developing countries in their Doha Round bargaining: that industrial countries reduce all tariffs on manufactured goods to no more than 10 percent. Doing so would eliminate about half of the remaining protective effect of Quad tariffs on imports of manufactured goods from developing countries even if tariffs below 10 percent were left unchanged. In exchange, leading developing countries could presumably offer to impose a ceiling on all of their own tariffs, such as 15 or 20 percent.

Tariffs and Quotas in Textiles and Apparel

Within manufactures, the protection of industrial countries against imports from developing countries has traditionally been most severe and most important in the textile and apparel sectors. Apparel in particular tends to be unskilled-labor intensive and hence of natural comparative advantage to developing countries. Textiles and apparel account for about one-eighth of the total of all imports from developing countries into the main industrial countries.[11]

Table 3.4 reports the course of tariff protection against textiles and apparel during the past four decades for the United States, European Union, and Japan. Successive rounds of multilateral trade negotiations have reduced apparel tariffs from the range of 20–25 percent in the 1960s and early 1970s to 10–12 percent in 2002 following implementation of Uruguay Round tariff cuts. Tariffs began this period almost as high in textile fabrics, but have fallen somewhat further (to a range of 6–9 percent), reflecting the greater susceptibility of textiles to mechanized processes and hence the lesser comparative advantage for countries with abundant unskilled labor. Tariffs on the lower stage of processing—yarn and thread—have traditionally been lower. (The convergence from the relatively high rates in the United States and lower rates in Europe and Japan in 1962 toward intermediate rates by 1987 after the Tokyo Round cuts reflected the process of tariff harmonization and reduction of tariff escalation in the latter two economies.) Despite the declining trend, tariffs in the textile-apparel complex remain far higher than those for manufactures overall.

Not surprisingly, textiles and apparel are also the locus of greatest concentration for peak tariffs. As shown in table 3.5, 33 percent of textile fabric categories and 55 percent of apparel categories (62.7 percent of apparel import value from developing countries) have post–Uruguay Round bound tariffs of 10 percent or more for the United States, and 18.5

11. United States: 12.5 percent; European Union, 11.7 percent; Japan, 9.8 percent. Calculated from USITC (2002); WTO (2001, 114).

Table 3.4 Tariffs in textiles and apparel[a]
(percent)

Country or group and year	Textiles: Yarn	Textiles: Fabric	Apparel
United States			
1962	11.5	24.0	25.0
1973	14.5	19.0	27.0
1987	9.0	11.5	22.5
1998[b]	8.7	11.2	13.9
2002[b]	6.7	7.9	11.5
European Union			
1962	3.0	17.5	18.5
1973	8.0	14.5	16.5
1987	7.0	10.5	13.5
1998[b]	6.6	9.9	12.8
2002[b]	4.3	8.6	11.7
Japan			
1962	2.5	19.5	25.0
1973	9.0	12.0	18.0
1987	7.0	9.5	14.0
1998[b]	6.0	7.8	12.8
2002[b]	4.7	6.2	9.8

a. Greater of simple and import-weighted averages.
b. Against developing countries.

Sources: Cline (1990, 163); OECD (2000).

percent (import-weighted) have tariffs of 15 percent or more in apparel.[12] Canada's levels are even higher, with an extraordinary 98.4 percent of apparel imports from developing countries facing tariffs of 15–20 percent (albeit with no tariffs above 20 percent). In the European Union, 22 percent of textile imports and 90–95 percent of apparel imports face tariffs of 10–15 percent, although the tariff structure has a strict ceiling and there are no tariffs in excess of 15 percent. Japan similarly has about 35–50 percent of apparel imports in categories with tariffs of 10–15 percent but no categories above 15 percent.

Table 3.5 also reports the incidence of high tariffs in manufactured goods excluding textile fabric and apparel. The striking result is a very low presence of high tariffs in manufactures outside these two sensitive sectors. In the United States, whereas 12.6 percent of imports from developing countries face post–Uruguay Round tariffs of 10 percent or higher for manufactures as a whole (table 3.2), the corresponding figure is only

12. Note that the estimates in table 3.5 omit textile yarn, which tends to have lower tariffs but also constitutes a much smaller import base. For example, in 1998 US imports from developing countries amounted to $6.5 billion in textile fabric and $40.9 billion in apparel, but only $0.98 billion in yarn.

Table 3.5 Tariff peaks: Textiles, apparel, and other manufactures (post–Uruguay Round rates)

	United States		European Union		Japan		Canada	
Type of manufacture	**%C**	**%V**	**%C**	**%V**	**%C**	**%V**	**%C**	**%V**
Textile fabric								
10 to less than 15 percent	28.6	17.9	10.1	22.3	5.2	4.8	74.2	66.8
15 to less than 20 percent	4.4	5.8	0.0	0.0	0.0	0.0	13.7	19.1
20 to less than 25 percent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25 percent and above	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total value (billions of dollars)[a]		6.5		11.0		2.2		0.7
Apparel								
10 to less than 15 percent	34.9	44.2	89.9	95.8	34.0	50.4	1.7	1.5
15 to less than 20 percent	12.6	15.1	0.0	0.0	0.0	0.0	95.0	98.4
20 to less than 25 percent	6.7	2.8	0.0	0.0	0.0	0.0	0.0	0.0
25 percent and above	0.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0
Total value (billions of dollars)[a]		40.9		44.4		11.9		2.1
Manufactures excluding textiles and apparel								
10 to less than 15 percent	1.5	1.5	6.4	1.0	1.0	0.6	3.6	2.1
15 to less than 20 percent	0.2	0.2	1.3	0.5	0.2	0.3	3.2	0.9
20 to less than 25 percent	0.2	0.0	0.0	0.1	0.6	0.2	0.1	0.2
25 percent and above	0.2	1.7	0.0	0.1	1.1	0.4	0.9	0.1
Total value (billions of dollars)[a]		229.2		272.3		69.6		15.8

%C = percent of categories
%V = percent of value of imports from developing countries

a. Including categories with tariff below 10 percent.

Source: Calculated from OECD (2000).

3.4 percent for manufactures excluding textiles and apparel (table 3.5). The same comparison shows 20.2 versus 3.5 percent for the European Union; 9.7 versus 1.5 percent for Japan; and 21.1 versus 3.3 percent for Canada (tables 3.2 and 3.5). This suggests that within manufactures, peak tariffs in industrial countries are a problem for developing countries primarily in textiles and apparel and to a far lesser extent in other goods.

In addition to high tariffs in textiles and apparel, for decades developing countries have faced quota restrictions under the Multi-Fiber Arrangement (MFA) and its precursors. A major breakthrough of the Uruguay Round of multilateral trade negotiations was to set a timetable for the elimination of these quotas by 2005. Because most industrial countries have "backloaded" the phaseouts, however, there are grounds for concern that in 2005 there will be numerous instances in which industrial countries impose safeguards or other contingent protection as a replacement for the remaining quotas.

It is significant, nonetheless, that the protective impact of quota regimes appears already to have been on a declining path during the past two

Table 3.6 Export-tax equivalent of textile and apparel quotas under the Multi-Fiber Arrangement (percent)

	United States		European Union	
Period	**Textiles**	**Apparel**	**Textiles**	**Apparel**
Mid-1980s	12.4	26.5	17.2	22.8
1998–99	9.1	11.4	5.1	5.2

Source: Calculated from Gelhar et al. (1997) and François and Spinanger (2002).

decades. Studies estimating tariff-equivalents of quotas have been based in part on quota "rents" as measured by the price of quotas available for purchase, especially in Hong Kong. The Global Trade Analysis Project (GTAP) has reported estimated export tax equivalents (ETEs) for textile and apparel quotas in several successive databases. Estimates for the mid-1980s were reported in GTAP2 (Gelhar et al. 1997, 95). Updated estimates for 1998–99 are incorporated in GTAP5 (François and Spinanger 2002). Table 3.6 presents aggregated tariff equivalents from these sources for the United States and the European Union, calculated by weighting the supplier-specific GTAP estimates of ETEs by the corresponding country shares in US and EU imports of textiles and apparel.[13]

The combined effect of tariff and quota protection was extremely protective in the mid-1980s, but had fallen substantially by the late 1990s despite the back-end loading of the MFA phaseout. The total tariff-equivalent is the chained effect of the tariff and the tariff-equivalent of the quotas.[14] For the United States, in the mid-1980s with a tariff of 22.5 percent (table 3.4) and quota tariff equivalent of 26.5 percent (table 3.6), total protection amounted to 55 percent for apparel. This combined protection had fallen to 27 percent by 1998. In principle, by 2005 with the elimination of MFA quotas, protection should be down to the bound post–Uruguay Round tariff rates, or only about 11.5 percent for both the United States and the European Union (table 3.4).

The IMF and World Bank (2002) have arrived at estimates similar to those in table 3.6 using the GTAP5 database, and they further report that the ranges of the ETEs are large (e.g., 0–34 percent for US imports of apparel). The IMF–World Bank study also reports Japan's quota tariff equivalents at zero, and those of Canada at 7.8 percent for textiles and 16.8

13. For the United States, weights for imports from each of the GTAP countries and regions are obtained from USITC (2002) for 1989 and 2001 for the two respective periods (SITC 65 and 84). For the European Union, import weights are from partner exports as reported in World Bank (2002c), for 1985, and from WTO (2001, 146, 153) for 2000.

14. That is, $z = (1 + t)(1 + \tau) - 1$, where z is the total tariff equivalent, t is the tariff, and τ is the tariff equivalent (or ETE) of the quota, all expressed as fractions.

percent for apparel. The zero estimate for Japan reflects the fact that Japan traditionally did not apply MFA quotas (see, e.g., Cline 1990, 137) but instead pursued tax incentives and financial support for sectoral restructuring as it shifted from being the prime exporter of textiles and apparel in the 1950s and 1960s to facing rising import competition from developing countries by the 1970s and after.

The Agreement on Textiles and Clothing of the Uruguay Round provided for quota elimination over 10 years beginning in 1995. In the first phase (1995 through the end of 1997), 16 percent of the 1990 volume of imports was to be "integrated" into nonquota treatment consistent with other GATT (now World Trade Organization, or WTO) products. In the second phase, by the end of 2001 an additional 17 percent was to be integrated. During the third phase, another 18 percent was to be integrated, after which, at the beginning of 2005, all remaining products (a maximum of 49 percent of the 1990 base) are to be integrated. Quotas were also to rise at specified rates—which, although providing additional interim liberalization, also meant that the fraction of actual total quota volume "integrated" was increasingly less than implied by the 17 and 18 percent targets for the first two phases, because these applied to the base period volumes. As a result, by the end of 2001 the United States and the European Union had removed quotas on products amounting to only about 20 percent of textile and apparel import volume (IMF and World Bank 2002, 42).

As is shown in chapter 1, moreover, textiles and apparel are key sectors for addressing global poverty. The measure of the "poverty intensity of imports" developed in chapter 1 places textiles and apparel relatively high, with both sectors at about 47 percent on the headcount basis and 12 percent on the income-share basis (compared with 40 percent and 8.6 percent respectively for all imports from developing countries). In import value, apparel ranks second (surpassed only by oil) and textiles ranks eleventh among the top two-dozen sectors, with total US imports in 2001 of $50 billion and $8.7 billion respectively from developing-country suppliers.

On the basis of simulations using the GTAP model, IMF staff have estimated that the removal of industrial-country tariffs and MFA quotas from textiles and apparel would increase developing-country exports by $39.8 billion annually, and increase developing-country income by $23.8 billion (IMF and World Bank 2002, 44). The income gain is concentrated almost entirely ($22.2 billion) in tariff removal, implying that the modeling treats almost all quota rents as already accruing to developing-country firms and governments. In contrast, industrial countries would enjoy $14 billion annually in consumer income gains from quota removal, which would be partially offset by an income loss of $3 billion from tariff elimination (which the IMF authors attribute to terms-of-trade loss).

The simple partial equilibrium calculation of potential for increased exports from tariff elimination, set forth above for all manufactures, can also be applied to textile and apparel tariffs. Using the post–Uruguay Round tariffs reported in tables 3.4 and 3.5, the simple partial equilibrium approach using a demand elasticity of 3.0 (absolute value) yields an estimated $4.5 billion increase in Quad imports of textile fabric and $30.2 billion increase in imports of apparel from developing countries as a consequence of tariff elimination, compared with the 1998 import bases of $20.4 billion and $99.3 billion respectively (OECD 2000).[15] The increase in annual imports of textiles and apparel amounts to $13.8 billion for the United States, $16.6 billion for the European Union, $3.2 billion for Japan, and $1.2 billion for Canada. These four (the Quad) account for 89 percent of total industrial-country imports from developing countries, suggesting a corresponding total of $39.1 billion in tariff removal impact for all industrial countries for the two sectors. Textiles and apparel would thus account for about 55 percent of total developing-country gains in exports of manufactures from the removal of tariff protection in industrial countries.

This simple partial equilibrium estimate is virtually the same as the general equilibrium estimate by the IMF–World Bank team. The implication is that feedback effects (especially from a less than infinitely elastic export supply) in the general equilibrium estimates serve to damp the trade impact estimates by approximately enough to offset other factors that would yield a higher estimate (inclusion of the impact of quota removal and expansion to 2005 scale, in the IMF–World Bank calculations).

In short, textiles and apparel constitute the most important manufacturing sectors in which developing countries still stand to reap large gains from further liberalization of industrial-country protection, even after full Uruguay Round tariff cut implementation. These sectors are also important in terms of relevance to production by countries with a relatively high incidence of poverty. It follows that the actual achievement of the Uruguay Round's pledge of full elimination of MFA quotas by 2005, and avoidance of their widespread replacement by safeguards and other contingent protection, will be essential if industrial-country trade policy is to provide a major opportunity for reducing global poverty in the area of manufactured goods. It also follows that a major reduction in tariff protection for textiles and apparel will also be a key goal in the Doha Round, in addition to the effective implementation of the promised removal of MFA quotas.

Industrial-Country Protection in Agriculture

The GTAP5 database provides estimates of post–Uruguay Round MFN bound-tariff protection against agricultural goods (Dimaranan and McDougall 2002, 4-1 to 4-6). These tariffs, which include the ad valorem

15. A slightly higher import price elasticity is warranted for textiles and apparel than for manufactures on average, because the two sectors tend to have above-average elasticities of substitution (domestic-import) in the CGE models that apply differing elasticities across sectors.

Table 3.7 Agricultural tariff rates (percent)

Sector[a]		Weight[b]	United States	Canada	European Union	Japan
1	pdr	2.94	4.9	0.0	64.9	409.0
2	wht	2.01	2.6	62.7	61.4	249.2
3	gro	2.76	0.6	8.9	38.6	20.2
4	v_f	8.63	4.7	1.9	14.5	44.9
5	osd	1.85	17.7	0.0	0	76.4
6	c_b	0.95	0.7	0.0	251.4	0.0
7	pfb	0.93	9.7	0.0	0	0.0
8	ocr	3.14	21.5	2.4	3.1	22.1
9	ctl	4.03	1.1	0.2	36.6	149.1
10	oap	5.71	0.6	19.8	6.7	5.0
11	rmk	3.96	0.0	0.0	0	0.0
12	wol	0.45	0.9	2.3	0	54.7
13	for	2.53	0.8	0.7	0.4	0.2
14	fsh	2.80	0.6	0.4	9	4.9
19	cmt	4.83	5.3	16.3	88.9	36.4
20	omt	5.40	3.6	72.4	30.9	58.2
21	vol	3.17	4.3	8.6	11.4	6.6
22	mil	5.61	42.5	214.8	87.7	287.0
23	pcr	3.05	5.3	0.7	87.4	409.0
24	sgr	1.93	53.4	4.9	76.4	116.1
25	ofd	21.73	11.4	14.1	28.8	38.3
26	b_t	11.59	3.0	62.5	8.3	16.2
Total		**100.00**	**8.8**	**30.4**	**32.6**	**76.4**

a. See table 4A.3 for sector definitions.
b. Weighted by the GTAP estimates of world output value for the corresponding products.

Source: GTAP5 database.

equivalents of specific tariffs, are reported in table 3.7. Where there are tariff-rate quotas, as a consequence of the Uruguay Round's conversion of quotas into tariff-rate quotas, the rates reported are the average between the in-quota and over-quota tariff rates (Gibson, Wainio, and Whitley 2002). The resulting estimated tariffs range as high as 409 percent for the protection of rice in Japan. When the protection rates are weighted by the GTAP estimates of world output value for the corresponding products (Gibson, Wainio, and Whitley 2002, 3-4, 3-5; MacLaren 1997, 214), the resulting weighted average tariff rates are 8.8 percent for the United States, 30.4 percent for Canada, 32.6 percent for the European Union, and 76.4 percent for Japan (table 3.7).[16]

In addition to tariffs, farm subsidies contribute substantially to agricultural protection. In the Uruguay Round, the amounts of these that were considered to have trade-distortive effects were summarized as the "Aggregate Measure of Support" (AMS). Under the Uruguay Round Agree-

16. The estimates here are lower than those in Cline (2002b) because of the availability of more detailed sectoral world output data than those used in the earlier estimates (from MacLaren 1997, 214).

ment on Agriculture (URAA), AMS levels were bound and countries committed to reducing these levels over time. These "amber box" subsidies were considered trade distorting.[17] The URAA committed industrial countries to reduce amber box subsidies by 20 percent over 6 years, and developing countries were to reduce theirs by 13 percent over 10 years (WTO 2002, 59).

As of 1998 (or closest year with AMS reported), the actual levels of the AMS were $6.2 billion for the United States, €51 billion for the European Union, ¥3.17 trillion for Japan, A$132 million for Australia, C$619 million for Canada, Kr10.9 billion for Norway, and SF3.3 billion for Switzerland (WTO 2002, 58). For the United States, a more meaningful AMS is the bound level ($20.7 billion). The reason is that new legislation in 2002 effectively set US agricultural subsidies at this level over the next decade. At 1998 exchange rates, and in light of the share of agriculture in GDP (2 percent for Canada, the United States, and Japan; and 2.3 percent for the European Union; WTO 2002, 296–97), the AMS subsidies (bound for the United States, actual for the others) amount to 2.3 percent of agricultural value added for Canada, 9.8 percent of agricultural production for the United States, 26.4 percent for the European Union, and 30.7 percent for Japan.

Some have argued that the WTO's AMS understates trade-distorting subsidies. De Gorter, Ingco, and Ignacio (2003) suggest that at least parts of the "blue box" permissible subsidies that are decoupled from production are in fact implemented in ways that stimulate output. They cite EU payments based on past acreage that are recalculated and prorated in proportion to the year's actual area planted, when the actual regional aggregate level exceeds the base level. Nevertheless, even if all blue box subsidies were added in, the AMS would not rise sharply. Thus, in 1999 the total OECD amber box subsidies were $80 billion and total blue box subsidies an additional $24 billion (de Gorter, Ingco, and Ignacio 2003, 3).[18] Considering that only some fraction of blue box subsidies would be appropriate to incorporate, the AMS measure would appear to capture the great bulk of production-distorting subsidies.

The OECD provides an alternative source of subsidy estimates. Unfortunately, most reports of these estimates tend to use a total that intermixes subsidies with tariffs and tariff-rate quota effects. The OECD calculates a

17. The WTO treatment of agricultural subsidies has classified domestic farm support programs in categories with varying degrees of acceptability. In the main "amber box" are trade-distorting measures, e.g., production-linked subsidies and farm price support programs. The Uruguay Round adopted commitments to phase these down over time. In contrast, subsidies in a "green box," e.g., research and other support unlinked to production, are not subject to reduction commitments. Neither are certain subsidies in a "blue box" that are not gauged to current production, e.g., acreage set-asides.

18. The largest amount for the latter was the EU's $20 billion, compared with its amber box total of $50 billion.

Producer Support Estimate (PSE), which in 2002–02 averaged $234.7 billion annually (de Gorter, Ingco, and Ignacio 2003, 2). However, 63 percent of the PSE was from "border measures," for example, tariffs and tariff-rate quotas. The other 37 percent, or $87 billion, was approximately the same as the AMS used here to capture subsidies as such. For the purposes of this study, the tariff and tariff-rate quota estimates from the GTAP5 database provide a more useful basis for analyzing protection, because they make it possible to separate out the distinct influences of subsidies on the one hand and tariffs and tariff-rate quotas on the other. In this approach, it would be double counting to consider both the tariff data and additional "subsidies" calculated from the PSE rather than AMS data.

The potential confusion between production subsidies and the OECD's support estimates is even greater when the OECD measure of Total Support Estimate (TSE) is used. The TSE adds in the amount of government spending on "general services provided to agriculture," such as research and development expenditures. The TSE concept is the basis for the $350 billion figure commonly reported in the press as the magnitude of agricultural subsidies in industrial countries.[19]

The failure of much of the policy debate to distinguish between production-distorting farm subsidies on the one hand and tariffs and tariff-rate quotas on the other is potentially counterproductive in terms of its impact on the negotiating strategy of developing countries in the Doha Round. Thus far, a disproportionate amount of their attention seems to have been focused on reducing industrial-country subsidies for agriculture. To the extent that this is an accurate portrayal, the implication is that they are focusing on the wrong problem: Their efforts should go more heavily toward reducing tariffs and tariff-rate quotas and toward increasing the volume thresholds at which the latter apply. A shift in this direction—especially if linked to a new emphasis on decoupling farm subsidies from production rather than eliminating them altogether—could provide a way forward after the breakdown in the Cancún ministerial meeting of Doha Round negotiations in September 2003, which occurred largely over the entrenched EU position on subsidies (albeit with the new "Singapore issues"—investment, competition, services, and trade facilitation—as the trigger for the breakdown).

Returning to the estimates of this chapter, in order to determine total agricultural protection, it is necessary to measure the combined effects of tariffs and subsidies. Appendix 3B sets forth a methodology for obtaining the tariff equivalent of the agricultural subsidy as a function of the subsidy rate and the ratio of domestic output to imports. The key elements of this estimate are the amount of the output-distorting subsidies (S), the amount of domestic agricultural output valued at world prices (Q_d), the

19. The average of TSE for all OECD countries in 2000–02 was $315 billion (de Gorter, Ingco, and Ignacio 2003, 2).

Table 3.8 Tariff equivalent of agricultural subsidies
(billions of dollars, percent and ratios)

Category	United States	Canada	European Union	Japan
Gross agricultural output, 2002 (V_d)	221.8	25.4	277.6	80.8
Average tariff (percent)	8.8	30.4	32.6	76.4
Agricultural output at world prices (Q_d)	203.9	19.5	209.4	45.8
Output-distorting subsidies (S):				
OECD (2000–02 average)	19.9	1.65	36.2	4.4
Subsidy rate (S/V_d) (percent)	9.0	6.5	13.0	5.4
Imports (M)	41.9	12.4	75.5	34.5
Exports (X)	57.0	17.4	70.6	2.4
Output/imports ratio ($\lambda = Q_d/M$)	4.87	1.57	2.8	1.3
Import share (ϕ_m)	0.22	0.86	0.35	0.44
Import price elasticity (β)	2.80	0.52	2.33	2.01
Tariff equivalent of subsidy (τ) (percent)	10.2	16.8	10.4	3.2

Sources: OECD (2003a, 2003e); WTO (2002); table 3.7.

ratio of domestic output at world prices to agricultural imports ($\lambda = Q_d/M$), and the price elasticity of demand for imports (β).

Table 3.8 reports estimates of these and other components of the calculation of the tariff equivalent of agricultural subsidies for each of the Quad countries, using the most recent data available. The table uses the closest concept for output-distorting components of the OECD's producer support subsidy estimate (average, 2000–02) as the central estimate for the amount of subsidies.[20] These OECD-based estimates turn out to be very close to the "bound" AMS figure for the United States, somewhat higher than the "actual" AMS figure for Canada, somewhat lower for the European Union, and sharply lower for Japan. Double counting tariff effects in some components of the AMS leads to a major overstatement in the WTO estimates for Japan.[21]

The price elasticity of demand for imports is needed to calculate the tariff equivalent of subsidies. As indicated in appendix 3B, when the price elasticity is high, a given subsidy rate tends to translate into a lower tariff equivalent, because the greater responsiveness of imports to price means that it takes a lower tariff to obtain the same cutback in imports.

20. The OECD subsidy components included are payments based on output, area planted/animal numbers, input use, overall farm income, and "countercyclical" payments (OECD 2003a, 234–78).

21. The AMS figure for Japan for 1998 is $25.8 billion, far above the OECD estimate of $4.4 billion. The AMS includes an imputed component for domestic price supports, even when the government does not make actual purchases from farmers. As a result, when tariff protection is high (as in the Japanese case) and the domestic price support program is redundant, the AMS overstates "subsidies." (I am indebted to David Orden for this point.)

The estimate of this elasticity in table 3.8 is again based on the its relationship to the elasticity of substitution between domestic goods and imports, and the share of imports in domestic use, as identified above. The average substitution elasticity for agricultural goods is 3.6 in the GTAP, World Bank Global Economic Prospects, and Harrison-Rutherford-Tarr (1996, 1997a) models. The varying import price elasticities in table 3.8 arise from the application of the varying import shares to this substitution elasticity.[22]

Using the OECD-based subsidy estimates and the method set forth in appendix 3B, and assuming that the elasticity of domestic supply is unity, the production-oriented subsidies translate into tariff equivalents of 10 percent for both the United States and the European Union, a surprisingly high 16 percent for Canada, and a low 3 percent for Japan. The low figure for Japan reflects its heavy reliance on extremely high tariff protection rather than subsidy payments to farmers as its means of agricultural protection. An equal level of the tariff equivalent for the United States and the European Union, despite the higher subsidy rate in the European Union, reflects the much higher ratio of domestic output to imports in the United States, and hence the larger impact of the boost to production relative to imports (implying a higher tariff to accomplish an equivalent import-suppressing outcome). Canada's tariff equivalent turns out to be more than twice its simple subsidy rate. This result is driven by the low price elasticity of imports, which at less than unity balloons the tariff-equivalent estimate, whereas for the other countries the price elasticity is 2 or higher and damps the tariff equivalent estimate.

The results for the tariff equivalent of subsidies are somewhat counterintuitive, for they conclude that in terms of the protective effect against imports, US agricultural subsidies are just as high as those in the European Union, and the tariff equivalents are higher for both than for Japan. This finding would not be obvious from the well-known US comparative advantage in agriculture. Nonetheless, as shown in table 3.9, when the subsidy tariff equivalents are chained to the tariff rates, for three of the four Quad countries the resulting overall protection shows the expected progression as related to comparative advantage, rising from about 20 percent in the United States to 46 percent in the European Union and a high of 82 percent in Japan. In contrast, Canada has relatively high total agricultural protection (52 percent tariff equivalent) even though its agricultural comparative advantage is much closer to that of the United States than the European Union.

22. Note that at the country level, imports no longer equal exports, so it is necessary to calculate domestic use as "apparent consumption": output (at world prices) plus imports minus exports, as the base for calculating the import share. The result is counterintuitive for Canada, which turns out to have a high import share even though it is a major agricultural exporter. This reflects large two-way trade, with imports about two-thirds as large as exports.

Table 3.9 Overall protection in agriculture (percent tariff equivalent)

Type of protection	United States	Canada	European Union	Japan
Tariffs	8.8	30.4	32.6	76.4
Subsidies	10.2	16.8	10.4	3.2
Total	19.9	52.3	46.4	82.1

Source: See text.

Table 3.9 also shows that for Canada, the European Union, and Japan, the protective effect of tariffs exceeds that of domestic subsidies. Only the United States, which has relatively low agricultural tariffs, has greater protection from subsidies than from tariffs. This finding confirms the diagnosis that much of the public debate on agricultural protection has tended to overemphasize subsidies and give insufficient attention to tariffs.[23]

A common argument concerning EU agricultural protection is that preferential access sharply reduces the average tariff. Gallezot (2002, 6, 9) provides data that can serve as a basis for examining this question. For MFN agricultural tariffs, including the ad valorem equivalent of specific tariffs but excluding above-quota tariff-rate-quota tariffs, he estimates a simple average rate of 20.7 percent in 2000, down from 26.1 percent in 1997. He estimates that in 2000, the European Union had total agricultural imports of €51.6 billion. Of the total, 22.7 percent was from countries with no preferential status, and hence presumably at an average tariff of 20.7 percent. Another 44.8 percent was from Generalized System of Preferences countries at an after-preference average tariff of 17.9 percent. A further 12.6 percent was from the 70 LDCs in Africa, the Caribbean, and the Pacific at an after-preference average tariff of 5.3 percent. A final 20.3 percent was from other preferential partners, primarily in Eastern Europe, at an average after-preference tariff of only 2.7 percent. It is straightforward to calculate that the resulting weighted average tariff, after taking account of preferences, was 13.9 percent.[24] On this basis, preferences might be said to reduce otherwise-applicable EU agricultural tariffs by an average of one-third (i.e., 1 – 13.9/20.7). Even this reduction is larger than would be associated with the developing countries usually cited in regard to prefer-

23. Another study stressing tariffs is Hoekman, Ng, and Olarreaga (2002b). Using a partial equilibrium framework, they find that "the positive welfare effect of reducing [agricultural] tariffs . . . is a multiple of what can be achieved from an equivalent percentage cut in domestic support only . . . [reflecting] not only . . . the high tariff peaks in OECD countries, but the fact that developing countries use tariffs to protect domestic production" (p. 18).

24. The author himself instead places the after-preference average at only 10.5 percent. However, this estimate is based on actual tariff revenue, which is usually considered to give a downward bias in comparison with an average of applicable tariffs.

ences, such as the LDCs, and is heavily driven instead by preferential access for relatively developed trading partners in Eastern Europe.

This preference-adjusted EU tariff is an understatement, moreover, because it apparently does not include the effect of above-quota tariff-rate quotas, and it is a simple average rather than one using world production rates. One way to incorporate the preference information into a more complete estimate of tariff protection is to start from the GTAP5 tariff average of 32.6 percent (table 3.9) and adjust it downward by one-third, assuming the proportionate reduction from overall preferences inferred from Gallezot's (2002) data. This approach would yield an EU agricultural tariff average of 21.8 percent after taking account of preferences. The corresponding total agricultural protection for the European Union, including the effect of subsidies, would be a 34.5 percent tariff equivalent rather than the table 3.8 estimate of 46 percent. On this basis, it can be said that adjusting for preferential entry does not sharply reduce overall agricultural protection for the European Union, and leaves total EU agricultural protection still about 14 percentage points higher than that in the United States.

For the European Union as well as other countries, moreover, the use of simple or trade-weighted tariff averages in agriculture may substantially tend to understate the protective effect by not specifically taking account of tariff dispersion. Peak tariffs tend to be higher in agriculture than in other sectors. Martin, van der Mensbrugghe, and Manole (2003) develop an approach converting the information from detailed tariffs (hence capturing dispersion) into an overall average, in the spirit of the trade restrictiveness index proposed by Anderson and Neary (1996). Essentially, the approach takes into account the fact that the welfare triangles from tariff distortion rise with the square of the tariff rather than linearly. Martin and his colleagues calculate that the European Union, whose average agricultural tariff is usually estimated at about 35 percent, has an average tariff that is equivalent to about 46 percent when dispersion is taken into account. On this basis, it might be said that the EU agricultural tariff in table 3.9 is understated rather than overstated (although presumably the same technique would boost the averages for the other countries as well).

Returning to the main estimates of table 3.9, it is again useful to use a partial equilibrium back-of-the-envelope approach as an initial gauge of the protective effect. Using 1998 trade data, the value of agricultural imports (HTS chapters 01–24) from developing countries amounted to $2.46 billion for Canada, $52.21 billion for the European Union, $20.84 billion for Japan, and $12.77 billion for the United States (calculated from OECD 2000). Applying the import price elasticities reported in table 3.8 to these import-base values, the following rough magnitudes may be estimated for the change in imports from developing countries as a consequence of removal of all agricultural tariffs, tariff-rate quotas, and domestic farm subsidies: Canada, $0.84 billion; United States, $2.2 billion; European Union,

$16.6 billion; and Japan, $9.4 billion—for a total of $29 billion annually for the Quad.[25]

IMF staff simulations using the GTAP model arrive at estimates on the same order of magnitude (IMF and World Bank 2002, 33). OECD agricultural distortions as of 1997 (including tariffs) are calculated to cause a loss in export revenue of $22.8 billion annually for non-OECD countries.[26] Presumably the figure would be somewhat higher if the six middle-income developing countries in the OECD (Czech Republic, Hungary, South Korea, Mexico, Poland, and Turkey) were added, because except for the Czech Republic and Korea these economies tend to be net exporters of agricultural goods. Another reason the IMF simulation estimates may be smaller than the back-of-the-envelope calculation here is that they incorporate a noninfinite elasticity of supply. The corresponding income loss calculated by the IMF staff is $8.7 billion annually.[27] As reviewed below, however, alternative CGE model estimates for this concept (static annual welfare loss by developing countries from industrial-country agricultural protection and subsidies) range as high as $31 billion annually, in the World Bank's Global Economic Prospects model at 1997 prices but 2015 economic scale, corresponding to about $17 billion at 1997 prices and 1997 economic scale.[28] The CGE model applied in chapter 4 of the present study arrives at estimates closer to the upper end of this range.

In contrast, much of the public debate often crystallizes around a much larger figure based on the OECD's TSE for farm support, discussed above. Typically on the order of $350 billion annually (OECD 2002a), this figure for support is often cited in a context of calls for liberalizing agricultural trade to provide greater opportunities for developing countries.[29] As a result, the informed public could be forgiven for drawing the mistaken conclusion that agricultural protection in industrial countries somehow costs developing countries something like $350 billion annually. Instead, the

25. The estimate is again of the form $\Delta M = zM_0$, where ΔM is the increase in imports, $z = -e[\Delta t/(1 + t)]$, and e is the price elasticity of demand.

26. Because the six developing-country members of the OECD have agricultural exports to the OECD that are almost equal to their imports from the OECD ($15.5 billion and $16.5 billion respectively in 1998; OECD 2000), shifting them to the "non-OECD" grouping would make little difference to the IMF simulation.

27. The IMF calculations also show that both the OECD and the non-OECD experience the greatest losses from their own import restrictions rather than those imposed on their exports by the other grouping.

28. This is calculated by multiplying the absolute IMF–World Bank results by the ratio of the World Bank percentage of GDP results to those from the IMF–World Bank study (table 3.12 below).

29. Thus, in his speech to the 2002 Annual Meeting, World Bank president James D. Wolfensohn remarked, "We know that agricultural subsidies in rich countries, at $1 billion per day, squander resources and profoundly damage opportunities for poor countries to invest in their own development" (Wolfensohn 2002).

great bulk of the cost is imposed on the industrial-country consumers and taxpayers themselves.[30] As indicated in chapter 4, the annual static welfare costs to developing countries resulting from agricultural protection (including their own) as estimated in the CGE model of the present study are about $45 billion, or only about one-eighth as large as the frequently cited $350 billion figure. Even so, these agricultural protection costs are high, and they are much higher if dynamic effects are taken into account.

Finally, an important dimension of the impact of agricultural protection is the question of whether developing countries suffer mainly from industrial-country protection of agriculture or, instead, mainly from their own protection. Some estimates (including those summarized in table 3.14) suggest that developing countries experience far greater welfare losses from their own agricultural protection and that of other developing countries than they do from industrial-country protection of agriculture. In a negotiating context, this point has been used to criticize the position of those developing countries that insist on reductions in industrial-country agricultural subsidies and protection but seek to avoid a reduction of their own agricultural protection on the grounds of "special and differential treatment." This issue will be examined in greater detail in chapter 4, where runs of the CGE model are implemented to shed additional light on this question. For the purposes of this chapter, however, it can simply be said that the estimates of total agricultural protection by industrial countries shown in table 3.9 suggest that this protection is extremely high, and that the potential benefits for developing countries from its reduction should be neither downplayed (e.g., by shifting attention to developing-country protection) nor exaggerated (e.g., by loose use of the $350 billion TSE figure as implicitly a direct cost to developing countries).

Aggregate Protection Against Developing Countries

The sectoral estimates of protection for textiles and apparel, other manufactures, and agriculture discussed above, and corresponding weighted average tariffs for oil and other nonagricultural raw materials, are combined in table 3.10 to obtain an Aggregate Measure of Protection (AMP) against developing countries for each of the four large industrial-country importers (i.e., the Quad). The adjusted-import-weighting method set forth in appendix 3A is applied for this purpose. All tariff rates are post–Uruguay Round bound levels; import shares are for 1998 (calculated from OECD 2000). The textile and apparel rates exclude the protective ef-

30. For 2001, the OECD places the estimate of TSE at $311 billion. This derives from $164 billion in transfers from consumers and $170 billion transfers from taxpayers, with a modest offset of $23 billion in budget revenue (OECD 2002a, 40).

Table 3.10 Aggregate Measure of Protection against developing countries (tariff equivalent, percent)

Sector	United States	European Union	Japan	Canada
I. Import-weighted average tariff				
Manufactures, excluding textiles and apparel	2.10	3.20	1.49	3.48
Textiles and apparel	10.87	11.62	9.20	16.45
Agriculture	19.92	46.37	82.05	52.26
Oil, other	0.92	0.58	0.29	0.93
II. Import shares				
Manufactures, excluding textiles and apparel	0.699	0.618	0.480	0.680
Textiles and apparel	0.145	0.119	0.097	0.120
Agriculture	0.039	0.117	0.144	0.106
Oil, other	0.117	0.145	0.279	0.094
III. Adjusted-import share weights				
Manufactures, excluding textiles and apparel	0.694	0.607	0.465	0.666
Textiles and apparel	0.149	0.121	0.097	0.124
Agriculture	0.041	0.131	0.169	0.119
Oil, other	0.116	0.141	0.269	0.091
IV. Aggregate Measure of Protection				
Import weighted	3.93	8.89	13.48	9.96
Adjusted-import weighted	4.01	9.53	15.55	10.68
Memorandum: excluding oil, other:				
Import-weighted	4.33	10.31	18.59	10.89
Adjusted-import-weighted	4.42	10.99	21.16	11.65

Source: Author's calculations.

fect of MFA quotas, because the estimates are for complete post–Uruguay Round protection and hence assume the full removal of quotas by 2005. Agricultural estimates include the tariff equivalent of subsidies, as discussed above.

The AMP estimates show substantial differences in the level of overall protection against developing countries, among the four big industrial-country areas. This is in contrast to the relatively homogenous industrial-country protection levels against developing countries in manufactures, including textiles and apparel. The differences are driven by the large differences in the summary protection measure for agriculture. Thus, because the EU agricultural protection measure is at a relatively high 46 percent tariff equivalent, whereas the US level is considerably lower at 20 percent, the overall AMP for the European Union stands at 10 percent, more than twice as high as the US 4 percent, even though the two areas' manufacturing protection levels are comparable at about 11 percent for textiles and apparel and 2 to 3 percent for other manufactures. The even higher Japanese protection in agriculture (82 percent) similarly places its overall AMP at an even more restrictive 16 percent.[31]

Even though the AMP measures show substantial overall protection, for some purposes they are underestimated by including oil. All industrial countries impose minimal tariffs (below 1 percent) on oil, and this low protection of oil has little to do with a forthcoming approach to openness of markets to goods from industrial countries more generally. Japan in particular is more heavily dependent on oil imports, so inclusion of oil tends to reduce the AMP disproportionately for Japan. As shown in table 3.10, if the sector of oil and other nonagricultural raw materials is excluded, the AMPs rise by about 1 percentage point each for the European Union and Canada but by about 5 percentage points for Japan.

The Impact of Industrial-Country Agricultural Trade Liberalization on Global Poverty

The high level of protection in agriculture is only one reason the sector deserves special attention. The other reason is that agriculture is unique in two important dimensions for analyzing the impact of its liberalization on poverty. First, because a large share of the global poor are in the rural sector, their incomes are likely to be closely related to world agricultural prices, which are artificially held down by the existing structure of international protection and subsidies. Second, food comprises a large share of the consumption budget of the poor, and induced real income losses from higher food prices must be carefully considered in drawing a balance on the overall impact of liberalization on global poverty.

Appendix 3C below sets forth a simple quasi-accounting model of this impact. It turns out, under simplifying assumptions, that a good approximation of the condition for industrial-country agricultural liberalization to reduce rather than increase global poverty incidence is that the share of food in the consumption basket of the poor be smaller than the fraction of the poor located in the agricultural sector. This result is for static welfare effects. If dynamic gains are added, there can be net gains for the poor even if somewhat more of them than this fraction live in the urban sector, and under optimistic assumptions about dynamic effects there can even be net gains for the urban poor.

The driving force behind poverty reduction in the rural sector and increase in the urban sector is the rise in world food prices when industrial

31. The AMP estimates here are different from those in Cline (2002b) because: (1) this version uses a more standardized database (OECD 2000); (2) the estimates here exclude the tariff equivalent of quotas on textiles and apparel because these are to be eliminated after full implementation of Uruguay Round commitments; and (3) new sectoral weights place the weighted average agricultural tariff levels lower than before for, especially, the European Union and Japan (table 3.7).

countries eliminate agricultural subsidies and agricultural protection. Because this liberalization will result in lower agricultural production in industrial countries, and this reduction will be offset only partially by an induced rise in agricultural production in developing countries, world agricultural prices will rise. This increase will in turn cause upward pressure on food prices within the developing countries themselves. The rural poor will tend to gain, because the rise in agricultural prices will affect nearly the entirety of their income but boost their living costs only by the proportion associated with food costs in the consumption basket. The rise in food prices will cause a real income loss for the urban poor from the impact on food consumption cost. This static effect may or may not be offset by eventual gains from induced economywide dynamic effects.

Appendix table 3C.1 reports the central case results of applying the model. For the 72 countries with relevant data available, accounting for 2.53 billion persons in poverty ($2 per day, purchasing power parity definition), a rise of world agricultural prices by 10 percent as the consequence of agricultural trade liberalization would reduce the incidence of poverty by 201.5 million persons, or by about 8 percent. The 10 percent rise in world prices is based on existing trade model estimates (see appendix 3C). This net effect comprises a large net reduction in poverty in most countries (i.e., 56 countries, with a net reduction of 204.3 million persons), which would be slightly offset by a net rise in poverty in a smaller number of countries (16, with an aggregate net increase in poverty of 2.8 million).

The principal influence leading to this result is that the poor predominantly live in the rural areas.[32] For the 72 countries, the aggregate portion of poor living in rural areas amounts to 74.7 percent.[33] Latin America is an important exception, because in several key countries more poor people live in urban than rural areas. With only about 14 percent of the poor in the rural areas of Argentina and 18 percent in Chile's, poverty rises by about 5 percent in each case. In contrast, there is virtually no change in poverty for Brazil, where the 39 percent portion of the poor living in rural areas is almost identical to the share assumed for food costs in the consumption basket.

32. Note, however, that poverty incidence also falls in urban areas in a handful of countries (9 of 72) where one of two conditions occurs. Where the poor population is almost entirely in the rural area (e.g., Vietnam), the static gains base on which the dynamic gains are extrapolated is sufficiently large relative to the number of urban poor that the dynamic gains for the urban poor outweigh the direct losses from higher food costs. Alternatively, where the fraction of agricultural production exported is especially high (e.g., Costa Rica), the static gains base applicable for the dynamic gains extrapolation is also large, leading to the same result (see appendix 3C).

33. The unweighted average portion of the poor living in rural areas is 59 percent. For the key large-population economies, however, this share is considerably higher, ranging from about 70–72 percent for India, Indonesia, Nigeria, and Pakistan to 89 percent for China and 94 percent for Bangladesh (see appendix 3C).

These results do show considerable sensitivity to the parameter assumptions. Under the set of unfavorable assumptions, global agricultural liberalization actually increases world poverty slightly, by 0.5 percent (14 million people). In contrast, under the set of favorable assumptions, poverty reduction reaches an impressive 18.5 percent, accounting for a massive 471 million reduction in the number of poor persons.

Although these calculations provide reassurance that global agricultural liberalization would not be injurious to the world's poor even though foodstuffs are crucial to their consumption budgets, the impacts on the urban poor do give one pause. Thus, even though the aggregate impact is a global reduction in poverty of about 200 million persons, within each country the urban poor tend to lose. The aggregate increase of urban poverty amounts to 54 million, whereas the aggregate reduction in rural poverty reaches 255 million. The winners among the poor thus outnumber the losers from global agricultural liberalization by a factor of almost five to one. Even so, the prospect for increased urban poverty suggests that in at least some countries, such mechanisms as food stamps might be important in helping to cushion the effect on the urban poor.

Concern about adverse effects on the urban poor is even more relevant if one considers the recent outbreaks of famine in sub-Saharan Africa. From a global standpoint, there is something inconsistent in pursuing policies that raise agricultural prices as a way to help the global poor, on the one hand, and ignoring adverse effects on those already facing famine, on the other. This suggests the possible desirability of a "famine relief box" of permissible agricultural subsidies if they are linked in some appropriate way to donations of agricultural goods for famine relief. For example, each year the Food and Agriculture Organization could designate (and update quarterly) a list of low-income countries experiencing famine conditions. Subsidies for food exports to these countries could then be exempt from general commitments reducing or eliminating agricultural export subsidies.

A recognition of the broad divergence of the impacts on rural as compared with urban sectors also illuminates a crucial aspect of the poverty impact of agricultural liberalization: internal income redistribution. Because most of the effects in question come from "transfer rectangles" rather than "welfare triangles," a major part of the reduction in poverty arises from what amounts to a transfer from the urban population (including, or especially, the urban nonpoor) to the rural population domestically, rather than from industrial-country farmers to poor-country farmers. Thus, in the model developed in appendix 3C, even a country that has no agricultural exports or imports at all experiences a reduction in rural poverty as a consequence of the transfer of income from the urban sector associated with higher food prices, so long as there is a sympathetic rise in domestic agricultural prices when world agricultural prices rise.

Finally, it should be noted that the analysis here abstracts from changes in developing countries' own protection of agriculture. As discussed in chapter 4, however, protection tends to be relatively high in agriculture in developing as well as industrial countries. The average level of agricultural tariffs in industrial countries is high at 36 percent, but in developing countries the average is not far behind at 30 percent (table 4.4). Nonetheless, as discussed in the next section of this chapter, the bulk of the world's poor live in countries that are net agricultural exporters, or at least have a comparative advantage in agriculture. This suggests that the high levels of protection tend to be redundant, or that the tariffs contain "water." That is, the local cost of agricultural production is low enough to compete on world markets, and the tariff is not the binding influence determining the level of imports because domestic supply is available at world prices.[34]

Even so, the presence of significant agricultural protection in developing countries does suggest that the central estimate of 200 million poverty reduction from agricultural liberalization may tend to be an overstatement for a scenario of global agricultural liberalization in which both developing and industrial countries remove protection. That is, if developing countries' protection is not redundant, its removal would tend to reduce prices to farmers, offsetting the rise in world prices and potentially even turning the net income effect for farmers negative.

These considerations suggest that in multilateral trade negotiations, developing countries should be prompt to offer to remove any agricultural protection that in practice is redundant, in order to increase the willingness of industrial countries to remove their protection in a somewhat reciprocal manner, rather than relying on unilateral industrial-country liberalization. However, where developing countries (especially net agricultural importers) do have significant binding (as opposed to redundant) agricultural protection, then considerations of poverty impact would point toward partial rather than complete liberalization and implementation on a lengthier timetable than otherwise.

Food Trade Balance and Poverty

A reasonable concern about global agricultural trade liberalization is that by pushing up prices of food, it could bring losses to poor countries that are net importers of foodstuffs. For this reason, it is of special interest to consider more closely whether poor countries tend on balance to be food importers.

34. One indication of redundancy is that applied agricultural tariffs in developing countries tend to be significantly lower than bound tariffs, whereas the two are much closer in industrial countries (WTO 2002, 51–52). In principle, the tariffs in the GTAP5 database (see table 4.4 in this study) are applied rather than bound tariffs, but in practice the bound levels are used in a number of cases for developing countries, especially in Africa (Rozanski, Kuwahara, and Amajadi 2002).

The GTAP database used in chapter 4 below for modeling the impact of multilateral trade liberalization provides a convenient summary of data that can be brought to bear on this question. This database, which in its most recent version (GTAP5) reports trade data for 1997, aggregates trade into 57 product groups and 66 countries or regions. The regions and products are enumerated in appendix 4A (tables 4A.1 and 4A.3).

Table 3.11 reports the exports, imports, and trade balance of food products in this database for the 41 countries or regions that are relevant for global poverty. The products include rice (paddy and processed); wheat; other cereal grains; vegetables, fruits, and nuts; oil seeds; other crops; meat and dairy products; and other food products.[35] They exclude raw and processed sugar, which although a foodstuff is mainly a tropical export that could give a misleading impression of degree of dependence on food imports.

The strong pattern in table 3.11 is that developing countries are net exporters of food. China (CHN in the table) and India (IND) are both net exporters by a small margin. So is Indonesia (IDN). The only country toward the top of the list of number in poverty with a negative food trade balance is Pakistan (XSA), which on balance imports only a net $8 per capita in food. In Africa, Botswana (BWA) is a substantial net food importer (at $73 per capita), but otherwise the region tends to be a net exporter. South Africa (XSC), Malawi (MWI), Mozambique (MOZ), Tanzania (TZA), Zambia (ZMB), Zimbabwe (ZWE), and Uganda (UGA) are all net food exporters. The important aggregate case of the "rest of sub-Saharan Africa" (XSS), numbering 477 million people, is also a net exporter of food, although only slightly so. This does mean that some individual countries may be substantial net importers, but the dominant pattern is of broad food trade balance in this key grouping.

The developing countries that are clear net food importers tend to be upper middle income. These include especially South Korea (KOR), with net food imports of $119 per capita annually; Russia and other former Soviet Union countries (XSU); and the rest of Eastern Europe (XSE, and POL, Poland), with the strong exception of Hungary (HUN). The Middle East and North Africa (XME and XNF) are also relatively large net food importers. In Latin America, only Mexico (MEX) and Venezuela (VEN) are net food importers, and in amounts that are relatively small in Mexico ($8 per capita) and moderate in Venezuela ($40).

In sum, the data in table 3.11 should provide considerable reassurance that the problem of the adverse impact of agricultural liberalization on global poverty because of the poor's reliance on food imports is at most a selective and limited one. It is obvious from the table that any poverty-weighted net food trade balance would show that, on balance, the poor

35. These correspond to the product groups 1–5, 8–11, 19–23, and 25 in table 4A.3 in this volume.

Table 3.11 Food trade balance in developing countries, 1997

Economy or region	Exports (millions of dollars)	Imports (millions of dollars)	Balance (millions of dollars)	Population (millions)	Food balance (per capita dollars)
3 CHN	11,891.8	10,433.5	1,458.3	1,253.6	1.2
6 KOR	2,188.2	7,761.7	–5,573.5	46.9	–118.8
8 IDN	5,487.6	3,485.0	2,002.6	207.0	9.7
9 MYS	5,805.7	3,823.4	1,982.3	22.7	87.3
10 PHL	1,835.0	2,865.3	–1,030.3	74.3	–13.9
12 THA	7,340.4	2,843	4,497.4	60.3	74.6
13 VNM	1,969.7	431.2	1,538.5	77.5	19.8
14 BGD	382.9	987.4	–604.5	127.7	–4.7
15 IND	6,532.0	2,114.8	4,417.2	997.5	4.4
16 LKA	521.4	521.1	0.3	19.0	0.0
17 XSA	806.7	2,109.4	–1,302.7	159.3	–8.2
20 MEX	5,368.1	6,504.3	–1,136.2	96.6	–11.8
21 XCM	7,074.6	5,368.0	1,706.6	55.0	31.0
22 COL	3,927.3	1,519.1	2,408.2	41.5	58.0
23 PER	2,006.4	1,045.9	960.5	25.2	38.1
24 VEN	518.2	1,465.5	–947.3	23.7	–40.0
25 XAP	3,116.9	735.5	2,381.4	20.6	115.9
26 ARG	11,885.7	1,577.8	10,307.9	36.6	281.8
27 BRA	12,538.1	5,127.2	7,410.9	168.0	44.1
28 CHL	3,668.2	1,104.8	2,563.4	15.0	170.7
29 URY	1,220.9	317.5	903.4	3.3	272.9
30 XSM	1,011.9	388.0	623.9	5.4	116.4
48 HUN	2,255.2	969.0	1,286.2	10.1	127.7
49 POL	2,531.4	3,274.3	–742.9	38.7	–19.2
50 XCE	2,395.2	3,854.2	–1,459	48.3	–30.2
51 XSU	6,502.1	17,679.0	–11,176.9	257.3	–43.4
52 TUR	4,008.2	3,176.4	831.8	64.4	12.9
53 XME	3,002.4	13,508.1	–10,505.7	120.7	–87.1
54 MAR	1,347.7	986.0	361.7	28.2	12.8
55 XNF	1,168.4	7,555.3	–6,386.9	102.1	–62.6
56 BWA	78.1	194.6	–116.5	1.6	–73.3
57 XSC	2,258.0	1,645.8	612.2	42.1	14.5
58 MWI	432.6	10.9	421.7	10.8	39.1
59 MOZ	136.3	82.3	54.0	17.3	3.1
60 TZA	441.2	188.7	252.5	32.9	7.7
61 ZMB	44.9	21.9	23.0	9.9	2.3
62 ZWE	956.0	171.5	784.5	12.0	65.4
63 XSF	178.9	572	–393.1	13.5	–29.1
64 UGA	486.2	39.9	446.3	21.5	20.8
65 XSS	6,920.0	3,364.9	3,555.1	477.4	7.4
66 XRW	3,102.2	5,078.0	–1,975.8	58.7	–33.7

Note: The codes given above for economies and regions are spelled out in the GTAP5 column.

Source: GTAP5.

globally live in net food-exporting rather than food-importing countries (a result ensured by the estimates for China and India).

Two further dimensions of this issue warrant exploring. The first is whether this judgment is valid for the LDCs as well as for developing countries overall. The second is a more subtle but crucial economic point: Just because a country has a food (or agricultural) trade deficit, it does not follow that it will be adversely affected by a rise in relative food (or agricultural) prices following global trade liberalization. What matters is whether the country has a comparative advantage in food (or agriculture).

Appendix 3D reports estimates on both of these further questions. Consider first the simple question of whether LDCs have trade deficits in food and agriculture. As indicated in the table, the answer is a clear yes. Of the 45 LDCs for which data are available, on average 35 (including Bangladesh) had food trade deficits in the period 1999–2001. Thirty (including Bangladesh) also had agricultural trade deficits. If the analysis stopped there, as it usually does, the implication would be that higher world food and agricultural prices resulting from trade liberalization will be disadvantageous to LDCs.

The analysis needs to recognize, however, that these countries typically are not just trade deficit countries in food (and/or agriculture). They are trade deficit countries in everything, reflecting large inflows of foreign assistance that pays for a substantial portion of imports. If a country's trade deficit is relatively more extreme in nonfood products, however, then it can actually benefit from global trade liberalization, even though the relative world price of food rises and it is a net food importer. The reason is that it gains more in the *reduction* of the relative price of manufactured and other nonfood imports than it loses in the rise in the relative price of food, because it is more intensively a net importer of nonfood than it is of food.

Consider the following logic. First, global trade liberalization raises the relative price of food (as discussed above). Second, global trade liberalization should not raise average prices, because if it did, it would be welfare reducing rather than welfare increasing. Third, it follows that global trade liberalization reduces the price of nonfood products. This means that even a food deficit country can obtain a welfare gain from improved terms of trade, as long as it has a comparative advantage in food.

A measure of revealed comparative advantage is the ratio of exports to imports. So the key test for the net impact of liberalization on food importers is whether the ratio of food exports to food imports (which will be less than unity by definition) is greater than or less than the ratio of nonfood exports to nonfood imports. As shown in appendix 3D, it turns out that *fewer than half of LDCs have a comparative disadvantage in food.* More than half have a higher ratio of food exports to food imports than their ratio of nonfood exports to nonfood imports. Moreover, *excluding Bangladesh, countries with a comparative disadvantage in food account for only 29 per-*

cent of the total number of poor people in LDCs. The corresponding conclusion is that *71 percent of the poor in LDCs (excluding Bangladesh) live in countries that should benefit from improved terms of trade as world food prices rise from global trade liberalization.*

This finding should counter the view that it is not in LDCs' general interest to have liberalization in global agriculture because food prices will rise. Basically, that view ignores the fact that these countries tend to have a comparative advantage in food despite their trade deficits in agriculture. Thus, the general equilibrium effect will be that the direct adverse effect of higher prices for their net agricultural (or food) imports will be more than offset by relative declines in nonfood goods, which are even more important in these countries' imports and less important in their exports. As shown in appendix 3D, this same set of conclusions applies if the focus is shifted from food to all agricultural products.

Finally, the crucial exception of Bangladesh warrants special attention. Bangladesh accounts for about one-fifth of the total poverty population of LDCs. As a major exporter of textiles and apparel in particular, this country has a comparative disadvantage in both food and agriculture. Its ratio of exports to imports for food and also for agricultural goods is less than one-tenth of its ratio of exports to imports for all other goods. This indicates that Bangladesh would lose from global trade liberalization from the standpoint of higher relative agricultural prices. However, as will be found in the CGE estimates of chapter 4, Bangladesh turns out to have positive overall welfare effects from global trade liberalization, so increased export opportunities in textiles and apparel and other manufactures more than offset higher relative prices for its food and agricultural imports.

Contingent Protection

In addition to tariffs (including quota-rate tariffs in agriculture after conversion of quotas in the Uruguay Round) and the remaining MFA quotas in textiles and apparel, developing-country exporters face "contingent" or "process" protection in industrial-country markets. These have primarily included antidumping duties, countervailing duties to offset export subsidies, and "safeguard" (GATT Article XIX) restrictions. In practice, and since the Uruguay Round banned the so-called voluntary export restraint, antidumping duties have become the instrument of choice for contingent protection, not only in industrial countries but increasingly also in developing countries. This is because antidumping can be levied against individual exporting countries instead of on an MFN basis; it is unilateral and requires no WTO compensation; its injury test is typically softer than that for safeguards; its unfair trade rhetoric facilitates imposition politically; and the legal and administrative costs are borne by the exporter (Finger, Ng, and Wangchuk 2001).

Table 3.12 Intensity of antidumping initiations per dollar of imports, 1995–99

	By			
Against	United States	European Union	Japan	Canada
Industrial economies	61	22	0	64
China	186	681	0	262
Transition economies	672	517	0	2,897
Other developing countries	133	150	0	209
All: Index	100	100	0	100
All: Number	136	160	0	50

Source: Finger, Ng, and Wangchuk (2001).

Moreover, instead of being strictly limited to the traditional test of selling at a lower price in the export market than at home, antidumping in recent years has increasingly been based on a constructed cost methodology based on questionable measures of cost (including exaggerated imputed profit rates). This has meant, correspondingly, that pricing treated as unfair under antidumping would rarely have been questioned under domestic competition law (Lawrence 1998; Lindsey 1999).

Developing countries have tended to face a disproportionate incidence of antidumping investigations in industrial-country markets. This is especially true for transition economies, perhaps in part because of the appeal of imputing constructed costs on grounds that (earlier) nonmarket economies did not have meaningful cost data. As indicated in table 3.12, compared with an index of 100 for the average ratio of number of antidumping initiations relative to total import value, the intensity of antidumping has been well below 100 for imports from industrial economies, and well above 100 for imports from developing countries. The intensity index is in the range of 130–200 in the US, EU, and Canadian markets for goods from most developing countries; in a range of about 200–700 for imports from China; and reaches 500–700 for imports from transition economies (and nearly 3,000 in the case of the Canadian market).

It should be stressed that antidumping has also been employed by the developing countries themselves. Indeed, whereas traditionally the instrument was used primarily by industrial countries, after the Uruguay Round there were actually more antidumping initiations by developing countries than by industrial countries (566 vs. 463 during the period 1995–99; Finger, Ng, and Wangchuk 2001, 12). It may also be noted that Japan has been the prime exception, and has not used antidumping measures.

Unfortunately, there appear to be no major estimates of the economic impact of antidumping measures. Most estimates are confined to counts of initiations (or number of tariff lines involved), so it is difficult to tell whether the protective effect is large or small, and where it ranks in comparison with tariff and other nontariff protection. The simple number of

Table 3.13 Core nontariff barriers, 1996[a] (percent of tariff lines)

Type of manufacture	United States	European Union	Japan	Canada
Food, beverages, tobacco	2.8	17.2	5.9	0.4
Textiles and apparel	67.5	75.2	31.9	42.9
Wood, wood products	0.6	0	0	3.2
Paper, paper products	1.1	0.7	0	0.4
Chemicals, petroleum products	3.3	2.9	0.9	0.6
Nonmetallic mineral products	3.6	0	0	0
Basic metal industries	30.4	0.6	5.1	1.7
Fabricated metal industries	5.9	0	0	2.2
Other manufacturing	1.7	0	0	0.9
All manufacturing	17.9	13.4	10.3	7.8

a. Antidumping and countervailing actions, export restraints, and other quantitative restrictions, export price restraints, variable charges, and nonautomatic licensing.

Source: WTO (2002).

antidumping initiations is modest (e.g., 136 cases for the United States in a five-year period; table 3.12). Moreover, it would appear that the cases are concentrated in certain sectors (especially steel, for the United States).

The OECD has compiled data on the incidence of "core nontariff barriers" (NTBs) that include not only antidumping measures but also countervailing duties, quotas (notably under the MFA), export price restraints, variable charges, and nonautomatic licensing. As shown in table 3.13, for 1996 these core NTBs were extremely high in textiles and apparel (in which about 70 percent of tariff lines were affected, in the United States and the European Union). They were also quite high for "basic metal industries" (which include steel) in the case of the United States (30 percent). Otherwise, the principal instance of relatively high core-NTB coverage is for food, beverages, and tobacco in the European Union (17 percent). Considering that MFA quotas are to be eliminated by 2005, and keeping in mind that most agricultural restraints in 1996 were quotas (i.e., the EU core NTBs just cited) but that quotas have been converted to tariff-rate quotas by the Uruguay Round, the implication is that after full implementation of the Uruguay Round, contingent protection will be relatively limited and concentrated in basic metal industries.

The most conspicuous recent instance of contingent protection is the safeguard protection imposed on US steel in 2002. Steel has long been one of the main US industrial sectors periodically receiving major protection. Antidumping and countervailing have been the principal instruments in recent years. As of early 2001, approximately 80 percent of steel imports were subject to antidumping orders (Hufbauer and Goodrich 2002, 4). In June 2001, President George W. Bush requested an investigation by the International Trade Commission under the safeguards law (Section 201) providing for temporary protection for sectors experiencing injury from imports.

In the eventual presidential decision issued in March 2002, tariffs of 30 percent were imposed on flat rolled steel, tin mill products, and hot-rolled bar and cold-finished bar steel; 15 percent on rebar (used in construction), pipes, and stainless rod and bar steel; and 8 percent on stainless wire (*Wall Street Journal*, March 6, 2002). The timetable called for the 30 percent tariffs to fall to 24 percent in the second year, 18 percent in the third year, and then expire (with a corresponding degression to 12 percent in the second year and 9 percent in the third year for the 15 percent tariffs). The executive decision was oriented toward imposing the heaviest protection on steel from China, the European Union, Japan, South Korea, and Taiwan. In contrast, partial special exemptions were granted for key political allies (Turkey) and some politically important developing countries (Argentina, Brazil, Russia). NAFTA partners were also exempt but were warned not to create a surge in exports. The decision provided that "consistent with WTO rules," developing countries that exported only "small amounts" of steel to the United States would also be exempted. As a result, the only developing countries subject to the safeguard duties, and only for selected products, were Brazil, India, Moldova, Romania, Thailand, Turkey, and Venezuela (USTR 2002).

The basis for US steel safeguards was technically in doubt because any surge in imports had occurred in the late 1990s rather than in the period immediately preceding the investigation. It can be argued that the move (along with the mid-2000 escalation in planned US agricultural subsidies) was a necessary tactical movement to ensure congressional passage of the Bush administration's Trade Promotion Act granting fast-track negotiating authority for the Doha Round and a number of prospective free trade arrangements (most notably, the Free Trade Area of the Americas, or FTAA) (Bergsten 2002). Nonetheless, the European Union threatened retaliation carefully targeted toward politically sensitive US products and regions. Subsequent US exemptions of products of special interest to the European Union facilitated the postponement of any EU retaliation before the completion of the lengthy WTO review process.[36]

In late 2003, the WTO declared the US steel safeguard tariffs illegal. The Bush administration then removed the tariffs, bringing this episode to a close. This decision was facilitated by the changing politics of protection for the sector, as opposition to the tariffs by steel-using sectors in several industrial states increasingly offset any political gains in steel-producing states. From the standpoint of impact on developing countries, however, the main point would seem to be that the latest round of contingent protection in US steel was unusually benign, because it largely exempted

36. For an analysis of developments through late 2002, see Hufbauer and Goodrich (2003).

developing-country suppliers, and it may even have created some temporary export opportunities through trade diversion from the main industrial-country suppliers.

In short, if the recent US steel episode is any indication, the impact of contingent protection against developing countries in manufactured goods may be diminishing, especially considering that this sector has been the most prominent (outside agriculture and textiles and apparel) for this type of protection (table 3.13).

General Equilibrium Model Estimates of Trade Liberalization Effects

In an important sense, the most meaningful measure of the extent of remaining industrial-country protection against developing countries is a calculation of the prospective gains in exports and economic welfare that could be obtained by developing countries as a result of the removal of industrial-country barriers. Numerous CGE model estimates have been prepared in recent years providing estimates of the impact of trade liberalization.[37]

At the simplest level, the traditional "partial equilibrium model" for trade liberalization comprises a series of product-specific "elasticities" of supply and demand, confronted with changes in price when the tariff or quota is eliminated to obtain an estimate of the change in trade volume and net consumer and producer welfare (e.g., see the illustrations in appendices 3A and 3B). In such models, highly detailed tariff-line calculations can be made, although the availability of reliable empirical estimates of elasticities is typically problematic.

In contrast, the CGE models tend to be far more aggregative, comprising, for example, one- or two-dozen product sectors and "countries" or regions. There tends to be far richer variety in the styles of one model or another. For example, perfect competition will tend to generate the solution that a country either exports or imports a given product but does not have two-way trade in a single product sector. To approximate reality, often the "Armington assumption" is made that a product imported from one region is "differentiated" from the same product imported from a different region. Alternatively, the "new trade theory" emphasizing two-way trade resulting from imperfect competition, economies of scale, and heterogene-

37. For example, for a description of one of the most widely used CGE models, the GTAP model, see Hertel and Tsigas (1997). The model comprises accounting equations (e.g., product value equals the sum of factor and input costs; import price equals foreign f.o.b. export price plus transportation cost and import tax), behavioral equations (firms' choice of factor combinations, households' constant-share budget expenditure systems), and "closure" rules (e.g., fixing the current account balance). Reducing a tariff causes changes in consumption and production that must work through this system until all of the market-clearing conditions (e.g., uniform price for a given factor of production) obtain.

Table 3.14 Impact of complete trade liberalization on developing-country income (billions of dollars; percent in parentheses)

Liberalizing group, type of impact, and source	Sector				
	Agriculture	Textiles and apparel	Other	Total	Notes
I. Industrial countries					
Static					
AFHHM	11.6	9.0	22.4	43.1	a
DFS (OECD)	n.a.	n.a.	n.a.	43	b
IMFWB	8.7 (0.14)	23.8 (0.39)	n.a.	n.a.	c
WBGEP	31 (0.27)	19 (0.17)	26 (0.23)	75 (0.65)	d
Total, including dynamic					
WBGEP	99 (0.86)	20 (0.17)	7 (0.06)	124 (1.08)	d
DFS (OECD)	n.a.	n.a.	n.a.	292 (3.1)	
II. All countries					
Static					
AFHHM	43.0	12.6	52.6	108.1	a
DFS (OECD)	n.a.	n.a.	n.a.	18 (0.2)	b
BDS	n.a.	n.a.	n.a.	370 (5.8)	e
IMFWB	30.4 (0.51)	51.8 (0.87)	n.a.	n.a.	c
WBGEP	142 (1.23)	24 (0.21)	20 (0.17)	184 (1.6)	d
Total, including dynamic					
DFAT	n.a.	n.a.	n.a.	— (3.5)	f
DFS (OECD)	n.a.	n.a.	n.a.	455 (4.9)	b
WBGEP	390 (3.4)	123 (1.1)	27 (0.23)	539 (4.7)	d

n.a. = not available

a. 2005 scale, 1995 dollars.
b. 2010 scale, 1995 dollars. Case I includes a 50 percent tariff cut for developing countries.
c. 1997 scale and dollars. Welfare measure.
d. 2015 scale, 1997 dollars.
e. 2005 scale, 1995 dollars. Includes economies of scale, monopolistic competition, and product heterogeneity effects.
f. Includes liberalization of services.

Sources: AFHHM: Anderson et al. (2000); DFS: Dessus, Fukasaku, and Safadi (1999); IMFWB: IMF and World Bank (2002); WBGEP: World Bank (2002a); BDS: Brown, Deardorff, and Stern (2001); DFAT (1999).

ity is adopted in some models, requiring correspondingly greater information. Another crucial dimension of the differences among CGE models is whether or not dynamic effects are added to static effects. Within the dynamic effect models, some may be based upon induced capital formation, whereas others are premised on induced productivity growth changes.

Table 3.14 reports recent estimates of leading CGE models for the impact of post–Uruguay Round trade liberalization. A number of important generalizations can be inferred from these estimates:

- The gains to be obtained from removal of post–Uruguay Round protection remain substantial, even after the tariff cuts and reductions in

NTBs in that round. Static gains for developing countries from the liberalization of industrial-country markets tend to be in the vicinity of $60 billion annually at mid-1990s prices but scaled to a future, larger economic base as of 2005 to as late as 2015. This magnitude is on the order of two-thirds of 1 percent of GDP for developing countries. It is also about the same as the current annual flow of concessional development assistance, although in the case of trade liberalization the benefits would be much more heavily oriented toward the large middle-income economies rather than the low-income countries that receive most of concessional aid.

- The gains are highly concentrated in agriculture and in textiles and apparel, with all other sectoral gains (almost wholly manufactures, given already typically free entry in such key raw materials imports as oil) about comparable in magnitude to either agriculture or textiles-apparel singly.

- In the studies summarized in table 3.14, developing countries' estimated gains tend to be even larger from the liberalization of their own markets and those of their developing-country peers than from the liberalization of industrial-country markets.[38] However, as examined in chapter 4, the CGE analysis of the present study finds just the opposite, as does recent CGE modeling by the OECD (2003c).

- Dynamic gains tend to be larger than static gains. The most conspicuous example is World Bank's Global Economic Prospects model (WBGEP)—in which total gains, including dynamic ones, are two to three times static gains, depending on whether liberalization is just by industrial countries or developing countries remove their barriers as well. The inclusion of dynamic gains tends to boost total estimated gains to the range of 3 to 5 percent of developing-country GDP for global liberalization, and 1 to 3 percent of developing-country GDP for liberalization only by industrial countries.

- Model coverage can matter as much as the inclusion or exclusion of dynamic gains. Thus, primarily because of the inclusion of liberalization of barriers in services trade, the model of Brown, Deardorff, and Stern (2001) estimates higher gains (5.8 percent of developing-country GDP) than any of the other models considered, even though it captures only "static" effects.[39]

38. A sharp exception is the model of Dessus, Fukasaku, and Safadi (1999), which places heavy emphasis on the loss of tariff revenue to developing countries when they are included in the imports liberalized.

39. The overall percent of GDP estimate for the model of Brown and her colleagues is inferred from their country- and region-specific welfare estimates (Brown, Deardorff, and Stern 2001, 40). Liberalization of services accounts for 64 percent of total gains in this model.

The incorporation of "new trade theory" effects in model structure, as in the Brown-Deardorff-Stern model, also tends to boost estimated welfare effects. In the traditional static model, the upward-sloping supply curve means that marginal cost is rising. Under economies of scale, marginal cost is falling. It follows that when production for exports expands, the traditional model will show much less welfare gain than a model incorporating economies of scale.[40] The inclusion of imperfect competition arises as a natural concomitant of economies of scale, and it boosts potential welfare effects because the erosion of monopoly power through increased import competition makes it possible for production to move closer to the socially efficient level. The inclusion of product differentiation allows for two-way trade in a given product sector instead of complete specialization.[41]

Similarly, the intuition behind the "dynamic productivity effects," such as those included in the WBGEP model, is straightforward, if somewhat ad hoc in terms of traditional trade theory. The broad notion is that exposure to international trade acts as a stimulus to technical change and hence productivity growth. The World Bank (2002a, 180) calibrates this effect by positing the relationship $\gamma^e = \chi^0(E/X)^\eta$ for a given sector, where γ^e is the additional productivity growth attributable to openness, E/X is the ratio of exports to output, η is the elasticity of productivity growth with respect to this openness ratio, and χ^0 is a constant set so that γ^e contributes an average of 40 percent of productivity growth. The model appeals to economies of scale through increased exports as one motivation for this treatment, as an alternative to incorporating scale economies directly in the model.

The central question on the induced-productivity dynamics is simply how to obtain robust estimates of these parameters. The parameters assumed in the WBGEP model seem plausible.[42] Chapter 5 examines the

40. There will be partially offsetting losses of economies of scale in import-competing industries, but because these are less efficient, the losses will be smaller than the gains in the export sectors.

41. As reviewed in chapter 4, however, Harrison, Rutherford, and Tarr (1996) find that in the increasing-returns-to-scale version of their CGE model, the increase in static welfare effects above those estimated in the constant-returns-to-scale version is considerably smaller than is often asserted in other studies.

42. Thus, consider a sector with exports equal to 20 percent of output and productivity growth of 3 percent. The trade influence accounts for 40 percent of productivity growth, or 1.2 percent. Suppose trade liberalization boosts the trade ratio by 10 percent. With an elasticity of unity (η is set at unity in WBGEP), the result is to raise this trade component to 1.32 percent. Over a decade, the extra 0.12 percent annual productivity growth boosts output by about 1.2 percent. This order of magnitude is consistent with the difference between the static and total effect in the WBGEP results for case I in table 3.14, where only industrial countries liberalize. The larger difference for case II (liberalization by developing countries as well) is heavily concentrated in the agricultural sector, suggesting that the model shows high increases in agricultural trade ratios when the developing countries liberalize their own barriers.

literature on this question and arrives at its own summary parameters, which are broadly consistent with the WBGEP measurement of this effect.

In summary, the leading CGE models tend to place the gains to developing countries from post–Uruguay Round elimination of protection at about two-thirds of 1 percent of GDP (static) to 2 percent of GDP (total including dynamic) from the removal of industrial-country protection, and at about 2 percent (static) to 5 percent (total including dynamic) if developing countries also remove their own protection. Although the total effects are more relevant in principle, the conceptual basis for and empirical estimates of the dynamic effects are far less widely agreed on than is true for the traditional static effects.

The Poverty Impact of Trade Liberalization

The World Bank (2002a) has considered the implications of its trade liberalization estimates for global poverty. The WBGEP model estimates include calculations on changes in factor incomes. These indicate that complete trade liberalization would raise unskilled wages in developing countries by 5.7 percent from the baseline reference path without trade liberalization by 2015 for the static model, and by 7.4 percent for the model including dynamic productivity gains (World Bank 2002a, 173). Applying a poverty elasticity of –2, the World Bank thus estimates that trade liberalization would reduce global poverty by 15 percent (2×7.4), or by 320 million people in 2015 (p. 174). Of particular importance, the World Bank estimates imply that even in the baseline without trade liberalization, global poverty at the $2 per day threshold should have declined from 2.9 billion today (chapter 1) to 2.13 billion (= 320/0.15). This means in effect that complete trade liberalization would boost the rate of reduction of the absolute number of the global poor from 2 to nearly 3 percent annually.[43]

A subsequent World Bank study uses the same GEP model to estimate the trade and poverty impact of a more realistic liberalization scenario (World Bank 2003, 48–51). Industrial countries are assumed to cut agricultural tariffs to no more than 10 percent and a target average of 5 percent, and to reduce tariffs on manufactured goods to no more than 5 percent and a target average of 1 percent. Developing countries are assumed to implement corresponding ceilings and averages of 15 and 10 percent for agriculture and 10 and 5 percent for manufacturing, respectively. There

43. The World Bank baseline suggests a greater optimism about growth and poverty reduction during the next 15 years than the in the past decade. The institution estimates that from 1990 to 2000 the absolute number in poverty remained unchanged, because population growth offset a reduction in poverty rates (see chapter 1). In contrast, the projection through 2015 implies an annual reduction of about 2 percent in the absolute number of poor people (baseline without trade liberalization).

would be complete elimination of export subsidies, specific tariffs and tariff-rate quotas, and antidumping penalties. This scenario would achieve an estimated three-fourths of potential gains from complete free trade. In this outcome, the number of poor people in developing countries at the $2 per day threshold would decline by 144 million from the baseline level.[44] In contrast to the results of chapters 4 and 5 below, the largest absolute reductions would be in sub-Saharan Africa (67 million) and Asia (45 million; World Bank 2003, 52). As discussed in chapter 5, this study finds a greater concentration of poverty reduction in Asia, in part because the poverty elasticity tends to be higher there than in Latin America and sub-Saharan Africa.

This earlier World Bank estimate is consistent in order of magnitude with that identified above in this chapter as the static poverty reduction impact of liberalization in agriculture alone (an 8 percent reduction in global poverty). Conceptually, the two effects are different, because the World Bank estimate is largely driven by a real income effect, whereas the agricultural estimate in the present chapter implicitly also involves an internal redistribution from the nonpoor urban to poor rural population. There is considerable congruence as well, however, because presumably much of the rise in real unskilled wages in the World Bank estimates reflects higher rural wages from agricultural liberalization (especially in view of the outsized share of agriculture in the total liberalization gains, including dynamic, in the WBGEP model; see table 3.14).

Chapters 4 and 5 below present new CGE-based estimates of the potential reduction in global poverty resulting from trade liberalization. Chapter 4 estimates the static welfare and poverty impacts. Chapter 5 incorporates dynamic effects from productivity gains and induced capital investment, and it arrives at approximately 500 million people (440 million central estimate, 592 million high) as the number who could be lifted out of poverty by global free trade during a 15-year period. *The estimates of this study for the poverty-reducing impact of global free trade are thus about half again as large as the corresponding estimates by the World Bank*, and more than three times the World Bank's more recent "realistic scenario" calculation. The reasons for the differences are set forth in chapter 5.

It is important to reiterate that in the World Bank (and some other) estimates, much of the potential for welfare gains and poverty reduction in developing countries is sacrificed if the developing countries do not liberalize their own markets. The WBGEP welfare estimates (including dynamic effects) are only 23 percent as high for developing countries if the only markets liberalized are those of industrial countries. The implication is that about three-fourths of the potential poverty reduction would be sacrificed if developing countries do not liberalize, cutting the reduction in absolute

44. It is not reported why the poverty impact is less than half the free trade total, whereas the welfare gains are three-fourths as large.

number of poor people (from the baseline) from 320 million to only 80 million. In agriculture, the more recent (i.e., realistic scenario) World Bank estimates attribute fully 80 percent of developing country welfare gains to the reduction of barriers in the developing-countries themselves, and for manufactures the share is 57 percent (World Bank 2003, 51), a politically salient point that tends to undermine developing-country complaints that the industrial countries are the main source of the problem.[45]

This finding is surprising considering that industrial-country protection of agriculture tends to be higher than that in developing countries, and it is explored further in chapter 4, where a greater relative impact of industrial-country liberalization is found. Specifically, it is found there that industrial-country liberalization provides from about half to two-thirds of the total potential welfare gains to developing countries from trade liberalization, whereas developing countries' liberalization conversely provides only about a third to a half. The reasons for these divergent results are set forth in chapter 4.

An important recent direction in CGE research on this issue, finally, is to combine a cross-country general equilibrium trade model with detailed household survey data for individual countries, to obtain a richer analysis of the impact of trade liberalization on poverty incidence. Hertel, Preckel, Cranfield, and Ivanic (2002; hereafter, "HPCI") use the GTAP model in combination with national household survey data for seven developing countries for this purpose. They concentrate on the impact of liberalization on factor income. They divide households into those primarily dependent on (1) self-employed agriculture, (2) nonagricultural enterprises, (3) wages, (4) transfers (public and private), and (5) all other. For each group, they map the income distribution by 5-percentage-point steps. They then trace the impact of multilateral trade liberalization on the income of the representative "marginal" household in the group located at the poverty line ($1 per day).[46] The effects derive from both the influence of product price changes on the consumption basket and from factor price changes on income.

The HPCI study finds that the complete removal of protection existing as of 1997 reduces poverty in Indonesia, the Philippines, Thailand, Uganda, and Zambia but increases it in Brazil and Chile. Even so, within Brazil and Chile, there are large reductions in poverty (more than 30 percent) for agriculture-specialized households.[47] This group also experiences 7 to 9 percent poverty reductions in the Philippines and Thailand, as do wage

45. See, e.g., *The Economist*, September 6, 2003, 60.

46. This choice somewhat attenuates the inherent interest of the findings, because it confines the initial poverty group to only 2 percent of households in Thailand, 4 percent in Chile, and 5 percent in Brazil, although the share rises to 73 percent in Zambia.

47. The poverty measure chosen is Foster, Greer, and Thorbecke's (1984) concept of the transfer required to lift all households in poverty up to the poverty threshold.

labor households in Indonesia and the Philippines. There are increases of poverty by 5 to 11 percent, however, for self-employed nonagricultural households in Indonesia and labor-specialized households in Brazil and Chile.

The HPCI findings tend to confirm the importance of global agricultural liberalization for reducing global poverty, as well as the nuance that this liberalization has at least the potential to raise poverty in countries where the bulk of the poor are urban rather than rural. Thus far, this line of research has not generated sufficient results for global aggregation like that in the WBGEP analysis at the country level, because the individual country data requirements are demanding. It does, however, shed light on key influences, such as the finding that differences in the household source of factor income are more important than differences in consumption patterns in tracing the impact of trade liberalization on poverty incidence. The estimates of chapter 4 below pursue a parallel approach that seeks to take into account factor shares at the poverty level and the impact of trade liberalization on factor prices.

Protection in Services

Economists and trade negotiators have increasingly recognized that the liberalization of trade in services might generate gains that are as large as, or larger than, those attainable through further liberalization in merchandise trade. The Uruguay Round created a framework for negotiations in the General Agreement on Trade in Services. The WTO has identified four "modes" of services trade. Mode 1 is "cross-border" services, illustrated by the electronic transmission of back-office and software service activities.[48] This is a relatively new area and has not acquired a backlog of protection, but it has become increasingly salient as fears mount about the outsourcing of white-collar jobs to low-income countries. The main challenge now is to ensure that new protection does not arise that would choke off cross-border service opportunities for developing countries. Mode 2 is "consumption abroad," including most prominently tourism but also education and medical services. Here also, protection would not seem rampant, particularly in tourism, although it can be argued that liberalization measures should be adopted to extend (for example) eligibility for medical insurance reimbursement to procedures undertaken abroad.

Most analysis of services trade liberalization seems to concern mode 3. This is "commercial presence," and it refers primarily to the right of establishment for foreign affiliates of multinational firms (i.e., foreign direct investment). The implications of liberalization are much more profound,

48. India in particular has advanced rapidly in these areas, with software exports rising from $225 million in 1992–93 to $1.75 billion in 1997–98 (World Bank 2002a, 73).

however, for mode 4, the "movement of individuals," which is difficult to distinguish from immigration, the sole distinction being the temporary nature of mode 4 services. Yet from an economic standpoint, the relative abundance of different factors is what matters, and it makes little difference whether there is a large increase in the availability of, say, unskilled labor through a permanent increase in the stock of immigrants by *X*, or an annual inflow of *X* additional temporary unskilled workers who next year are replaced by another *X* temporary workers.

Immigration is perhaps the most socially and politically charged dimension of international economic relations, because it raises ethical and cultural issues absent from trade policy. The questionable political feasibility of large-scale temporary labor programs may account for the relative dearth of analyses of mode 4 liberalization, but this seems likely to be an area of increasing analysis. In particular, the early 2004 proposal of the Bush administration in the United States for a temporary work program to absorb previously illegal immigrants could place this area more centrally on the policy agenda.

This study does not include trade in services, either in the estimates of protection or in the calculations of the potential trade and poverty effects of liberalization. From this standpoint, the main estimates in this study for the potential poverty reduction resulting from trade liberalization will tend to be understated rather than overstated. There are two broad reasons why services are omitted. First, at the policy level free trade in services remains much further removed from the realm of political feasibility than free trade in goods. The best example, as just suggested, is in mode 4. The absolutely free entry of temporary workers, like absolutely unconstrained immigration, would surely mean the arrival of tens, or even hundreds, of millions of workers from low-income countries into industrial countries. Even though the welfare effects of such flows could be calculated, they would be largely an exercise in fantasy. Even the main pragmatic area of services trade liberalization—mode 3—faces considerably greater resistance in developing countries than most areas of merchandise trade liberalization.

The second broad reason for the absence of services in the calculations of this study is that the data on protection and the analytical techniques for quantifying liberalization effects are far less reliable than those for merchandise trade. The main estimates available to date have tended to rely on considerably more heroic assumptions than are needed to analyze merchandise trade. In particular, in the absence of direct measures of protection, several studies have relied on the "gross operating margins" in services sectors as a guide to protection.[49] Implicitly, they are examining mode 3 trade, and by implication they are assuming that opening services to di-

49. This is the ratio of revenue minus cost to cost.

rect investment by foreign competitors would eliminate excess profits. But this approach raises serious doubts about the meaning of protection.

Studies that use this approach tend to adopt the lowest-gross-margin country as the benchmark and then to assume that countries with higher gross operating margins have "protection" (Hoekman 2000; Brown, Deardorf, and Stern 2001; Robinson, Wang, and Martin 2002). Unfortunately, this approach yields what would appear to be implausible levels of protection. For example, Robinson, Wang, and Martin (2002) rely on other analysts' estimates of gross operating margins to estimate that "protection" amounts to about 100 percent in construction, trade and transport, private services, and public services in the European Union, and it stands at 70 percent for trade and transport and private services in the United States.

But what is this protection? In what manner do "private services" in the United States impose a 70 percent penalty for participation by foreign producers? What assurance is there that after the entry of foreigners, monopolistic practices will not persist, leaving the supposed "protection" embodied in excess profits unchanged? And for that matter, why would these margins be the highest in the European Union, where the influence of services-sector competition from within the single market should by now be among the most advanced?

Not only are the protection levels likely overestimated by this approach, but the welfare gains from liberalization then tend to be ballooned by the simple fact that the services sectors are a large share of the economy, so assumed liberalization takes place on a larger base than that for merchandise trade. For these reasons, great caution would seem warranted in considering the estimates of large liberalization gains that such studies tend to generate. Thus, Robinson, Wang, and Martin (2002), who acknowledge that "our goal is to find large numbers" (p. 1), succeed in doing so as they estimate that "a 100 percent elimination of protection in all manufacturing sectors generates less gain in GDP than a 50 percent cut in the protection level in one service sector for most economies in the model" (p. 12). For its part, the World Bank (2002a, 172) draws on this school of work to estimate that the adoption of free trade in four services sectors (trade and transportation, communications, financial services, and "other private services") by the developing countries alone would provide static welfare gains for these countries amounting to 7.7 percent of GDP, far larger than the World Bank's estimate of 1.7 percent of GDP static welfare gains from free trade in goods.[50]

If one placed great faith in such estimates, the implication would be that the potential for global poverty reduction through liberalization even of just mode 3 services would be several times that for merchandise trade

50. The main source of the gains in the World Bank's calculation is the assumption that free trade in services would provide a "10 percent increase in efficiency" in the four services sectors.

liberalization. Unfortunately, the existing services estimates would appear to remain too speculative at present to warrant such a conclusion. Nonetheless, even if exaggerated, these estimates provide an ample cushion to help ensure that the estimates of poverty reduction in the present study, which exclude services liberalization, are unlikely to be overstated.

Conclusion

The broad conclusion of this chapter is that even though the Uruguay Round made important progress in reducing global protection, industrial-country protection against developing countries remains substantial, and its removal could make an important contribution to reduction of global poverty. More specifically:

- Outside textiles and apparel, protection in manufactures has fallen to low levels, about 2 to 3 percent for US and EU protection against developing countries.
- Post–Uruguay Round protection in textiles and apparel will remain high, however, at about an 11 percent average tariff for the United States and European Union, and much higher if the industrial countries fail to deliver on their pledge to eliminate quotas by 2005. Even so, the level of total tariff and quota protection has already fallen steeply, from about 55 percent for the tariff equivalent in apparel in the mid-1980s to about 27 percent in the late 1990s. A back-of-the-envelope partial equilibrium calculation suggests that removal of the remaining post–Uruguay Round industrial-country tariffs in textiles and apparel would boost developing-country exports by about $39 billion annually (at 1998 scale and prices), or about 55 percent of the total increase that could be expected from the elimination of industrial-country protection on all manufactures.
- Despite special concerns about tariff peaks, it turns out that the tariff-peak problem is almost wholly concentrated in textiles and apparel and agriculture. Excluding textiles and apparel, for other manufactures only 0.6 percent of tariff categories (representing only 1.9 percent of the value of imports of manufactures from developing countries) have bound tariffs of 15 percent or more in the United States; the corresponding incidence is 1.3 percent (categories) and 0.7 percent (value) for the European Union.
- The highest remaining protection is found in agriculture, where the combined effects of tariffs, tariff-rate quotas after conversion from physical quotas in the Uruguay Round, and domestic subsidies amount to an overall tariff equivalent of about 20 percent in the United States,

46 percent in the European Union, 52 percent in Canada, and 82 percent in Japan. A simple partial equilibrium calculation suggests that the removal of this protection would raise developing-country exports by about $30 billion annually (at 1998 scale and prices), or by about three-fourths of the increase in exports from liberalization in all manufactures including textiles and apparel.

- The aggregation of protection in textiles and apparel, other manufactures, agriculture, and oil and other nonagricultural raw materials yields an Aggregate Measure of Protection against developing countries of about 4 percent for the United States, 10 percent for the European Union, 11 percent for Canada, and 16 percent for Japan (tariff-equivalent). Overall industrial-country protection against developing countries thus remains substantial, although not particularly high by postwar standards.

- A simple model developed in appendix 3C calculates that industrial-country removal of agricultural subsidies and protection could reduce global poverty by about 8 percent, or about 200 million people for 72 countries included in the calculation. The driving force is a rise of about 10 percent in global agricultural prices, resulting from the induced cutback in industrial-country agricultural output. So long as the rural share in the poor population exceeds the share of food in the low-income consumer budget, rising world agricultural prices tend to reduce global poverty. For the 72 developing countries, in aggregate about 75 percent of the poor are in the rural sector, whereas the likely share of food in their household budgets is only about 40 percent. Exceptions include some Latin American countries (e.g., Argentina and Chile), where the bulk of the poor are in the urban sector. The same pattern of differing results depending on the concentration of rural or urban poverty is found in recent work combining CGE models with detailed household surveys.

- Much of the poverty reduction effect of industrial-country agricultural liberalization would stem from a redistribution from the urban sector (especially the urban nonpoor) to the rural sector within developing countries, rather than a redistribution from industrial to developing countries. Despite losses by the urban poor, the rural gainers among the poor would outnumber the urban losers by about five to one. Urban losses are smaller under more optimistic assumptions about dynamic gains from liberalization.

- Despite the prominence of agricultural liberalization in potential poverty reduction, a careful reading of the various model estimates shows much smaller welfare gains for developing countries from the removal of industrial-country agricultural protection (about $9 billion to $17 billion annually at 1997 scale for static gains, and about three times as much including dynamic ones) than the $350 billion annual figure frequently cited in public debate, including by leading international officials, as the amount of industrial-country "subsidies" to agriculture. The latter figure actually refers to industrial-country "support" for agriculture, and the great bulk of this support comes from the price-raising effect of tariffs and tariff-rate quotas, not from fiscal grants to farmers that might arguably be reallocated to international development assistance. Similarly, the corresponding transfers are primarily from consumers and taxpayers to farmers in rich countries, rather than from farmers in poor countries to farmers in rich countries. The new estimates in chapter 4 below suggest, however, that the existing models may understate the proportion of gains to developing countries stemming from agricultural liberalization in industrial countries.

- A review of the data on net agricultural and food trade balances suggests that, for the most part, the diagnosis of a favorable effect on global poverty from rising relative prices of food and agricultural products after global liberalization is not reversed by the food-importing status of some developing countries. The poor predominantly live in net food-exporting rather than food-importing countries. A further analysis of the least developed countries shows that although a majority of them are net food importers, they predominantly have a comparative advantage in food and agriculture. Overall, even the LDCs should thus gain rather than lose from the terms-of-trade effects of global liberalization, after taking account of the reduction in relative prices of their nonagricultural imports (which bulk even larger than their food imports).
- A brief review of contingent protection (i.e., antidumping, countervailing duties, and safeguards) suggests that although this type of protection has been disproportionately applied to imports from developing countries, the removal of quotas in textiles and apparel and in agriculture should leave the principal incidence of contingent protection in the steel sector. In this sector, the US safeguard measures adopted in 2002 went a considerable way toward exempting developing countries and were to be phased out after three years, even before they were cut short by an adverse WTO ruling. Much will depend, however, on whether there is a surge in safeguard protection in textiles and apparel to replace quotas after their removal by 2005.

This chapter concludes with a brief survey of leading recent CGE models of the impact of removing the remaining post–Uruguay Round protection. These models tend to find the following:

- The remaining benefits of further liberalization are still large. If only the industrial countries remove their protection, the developing countries experience welfare gains in the vicinity of two-thirds of 1 percent of GDP for static effects and 2 percent of GDP if dynamic effects are included. If the developing countries themselves also remove their trade barriers, these developing-country gains rise to about 2 percent of GDP for static effects and 5 percent of GDP including dynamic effects.

- The World Bank has applied a CGE model to estimate the corresponding impact on global poverty. It finds that if all countries remove all barriers, in its model including dynamic gains from stimulus to productivity growth, welfare gains in developing countries amount to about 5 percent of GDP, and unskilled wages in these countries would rise by 7.4 percent. Applying a "poverty elasticity" of 2, the World Bank study concludes that global trade liberalization would reduce global poverty ($2 per day definition) by 15 percent, or by 320 million people in the year 2015.
- Chapter 5 will show that, on the basis of new CGE estimates and taking account of long-term productivity and induced-investment effects, the potential poverty reduction from global free trade could be even larger.

The salient overall finding of this chapter, even without including the additional new estimates of chapters 4 and 5, is that the reform of trade policy contains substantial potential for reducing global poverty. Ensuring the successful removal of textile and apparel quotas by 2005, as already agreed on in the Uruguay Round, and further reducing tariffs in this sector will be crucial to realizing this potential. Even more critical will be major progress in removing agricultural protection, and it is inescapable that if the Doha Round is truly to be a development round, deep reductions in agricultural barriers will have to be on the negotiating table.

The estimates also contain important caveats. At the most fundamental level, even in their most sweeping form, the various estimates tend to show that trade policy is a useful but by no means sufficient instrument for addressing global poverty. Thus, in the extreme case of completely free trade, and even using the larger estimates developed in chapter 5 below, trade reform might reduce global poverty by about one-fourth or more from its baseline level by 2015. This means that other domestic economic policies will have to be employed to attack the other three-fourths.

Appendix 3A
Weighting Protection

This study proposes "adjusted-import weighting" as the best approach to obtaining an aggregated weighted measure of tariffs or tariff equivalents of protection.[51] The adjustment obtains an average between the observed import level and a measure of the import value that would occur if the protection were removed. For simplicity and transparency, this approach assumes a unitary price elasticity of demand for imports and a global supply elasticity of infinity. The free trade import volume equals the original volume plus a percent equal to the percent change in price resulting from removal of the tariff-equivalent protection. Thus,

$$M_1 = M_0 + M_0\left(-\alpha\left[\frac{-\tau}{1+\tau}\right]\right) \tag{A.1}$$

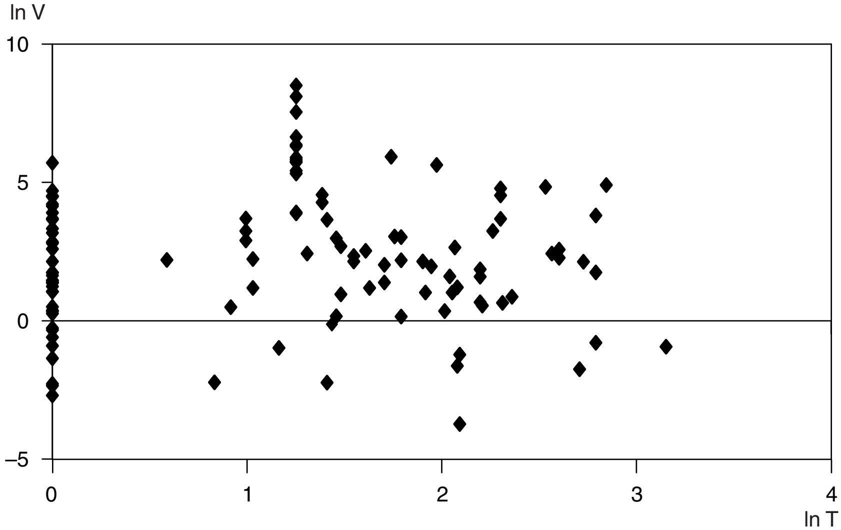
where α is the absolute value of the price elasticity of demand for imports, τ is the tariff equivalent, and (1 + τ)—often called the "force of the tariff"—is the ratio of the domestic price including protection to the world price. We seek as the basis for weighting an adjusted-import base M^* that is equal to the average of the actual import base (M_0) and the hypothetical free trade import base (M_1). Assuming $\alpha = 1$, then we have

$$M^* = \frac{M_0 + M_1}{2} = \frac{M_0}{2}\left(\frac{2+3\tau}{1+\tau}\right) = M_0\left(\frac{1+1.5\tau}{1+\tau}\right) \tag{A.2}$$

Adjusted-import weights along these lines should be preferable to actual import weights because of the problem of endogeneity of the latter (higher tariffs cause lower imports). An even simpler approach that avoids this problem is the use of simple unweighted tariffs, but these in turn are susceptible to distortions caused by arbitrary differences in the coverage of individual tariff-line categories. In support of the proposition that more error is introduced by using unweighted tariff category tariff averages than by weighting by adjusted (or even unadjusted) import values, consider figure 3A.1. For 115 categories drawn at random from the Harmonized Tariff System of the United States (about 1 percent of the total US nomenclature), the figure shows on the vertical axis the natural logarithm of the value of imports (in millions of dollars), and on the horizontal axis

51. This appendix is from Cline (2002b).

Figure 3A.1 Log value and log tariff: 8-digit Harmonized Tariff System of the United States



Source: Calculated from USITC (2002).

the natural logarithm of the percentage rate ad valorem tariff.[52] If the value scope of each tariff-line item were about the same, and the main influence were that higher tariffs compress imports to lower levels, we would observe a downward-sloping line with minimal dispersion around the line. If instead there is very wide variation between some categories with huge import values and some with small import values, and if there is little if any relationship between the difference in import value magnitudes and the tariff rate, we should instead observe a relatively random dispersion. It is evident from the figure that the latter is the case.

To illustrate the arbitrariness of the categories, in this sample the largest import value occurs in item 8708.29.50, amounting to $4.8 billion; the smallest, in 2915.40.20, comprising only $24,000.[53] The value multiple is a factor of 200,000. So if a minimally important category has an unrepresentative tariff, the potential distortion to the average can be significant.

52. Note that unity (i.e., 1 percent) is added to each tariff before taking the logarithm, because the numerous cases of zero tariff would yield undefined logarithms. Note also that the negative figures on the vertical axis occur because in these categories imports are less than $1 million.

53. These two items are, respectively: "other" under "other parts and accessories of bodies . . . of motor vehicles"; and "aromatic" under "saturated acyclic monocarboxylic acids, other."

Appendix 3B
The Tariff Equivalent of Agricultural Subsidies

In figure 3B.1, the domestic supply curve would be *S* without the subsidy, but shifts rightward to *S′* with the subsidy, which reduces production cost by the vertical distance between the two curves. This increases domestic output volume from *OA* to *OB*. Domestic demand is given by curve *DD*. World supply is available at price p_w, but because of the tariff *t* the price to the consumer is $p_w(1 + t)$. In the absence of the subsidy, imports would be the amount *AC*. In the presence of the subsidy, they are only *BC*. The question is thus: What is the tariff equivalent that would have the same effect as the subsidy, that is, in suppressing imports from *AC* to *BC*?

Let V_d be the value of domestic agricultural output at domestic prices. Then defining Q_d as the value of domestic output at international prices, we have $Q_d = V_d/(1 + t)$. Suppose the domestic subsidy is the fraction *s* of domestic market value of agricultural output (where the market value excludes the amount of the subsidy because the consumer does not pay it). Suppose the elasticity of domestic supply is ε. Then we can obtain the counterfactual level of domestic output (at world prices) in the absence of subsidy, or Q_d^*, as

$$Q_d^* = Q_d / (1 + s\varepsilon) \tag{B.1}$$

That is, an increase in the producer price of the good in the proportion *s* will raise supply by the proportion *s*ε, and in the absence of the subsidy output would have been observed output divided by unity plus this proportion.

Now consider what would have been the level of imports in the absence of the subsidy:

$$M^* = M + (Q_d - Q_d^*) = M + (s\varepsilon)\frac{Q_d}{(1 + s\varepsilon)} \tag{B.2}$$

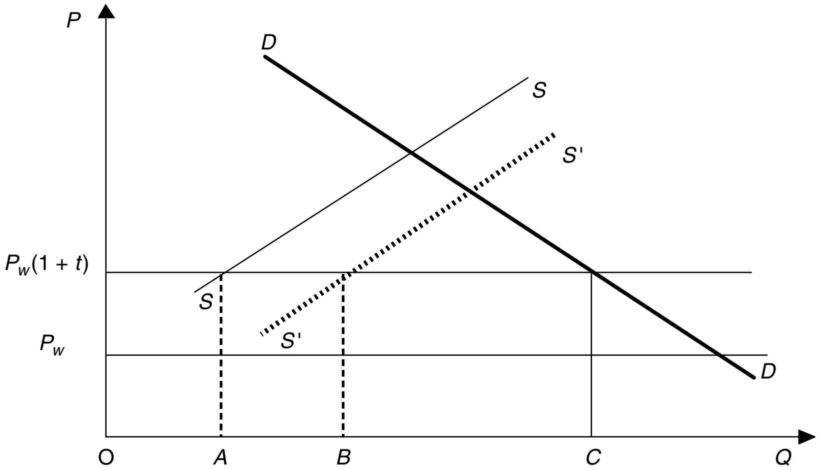
The proportionate reduction in imports attributable to the subsidy is thus

$$\frac{\Delta M}{M^*} = \frac{-[(s\varepsilon)/(1 + s\varepsilon)]Q_d}{M + [(s\varepsilon)/(1 + s\varepsilon)]Q_d} = \frac{-[(s\varepsilon)/(1 + s\varepsilon)]}{[1/\lambda] + [(s\varepsilon)/(1 + s\varepsilon)]} \tag{B.3}$$

where λ is the ratio of domestic output at world prices (Q_d) to imports (*M*).

If protection is implemented through a tariff rather than through domestic subsidies, the proportionate impact of an ad valorem tariff of τ on imports will be

Figure 3B.1 Impact of farm subsidies on imports



$$\frac{\Delta M}{M^*} = -\tau\beta \tag{B.4}$$

where β is the absolute value of the price elasticity of import demand. To obtain the tariff equivalent τ of a given ad valorem subsidy rate *s*, equations B.3 and B.4 can be equated. After rearranging, this yields

$$\tau = s\frac{\lambda}{\beta}\frac{\varepsilon}{1 + s\varepsilon + \lambda s\varepsilon} \tag{B.5}$$

A potentially counterintuitive result of this estimation is that the tariff equivalent of the domestic subsidy rises with the ratio of domestic output to imports (λ). The economic meaning is that a country that has a small volume of imports and large amount of domestic output will be causing a proportionately large further reduction in imports with only a modest subsidy. The tariff equivalent also varies positively with the size of the elasticity of supply (ε), reflecting the fact that a higher supply elasticity causes a greater expansion of domestic output and contraction of imports in response to a given subsidy rate. In contrast, the size of the tariff equivalent of the subsidy varies inversely with the (absolute) size of the price elasticity of demand for imports (β), because a larger elasticity means that a smaller tariff accomplishes the same reduction in imports.

Appendix 3C
The Impact of Industrial-Country Agricultural Import Liberalization on Poverty Incidence in Developing Countries

The removal of protection on and subsidies to agriculture in industrial countries will tend to reduce global agricultural supply and raise world agricultural prices. This will benefit developing countries by increasing their export opportunities, but it will tend to raise their consumers' food prices. As a consequence, whereas its effects will tend to be favorable for poor farmers in developing countries, they will tend to be unfavorable in the first instance for the urban poor. Even so, losses by the urban poor from higher food prices may be mitigated or conceivably offset by spill-over dynamic gains to the economy from the increased agricultural export opportunities.

Static Effects

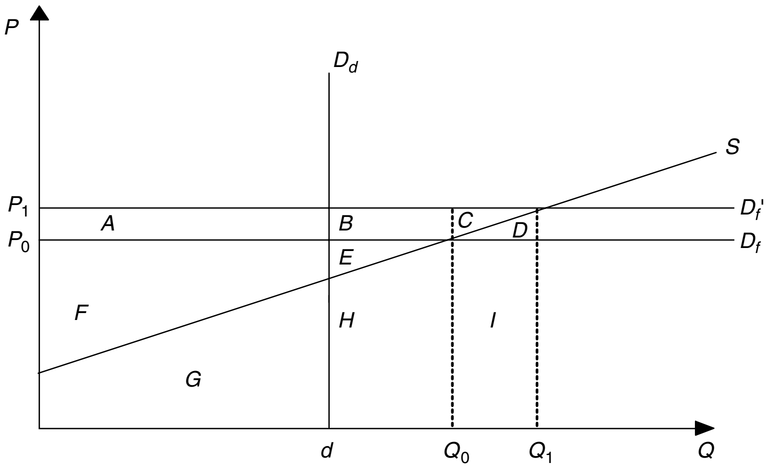
Let z be the proportionate change in real income per person, and w the proportionate increase in world food prices from industrial-country agricultural liberalization. Let θ be the share of food in the consumption basket of the poor. Let γ be the elasticity of the local food price with respect to the world food price. Let β be the elasticity of rural income with respect to the farm-gate agricultural price, and let α be the elasticity of the farm-gate price with respect to the world price. Let subscripts R refer to rural and U to urban.

The direct price effect on the real income of the rural poor, expressed as a proportionate change, is then

$$z_R^1 = \alpha\beta w - \theta_R \gamma_R w = w(\alpha\beta - \theta_R \gamma_R) \tag{C.1}$$

There is an additional component of static gain for agriculture associated with the increase in exports. Figure 3C.1 shows the demand and supply for agricultural output. The horizontal axis shows output volume; the vertical axis, price. Industrial-country liberalization raises the world price from P_0 to P_1. The domestic demand curve is shown for simplicity as completely inelastic (vertical line D_d). Output d is consumed domestically; exports are total initial production minus domestic consumption, or $Q_0 - d$. When prices rise, agricultural income on the original output volume rises by areas $A + B$. Area A is merely a transfer from domestic consumers to farmers. Area B is a net welfare gain from improved terms of trade on exports. In addition, area C is a net welfare gain on the increase in output

Figure 3C.1 Impact of liberalization of agricultural export markets



undertaken to meet increased exports, which are equal to $Q_1 - d$ after output rises to Q_1. (Area $D + I$ is the opportunity cost of the additional output.)

The first part of the direct price gain in equation C.1, or $\alpha\beta w$, corresponds to the area $A + B$, expressed as a ratio to the total original value added, or ratio $(A + B)/(F + E + H + G)$. In the figure, total agricultural output value is initially P_0Q_0. The farm-gate price rises by the proportion αw, so $P_1 = P_0(1 + \alpha w)$. Area $A + B$ is thus $(P_0Q_0)\alpha w$. Area C is $0.5\Delta P\Delta Q$. If the price elasticity of domestic supply is Ω, then $\Delta Q = \alpha w\Omega Q_0$, and area C is $(0.5\alpha wP_0)(\alpha w\Omega Q_0)$. The total static gain to farmers, expressed as a proportion of initial farm income, is thus $\{(P_0Q_0)\alpha w + (0.5\alpha wP_0)(\alpha w\Omega Q_0)\}/P_0Q_0$, or $\alpha w(1 + 0.5\alpha w\Omega)$. This proportionate change must be dampened by elasticity β to translate agricultural gain into a rural income gain. Finally, it is assumed that the rural poor share proportionately in the change in rural income. The resulting direct price effect on rural household income, augmented to incorporate the static welfare gain on increased export volume, and expressed as a proportion of total income of the rural poor, is

$$z_R^s = \beta\alpha w(1 + 0.5\Omega\alpha w) - \theta_R\gamma_R w = w(\beta\alpha[1 + 0.5\Omega\alpha w] - \theta_R\gamma_R) \quad \text{(C.2)}$$

In the urban sector, the static real income effect of the rise in food prices is

$$z_U^s = -\theta_U\gamma_U w \quad \text{(C.3)}$$

That is, real income falls by the proportionate rise in urban food prices times the weight of food in the consumption basket of the urban poor. The rise in urban food prices equals the proportionate rise in world food prices times the urban elasticity of food prices with respect to the world price.

Define ε as the absolute value of the elasticity of the incidence of headcount poverty with respect to household income. Define π as the poverty rate, and use the circumflex to denote proportionate change. Then the proportionate changes in the rural and urban poverty rates resulting from static effects of (industrial-country) agricultural trade liberalization will be

$$\hat{\pi}_R^s = -\varepsilon z_R^s;\ \hat{\pi}_U^s = -\varepsilon z_U^s \tag{C.4}$$

If the share φ_R of the country's poor are in rural areas, and the share φ_U are in urban areas ($\varphi_R + \varphi_U = 1$), then for the country as a whole the proportionate change in the incidence of poverty will be a weighted average of the rural and urban changes, or, with subscript T denoting the total:

$$\pi_T^s = \phi_R \hat{\pi}_R^s + \phi_U \hat{\pi}_U^s \tag{C.5}$$

Substituting, we have

$$\hat{\pi}_T^s = \varepsilon w \{\phi_R[\theta_R \gamma_R - \beta\alpha(1 + 0.5\Omega\alpha w)] + \phi_U \theta_U \gamma_U\} \tag{C.6}$$

From the standpoint of static effects, then, the condition for industrial-country agricultural liberalization to reduce rather than increase poverty in developing countries ($\hat{\pi}^s{}_T < 0$) is

$$\phi_R \theta_R \gamma_R + \phi_U \theta_U \gamma_U < \phi_R \beta\alpha(1 + 0.5\Omega\alpha w) \tag{C.7}$$

Inequality C.7 states that the increase in poverty incidence stemming from the reduction in real income associated with the rise in food prices in both the rural and urban areas (left-hand side) must be smaller than the reduction in poverty incidence arising from the boost in real farm income attributable to higher prices for farm exports (right-hand side). The central core of this condition can best be illuminated by making the not unreasonable assumption that several of these parameters, α, β, γ, and Ω, are all unity; and that there is no difference between their values in the rural and urban sectors, nor is there any difference between the two sectors for the share of food in the consumption basket. Under these assumptions, the condition for poverty reduction rather than poverty increase becomes

$$\theta < \phi_R(1 + 0.5w) \tag{C.8}$$

Essentially, inequality C.8 states that the share of food in the consumption basket of the poor (θ) must be smaller than the share of the country's poor found in agriculture (θ_R) for industrial-country agricultural liberalization to reduce rather than increase poverty in developing countries. The condition is a bit more lenient, because the test more precisely is against the share of the poor in agriculture augmented by half the percentage rise in world agricultural prices. For example, if the share of food in the consumption budget is 0.5, and if the rise in world food prices is 10 percent, then for poverty reduction rather than poverty increase, the share of the country's total poor population to be found in the agricultural sector must be at least $0.5/1.05 = 0.48$.

From inequality C.8, it becomes immediately clear that where the great bulk of the poor are in the rural sector, global liberalization of agricultural trade is likely to reduce poverty, but where most of the poor are in urban areas the reverse will be true, at least for the static effects.

On balance, a consideration of the differences in the list of parameters from unity seems likely to make the poverty reduction condition less stringent. In particular, the elasticity of domestic food prices with respect to the international price may well be less than unity, especially in the rural sector (γ_R), where foodstuffs grown for home consumption may differ from products grown for export. Similarly, in the rural area, the share of food in the consumption basket of the poor could be less than in the urban area, given the availability of low-opportunity-cost subsistence crops. Partly offsetting this may be a less than unitary elasticity of the farm-gate price to the world price (α). Unity is a reasonable value for the elasticity of rural income with respect to farm-gate price (β), however. The presence of intermediate input costs suggests this elasticity could be higher than unity (a given percent rise in product price yields a greater percent increase in income net of input costs), but the presence of nonagricultural rural activity (e.g., services sector) would make the elasticity less than unity, with the two effects tending to offset each other. Finally, for the agricultural supply elasticity, an assumption of unity would seem reasonable.

Plausible central values for these parameters thus might be as follows: $\theta_R = 0.4$; $\theta_U = 0.5$; $\gamma_R = 0.8$; $\gamma_U = 0.9$; $\alpha = 0.9$; $\beta = 1.0$; and $\Omega = 1.0$. If the rise in the world price is 10 percent ($w = 0.1$), then inequality C.7 becomes ϕ_R $(0.4)(0.8) + \phi_U (0.5)(0.9) < \phi_R (0.9)(1.0)(1.05)$. Under these assumptions, agricultural liberalization by industrial countries reduces poverty for those developing countries where $\phi_U < 1.65\ \phi_R$, which means $\phi_U < 0.58$. This will usually be the case, because for most countries the share of the total poor population to be found in the rural area will be well above half rather than below half.

At the same time, the simple fact that these conditions must be met for the impact of industrial-country agricultural liberalization to reduce rather than increase poverty in developing countries suggests that the poverty reduction gains from this reform might be smaller than many of the strong calls for this reform might imply. However, if there are dynamic as well as static gains from liberalization, the poverty reduction gains will be larger than those identified so far.

Dynamic Effects

It has long been recognized that there can be dynamic as well as static gains from trade liberalization. The "welfare triangles" theory of static gains is well worked out, but this is not the case for dynamic gains. The latter (broadly defined) include gains from economies of scale, gains associated with imperfect competition, stimulus to technical change (X-efficiency), and perhaps macroeconomic gains from an increased availability of foreign exchange. Although some models have specified particular forms for these gains (e.g., Rutherford and Tarr 1998), for the purposes here it is sufficient to recognize their presence and consider their likely magnitude relative to the static gains. In addition to incorporating a component of gains for dynamic effects, it is necessary to consider their allocation between the urban and rural sectors, and within each sector, between the poor and nonpoor, in order to obtain a more complete analysis of the impact on poverty incidence.

Suppose that total gains including dynamic ones (e.g., as measured, say, by the annual rate in the fifth year) amount to the multiple ψ of static gains. Dynamic gains alone are thus $(\psi - 1)$ times static gains. We seek first the total static and dynamic gains for the economy, and then the amounts accruing to the poor.

Returning to figure 3C.1, the static welfare gains on which we seek to build an estimate of dynamic gains must be the net welfare gains $(B + C)$, not the gross gains to farmers including transfers from consumers $(A + B + C)$. If we define the ratio of home-consumed agricultural output to the total as h, then from the figure $h = A/(A + B)$. So the net static welfare gain base corresponding to the gross base $w(\beta\alpha[1 + 0.5\Omega\alpha w])$ in equation C.2 will be $w(\beta\alpha[1 + 0.5\Omega\alpha w - h])$.

Per rural poor person, these net static gains amount to $y_{PR}w(\beta\alpha\ [1 + 0.5\Omega\alpha w - h])$, defining original income per rural poor person as y_{PR}. If the total number of poor people in the rural sector is N_R, if the share of the poor in total rural income is S_R^P, and if we assume that the share of the rural poor in the static liberalization gains is equal to their share in sectoral income generally, then we may estimate the implied aggregate static gains as

$$G_s = \frac{N_R}{S_R^P} y_{PR}[w\beta\alpha(1 + 0.5\Omega\alpha w - h)] \tag{C.9}$$

That is, per poor worker, the static gains amount to original income y_{PR} multiplied by the proportionate increase in income in the bracketed expression. The first right-hand-side component (the fraction) then balloons the per-poor-person gains into aggregate sectoral gains by first multiplying by the number of the rural poor and then expanding by the inverse of the share of the poor in rural income.

Total dynamic gains, by construction, are merely

$$G_d = (\Psi - 1)G_s \tag{C.10}$$

It is useful to recall, at this point, that the approach here is to use a benchmark relationship between dynamic and static gains from trade liberalization as the basis for incorporating dynamic gains. Because the liberalization in this case is rather special—unilateral liberalization by the industrial-country trading partners of the developing countries—it is worth making explicit the fact that the core static gains are from terms-of-trade improvement for exports, and the welfare triangle on export expansion. The more usual gains from import liberalization (net welfare triangle from lower consumer prices) are absent here. This means, correspondingly, that the dynamic gain estimates are substantially reduced if there is no export base.[54]

Intuitively, the dominant role of exports in measuring the dynamic gains is attractive. It coincides with the broad notion that the developing countries that are most likely to benefit from industrial-country agricultural liberalization are the agricultural exporters, whereas those that import agricultural goods could be adversely affected. It is also consistent with the strong implied role of exports in the various arguments invoked about dynamic gains, especially economies of scale and specialization in product varieties under imperfect competition.[55] Note further that the entire analysis could be recalculated to incorporate reciprocal import liberalization by developing countries. That, however, is not the focus here, which instead is on the effects on developing countries caused by agricultural protection in the industrial countries.

With a gauge of total dynamic gains in hand (equation C.10), the next step is to allocate them between the rural and urban sectors, and then add them to the static effects on the rural and urban poor. Suppose the fraction ρ of these total dynamic gains accrues to the rural sector itself, and the fraction $1 - \rho$ provides economywide gains. Suppose the share of agriculture in GDP is given as the variable a. The total dynamic gains accruing to the rural poor will thus be

54. If $h = 1$, there are no base-period exports. The construction here nonetheless attributes dynamic gains to the new exports obtained from the expansion of domestic production, so the welfare triangle C in figure 3C.1 persists even if the domestic demand curve D_d is located further to the right and domestic consumption d coincides with output Q_0.

55. The argument of stimulus to technical change, however, applies equally well to import liberalization.

$$G_{dPR} = S_R^P(\rho + [1-\rho]a)G_d \qquad \text{(C.11)}$$

Expressed as a proportionate change in income of the rural poor, these dynamic gains are

$$z_R^d = \frac{G_{dPR} / N_R}{y_{PR}} \qquad \text{(C.12)}$$

Substituting and simplifying,

$$z_R^d = (\rho + [1-\rho]a)(\Psi - 1)(w\beta\alpha[1 + 0.5\Omega\alpha w - h) \qquad \text{(C.13)}$$

The total dynamic gains accruing to the urban poor correspondingly amount to

$$G_{dPU} = S_U^P(1-\rho)(1-a)G_d \qquad \text{(C.14)}$$

The corresponding proportionate increase in real income per urban poor person amounts to

$$z_U^d = \frac{G_{dPU} / N_U}{y_{PU}} \qquad \text{(C.15)}$$

Once again substituting, simplifying, and in addition making the assumption that the household income of the urban poor is equal to that of the rural poor ($y_{PU} = y_{PR}$), and recognizing that $N_R/N_U = \phi_R/\phi_U$, we obtain

$$z_U^d = \frac{S_U^P \phi_R}{S_R^P \phi_U}(1-\rho)(1-a)(\Psi - 1)w\beta\alpha(1 + 0.5\Omega\alpha w - h), \qquad \text{(C.16)}$$

where S_U^P is the share of the urban poor in urban income. The initial right-hand-side term is essentially a scaling factor. The intuition is straightforward with respect to the term S_U^P, because there will be a larger impact for the poor where they have a larger share of urban income. Division by the fraction of poor in the urban sector ϕ_U is also intuitive, because there will be more income per urban poor person if there are fewer of them. Less intuitively, the rest of the initial scaling fraction gives a larger impact where there are more rural poor people, because this means the aggregate of the per-person amounts is larger, and when the share of the rural poor in rural income is smaller, because this means there is larger ballooning to the aggregate dynamic gains from the amount received by the rural poor.

Reasonable central values for the parameters required to estimate these dynamic effects are as follows. The total welfare gains might reasonably amount to twice the static gains, or $\psi = 2$. The share of dynamic gains specific to the agricultural sector itself might plausibly be set at two-thirds in the central case, or $\rho = 0.67$.

Combined Effects

The total static and dynamic gains to the poor in developing countries from industrial-country liberalization of agricultural trade, expressed as a proportionate change in real income, thus amount to $z_R = z_R^s + z_R^d$, in the rural sector, and $z_U = z_U^s + z_U^d$ in the urban sector. The corresponding proportionate change in total poverty incidence for the developing country is

$$\hat{\pi}_T^T = -\varepsilon[\phi_R z_R + \phi_U z_U] \tag{C.17}$$

Substituting, and for convenience setting $\Gamma = \beta\alpha(1 + 0.5\Omega\alpha w - h)$, $c = \rho + a - \rho a$, and $\mu = (S_U^P/S_R^P)(\phi_R/\phi_U)$, we have

$$\hat{\pi}_T^T = -\varepsilon w[\phi_R\{\Gamma(1 + c[\Psi - 1]) - \theta_R\gamma_R\} + \phi_U\{\Gamma\mu(1 - c)(\Psi - 1) - \theta_U\gamma_U\}] \tag{C.18}$$

Data and Results

The most important data for the calculations are the proportions of the poor located in the rural and urban areas, ϕ_R and ϕ_U. These are derived from World Bank estimates of the incidence of rural, urban, and national poverty (World Bank 2002d).[56] The term h, referring to the fraction of domestic agricultural production that is consumed domestically rather than exported, is estimated as $h = \min\{1.0; 1 - [X - M]/Q\}$, where X is agricultural exports, M is agricultural imports, and Q is agricultural value added. Export and import data are for International Standard Industrial Classification categories 1, 2, and 5 (revision 3) from the World Bank's World Integrated Trade Solution database. Agricultural value added is from World Bank (2002d), in current dollars. The trade and agricultural production data are for 2000. The share of agriculture in GDP, the variable

56. The World Bank reports the fraction of households in poverty at the national level (η), and for the rural and urban areas (η_R and η_U, respectively). Because the national rate must equal a weighted average of the rural and urban rates, we can infer that $\eta = m_R\eta_R + m_U\eta_U$, where m is the fraction of total population in each respective sector. These population shares can thus be estimated as $m_R = (\eta - \eta_U)/(\eta_R - \eta_U)$; $m_U = 1 - m_R$. With some manipulation, it can then be shown that the desired estimate of the share of total poor residing in rural areas can be obtained as $\varphi_R = (\eta_R/\eta)m_R$. Then, $\varphi_U = 1 - \varphi_R$. Note also that whereas the urban and rural poverty rates are reported using the national definition of poverty, for calculating the cross-country aggregates the international ($2 PPP per day) definition is used, along with the assumption that the allocation of poor people between the two sectors is the same under that definition as well.

a, is from World Bank (2002d). A single standard elasticity of poverty with respect to income, ε, is set at –2, the central value identified in most past empirical work (see chapter 1).

Table 3C.1 reports the results of the model estimates for the 72 countries for which data are available. These central estimates assume that global agricultural liberalization raises world agricultural prices by 10 percent ($w = 0.1$).[57] Key features of the central estimates include the following:

- Global agricultural liberalization substantially reduces global poverty. The number of poor people in the 72 countries falls by 201.5 million, or by 7.9 percent.
- The net impact comprises a large net reduction in poverty for 56 countries (by 204.3 million) and a small net increase in poverty for 16 countries (by 2.8 million).
- The results are heavily driven by the fraction of the total poor population found in rural areas. The minority of cases where poverty rises tend to have uncharacteristically high fractions of the poor living in urban areas. Notable cases include Argentina, Chile, and Mexico.
- As is true for the underlying poverty numbers, the impacts are concentrated in a limited number of large countries (especially China, a reduction by 72 million; India, 59 million; Bangladesh, 12 million; and Pakistan, 10 million).
- Most countries experience a reduction in rural poverty but an increase in urban poverty. The aggregate effect for the 72 countries in the rural sector is a reduction of 255 million in poverty; the corresponding urban aggregate is an increase of 54 million in poverty.
- Poverty reduction is greater where the export base is larger (i.e., *h* is smaller) and/or where the rural share of the total poor population is extremely large (e.g., 90 percent or more). Both factors tend to boost the dynamic gains experienced by the urban poor.
- In the central results, by far the dominant effects are the static impacts. Static rural income gains are 6.2 percent, and static urban income losses are 4.5 percent. Simple average dynamic rural income gains are 0.97 percent, and dynamic urban income gains are 0.57 percent. This result derives mainly from the typically relatively low ratio of net agricultural exports to agricultural production (i.e., a relatively close value of *h* to unity) for most countries.

57. IMF staff estimates using a CGE model find that freeing world trade in agriculture would raise world prices by 4 percent for cotton; 2–8 percent for rice, sugar, and wheat; 7 percent for beef; and 23 percent for milk (IMF 2002d, 89).

Table 3C.1 Impact of global agricultural liberalization on poverty

Country	Percent of poor in rural areas	Domestic consumption (*h*)	Share of agriculture in GDP	Change in poverty	
				Percent	Millions
Albania	74.8	1.00	0.51	–7.6	–0.1
Algeria	69.6	1.00	0.09	–6.4	–0.3
Argentina	13.5	0.69	0.05	5.4	0.3
Azerbaijan	52.7	1.00	0.19	–2.7	–0.1
Bangladesh	94.0	1.00	0.25	–11.8	–12.0
Belarus	36.8	1.00	0.15	0.9	0.0
Benin	71.1	0.82	0.38	–8.9	–0.4
Bolivia	42.9	1.00	0.22	–0.5	0.0
Botswana	61.3	1.00	0.04	–4.6	0.0
Brazil	38.8	0.92	0.07	0.0	0.0
Bulgaria	36.8	0.94	0.15	0.5	0.0
Burundi	95.0	0.90	0.51	–13.6	–0.8
Chile	18.4	0.82	0.11	4.4	0.1
China	88.9	1.00	0.16	–10.6	–72.1
Colombia	74.9	0.86	0.14	–9.0	–1.1
Costa Rica	50.6	0.22	0.09	–8.7	–0.1
Côte d’Ivoire	66.2	0.49	0.29	–11.2	–0.9
Czech Republic	30.7	1.00	0.04	2.2	0.0
Ecuador	61.0	0.28	0.10	–11.3	–0.7
Egypt, Arab Republic	55.4	0.90	0.17	–4.3	–1.5
El Salvador	44.9	0.92	0.10	–1.5	–0.1
Estonia	41.7	0.93	0.06	–0.6	0.0
Gambia	82.1	0.99	0.38	–9.3	–0.1
Georgia	45.5	1.00	0.32	–1.1	0.0
Ghana	62.7	0.85	0.35	–6.6	–0.7
Guatemala	73.6	0.78	0.23	–9.9	–0.7
Guinea	82.1	1.00	0.24	–9.2	–0.4
Honduras	64.2	0.60	0.18	–10.0	–0.4
India	70.5	0.99	0.25	–6.8	–59.2
Indonesia	72.3	0.99	0.17	–7.1	–9.9
Jamaica	53.9	1.00	0.06	–2.9	0.0
Jordan	31.9	1.00	0.02	2.0	0.0
Kazakhstan	61.9	0.66	0.09	–8.2	–0.2
Kenya	83.8	0.61	0.20	–14.8	–2.8
Latvia	38.0	0.95	0.04	0.3	0.0
Lithuania	39.2	1.00	0.08	0.3	0.0
Malawi	95.0	0.80	0.42	–15.2	–1.3
Mauritius	72.3	1.00	0.06	–7.0	0.0
Mexico	31.9	1.00	0.04	2.0	0.8
Moldova	66.2	0.77	0.28	–8.3	–0.1
Mongolia	45.8	0.99	0.33	–1.3	0.0
Morocco	66.3	1.00	0.14	–5.7	–0.1
Nepal	94.8	1.00	0.40	–12.0	–2.3
Nicaragua	62.2	0.75	0.32	–7.2	–0.2
Nigeria	70.6	1.00	0.30	–6.7	–7.7
Pakistan	72.5	0.85	0.26	–8.9	–10.4
Panama	77.3	0.74	0.07	–10.8	–0.1
Paraguay	29.3	0.78	0.21	1.5	0.0
Peru	47.8	1.00	0.08	–1.6	–0.2
Philippines	71.3	1.00	0.16	–6.8	–2.0
Poland	41.7	1.00	0.04	–0.2	0.0
Portugal	44.1	1.00	0.04	–0.8	0.0

(table continues next page)

Table 3C.1 *(continued)*

Country	Percent of poor in rural areas	Domestic consumption (*h*)	Share of agriculture in GDP	Change in poverty: Percent	Change in poverty: Millions
Romania	31.8	1.00	0.13	2.0	0.1
Russia	33.1	1.00	0.07	1.7	0.6
Senegal	65.0	1.00	0.18	–5.5	–0.4
Sierra Leone	77.2	0.90	0.47	–9.4	–0.4
Slovak Republic	52.7	1.00	0.04	–2.7	0.0
Slovenia	61.3	1.00	0.03	–4.6	0.0
South Africa	55.2	0.86	0.03	–4.4	–0.7
South Korea	22.1	1.00	0.05	4.1	0.0
Tanzania	88.3	0.90	0.45	–12.0	–2.4
Thailand	61.5	0.92	0.10	–5.4	–0.9
Trinidad and Tobago	71.4	1.00	0.02	–6.9	0.0
Tunisia	60.4	1.00	0.12	–4.3	0.0
Turkey	30.7	1.00	0.16	2.2	0.3
Turkmenistan	67.4	0.82	0.27	–7.9	–0.2
Uganda	95.0	0.93	0.42	–13.1	–2.2
Uruguay	11.0	1.00	0.06	6.6	0.0
Venezuela	15.9	1.00	0.05	5.5	0.5
Vietnam	90.1	0.70	0.24	–15.1	–6.3
Zambia	67.8	0.98	0.27	–6.2	–0.6
Zimbabwe	90.8	0.80	0.18	–13.7	–1.1
Total					**–201.5**

Source: See text.

Sensitivity Analysis

The results of this analysis are relatively sensitive to the parameters assumed. Table 3C.2 shows pessimistic, central, and optimistic parameter assumptions and the corresponding principal results. The elasticity of agricultural supply (Ω) could be high at 2.0 or low at 0.5. The elasticity of the farm-gate price with respect to the world price (α) could be optimistically as high as unity but pessimistically as low as 0.6; the elasticity of rural income with respect to the farm-gate price (β) could be optimistically as high as 1.1 but pessimistically as low as 0.7; and the elasticities of food costs in the consumption basket with respect to the farm-gate price (γ_R, γ_U) could be as low as 0.6 on the optimistic side.[58] The ratio of total welfare effects including dynamic gains to static gains (ψ) could plausibly be as high as 4 but as low as 1.5. The agriculture-specific portion of dynamic gains (ρ) could be as high as 0.9, on the pessimistic side, or as low as 0.5 (permitting greater economywide gains), on the optimistic side.

58. On the pessimistic side, considering that the farm price is set at a relatively low elasticity with respect to the world price in the pessimistic case, the elasticity of consumption food price with respect to the world price may appropriately be left unchanged from the central case, because the alternative of raising it would tend to create an implausible divergence between domestic agricultural production and consumption prices.

Table 3C.2 Sensitivity analysis for poverty impact of global agricultural liberalization

Parameter or results	Less favorable impact	Central	More favorable impact
Parameter			
Ω supply elasticity	0.5	1.0	2.0
α farm price elasticity	0.6	0.9	1.0
β rural income elasticity	0.7	1.0	1.1
γ_R food cost elasticity	0.8	0.8	0.6
γ_U food cost elasticity	0.8	0.9	0.6
Ψ ratio, total/static gains	1.5	2.0	4.0
ρ agriculture-specific portion of dynamic gains	0.9	0.67	0.5
Results (72 countries)			
Poverty			
Percent	0.5	–7.9	–18.5
Millions	13.9	–201.5	–470.7
Rural poverty			
Percent	–2.3	–13.5	–24.8
Millions	–43.8	–255.1	–469.5
Urban poverty			
Percent	9.0	8.3	–0.2
Millions	57.7	53.7	–1.2
Income change (percent)			
Rural static	1.06	6.21	9.7
Rural dynamic	0.23	0.97	4.0
Urban static	–4.50	–4.50	3.0
Urban dynamic	0.03	0.90	4.3

As indicated in table 3C.2, under the optimistic assumptions, world agricultural liberalization could reduce global poverty by an impressive 18.5 percent, or by 471 million people for the 72 principal developing countries examined. Under the pessimistic assumptions, however, the result could be a slight increase in global poverty, by 0.5 percent or 14 million people for the countries listed in table 3C.1.