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# Market and Welfare Implications of Doha Reform Scenarios

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The aims of this chapter are threefold: to summarize, from the preceding chapters and other material, some likely and some more ambitious scenarios that might emerge as part of an eventual Doha agreement, particularly with respect to agriculture; to analyze empirically the market, trade and welfare consequences of such scenarios relative to two benchmarks (the baseline, and a world free of distortions to goods trade); and to draw out implications of those Doha scenarios for developing countries especially.

More specifically, the chapter shows what the world economy would look like in 2015 with and without a successful conclusion to the Doha Round, how far Doha could take the world toward where it would be in the absence of all distortions to merchandise trade, and what contribution could be made by the various elements of a Doha package. For present purposes we make use of the World Bank's recursive dynamic model known as LINKAGE (van der Mensbrugghe 2004b), rather than the GTAP-AGR (Global Trade Analysis Project—Agriculture) model used by Hertel and Keeney (2005), because LINKAGE has a longer-run focus that is used for the World Bank's standard decade-long projections of the global economy and its earlier trade analysis (for example, World Bank 2002, 2004). We also use the latest version (6.05) of the GTAP database, which includes the tariff preferences enjoyed by many developing countries (see www.gtap.org). The distinction is made in our results between effects on developing countries and effects on more advanced economies, but in doing so, it is necessary to take into account not only the World Bank's country classification based on income level but also the self-

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nominated classification practiced in the WTO, in which even economies as advanced as Hong Kong (China), Republic of Korea, Singapore, and Taiwan (China) claim developing country status and so are eligible for special and differential treatment (SDT), including smaller tariff cuts and longer phase-in periods than what is likely to be eventually agreed for developed countries under Doha).

Our analysis suggests most of the potential gains from multilateral trade reform are from agriculture. Because of huge gaps between WTO-bound and applied rates of protection, however, there would be little real agricultural reform globally as a result of the Doha Round—especially by developing countries—unless WTO members are willing to make very substantial cuts to their bound tariff rates and domestic farm subsidy commitments. Without that, the gap between agricultural and manufacturing protection is likely to widen, as is the gap between developed- and developing-country protection rates, thereby limiting the welfare gains from reform to a small number of more advanced economies. We therefore explore the effects of a more ambitious agricultural reform package and of developing countries participating more fully in the Doha Round rather than invoking SDT to avoid reform. In both cases, we show how much closer the world could come to realizing the full benefits of trade if these more ambitious reform commitments were to be made and implemented over the next decade.

The chapter begins with an overview of the key elements of a prospective Doha agreement, focusing especially on the agricultural elements discussed in preceding chapters. It then describes the model of the global economy to be used to analyze the consequences of such an agreement and of alternative, more ambitious reforms, including a move to complete free trade (which provides a helpful benchmark). The estimates of protection and subsidy rates for each region are a crucial part of the data in the global model, and so they are discussed in some detail before the key results of the simulations are presented. After discussing some qualifications, the chapter concludes by highlighting the key messages and drawing out implications for developing countries in particular.

**<<A>>Key Elements of a Prospective Doha Agreement<<end>>**

To what extent are reform commitments likely to emerge from the Doha Round? In addressing that question, one needs to remember that WTO trade negotiators are focusing on reductions not to the applied tariffs and subsidies but rather to members' legally bound import tariffs, agricultural export subsidies, and bound commitments on domestic support to farmers. These bound rates are higher than applied rates in nearly all countries, but especially so in most developing countries. Hence if cuts to bound rates are sufficiently small, or the gap between bound and applied rates is sufficiently large, an agreed set of bound rate reductions could result in no actual reform.

The Doha Round was launched in late 2001, but the following trade ministerial meeting, in Cancún in September 2003, ended with acrimony and without an agreement on how to proceed. Developing countries made it abundantly clear that further progress would not be possible without a commitment by developed countries to significantly lower their import barriers and agricultural subsidies (especially for cotton, despite its relatively minor role in developed-country agriculture, see Sumner 2005). An intense period of consultations in July 2004 ended in the early hours of August 1 with a decision on how the Doha Work Programme should proceed (WTO 2004). The decision, known as the July Framework Agreement, reiterates the importance of keeping development at the heart of the Doha agenda, and it stresses agricultural reform as key to that. In its annexes, the decision provides guidance on how a Doha agreement might be structured, with frameworks outlined for agriculture and for nonagricultural market access, and for negotiations on trade facilitation, as well recommendations for trade in services. What emerged with respect to the three agricultural pillars has been the subject of careful scrutiny in this book because—as was the case in the Uruguay Round Agreement on Agriculture—the devil will be in the details. We begin by summarizing the July Framework Agreement as it pertains to those three agricultural pillars.

***<<B>>Agricultural Market Access<<end>>***

Jean, Laborde, and Martin (2005) examine the consequences of different tariff-cutting formulas, bearing in mind the tariff rate quotas (TRQs) described by de Gorter and Kliauga (2005), the prevalence of preferences for developing countries as described in Bouët, Fontagné, and Jean (2005), the need to accommodate sensitive and special farm products, and the special and differential treatment outlined in the July framework and discussed by Josling (2005). For our purposes, tariff cutting is implemented at the sixdigit level of the Harmonized System and involves a detailed comparison of each country's bound tariff, which is the negotiators' focus, with the applied MFN (most-favored-nation) tariff on a given bilateral trade flow. The gap between bound and applied MFN tariffs is the so-called binding overhang, and it can blunt significantly the impact of any negotiated outcome—so much so that in some scenarios countries are not required to change their applied tariffs at all. Once the detailed tariff analysis was conducted, the results were aggregated up to the GTAP and LINKAGE models' regions and sector levels by the CEPII (Centre d' Etudes Prospectives et d'Informations Internationales) staff in Paris.[1] Applied tariff cuts vary not only by sector but also by trading partner—and may involve smaller cuts on imports from those developing countries currently enjoying nonreciprocal preferential access to richer countries' markets (Hoekman and Ozden 2005).

Jean, Laborde, and Martin (2005) evaluate the effects of different approaches to liberalization on 2001 applied rates. They focus on different degrees of top-down progressivity in the bound tariff cuts, as well as on different degrees to which developing countries participate in reform. They look first at a proposal similar to the Harbinson progressive reduction formula (WTO 2003b), with marginal tariff rate reductions of 35 percent for tariffs below 15 percent, 65 percent for tariffs above 90 percent, and 60 percent for tariffs within the 15–90 percent bracket.[2] Harbinson's proposal for tariff cuts for developing countries also follow a progressive tiered formula, but Harbinson suggested four rather than three brackets, with inflexion points placed at tariff levels of 20, 60, and 120 percent, to maintain his criterion of cutting by an average of 25, 30, 40, and 45 percent, respectively, in those four brackets.

That set of cuts, it turns out, would lead to very little import liberalization, because bound tariffs in many countries exceed applied rates by such large margins. As a result, Jean, Laborde, and Martin focus on a set of reforms that involves cuts in applied agricultural protection rates that are at least 10 percentage points higher than Harbinson proposed, namely, 45, 70, or 75 percent bound rate cuts for developed countries and 35, 40, 50, or 60 percent cuts for developing countries. Consistent with the framework, least developed countries make no reduction commitments in either of these two cases.[3]

Jean, Laborde, and Martin then examine, and we model, the consequences of:

- Allowing smaller tariff cuts for self-nominated sensitive farm products, assuming that countries take into account the importance of the commodity, the height of the existing tariff, and the gap between the tariff binding and the applied rate in deciding which products to grant such treatment. Countries are allowed to treat 2 percent (in scenario 2) and 5 percent (in scenario 3) of tariff lines as sensitive, making those lines subject to just a 15 percent tariff cut;
- Including special agricultural products for developing countries, by adding another 2 percent (in Doha scenario 2) and 5 percent (in Doha scenario 3) of tariff lines as special and so subject to just a 15 percent tariff cut;
- Using instead a proportional cut formula that brings about the same reduction in average tariffs in industrial countries as a group, and developing countries as a group, as the tiered formulas used; and
- Adding a tariff cap of 200 percent, consistent with the suggestion in paragraph 30 of the July Framework Agreement that the role of a tariff cap be explored.

***<<B>>Agricultural Domestic Support<<end>>***

Reductions in domestic support have been a particular concern of developing countries. Developed countries are the major providers of such assistance, and many developing countries are concerned about the ability of their producers to compete with developed-country producers receiving large amounts of domestic support. While the marked asymmetry between industrial and developing countries is worrisome, evidence from Hertel and Keeney (2005) and from Hoekman, Ng, and Olarreaga (2004) suggests that the benefits to developing countries from reductions in domestic support may be substantially smaller than the potential gains from reductions in barriers to market access. Nonetheless, disciplining domestic support programs is crucial to ensure that when tariffs are lowered, import protection is not simply replaced by equally trade-distorting domestic measures.

Under the July framework, the base from which reductions in domestic support are to take place is in the commitments on the total bound aggregate measure of support (AMS) agreed under Article 6 of the Uruguay Round Agreement on Agriculture. Key elements of this framework are the distinction between nondistorting Green Box measures and trade-distorting Amber Box measures, together with a Blue Box containing measures tied to specific areas or livestock numbers.

Several features of this framework will influence the ability of negotiators to achieve substantial reductions in domestic support. One of these features is the de minimis provision that allows industrial countries to exclude from measurement up to 5 percent of the value of their agricultural output in commodity-specific support, and another 5 percent as non-commodity-specific support. Another feature is the market price support (MPS), which is based on a comparison of the official domestic price (which need not be closely related to domestic market prices) with the 1986–88 external reference price for each product. This MPS measure may not be associated with actual support and, to the extent that it is, it generally double-counts support provided by border price measures. A potentially more serious problem with the MPS is that countries can remove this element from their current AMS—without changing the amount of actual support provided—simply by abolishing the applied administered price used in calculating MPS. Because that does not alter the AMS binding commitments, it allows countries that formerly made extensive use of MPS to create substantial scope in their commitments to expand their actual support.

The July framework proposes tiered reductions in the total bound AMS, with larger reductions by members with higher initial AMS levels. In addition, it proposes capping product-specific AMS. De minimis levels are to be reduced to an extent to be negotiated. The definition of the Blue Box measures based on specific areas or livestock numbers is to be tightened by requiring these numbers to be “fixed and unchanging” and capped either at historical levels or at 5 percent of the value of production. The Green Box is to be clarified to ensure that the measures it incorporates are at most minimally trade distorting.

The MPS element of the AMS seems worthy of special attention because it does not measure trade-distorting support, and because of the scope it provides for avoiding disciplines. One option considered by Hart and Beghin (2005) is to redefine it so that it measures actual protection. Under some circumstances, this approach would impose greater discipline and would certainly encourage countries to adopt policies that reduce the damaging insulation of their domestic prices from world prices. Another alternative is to ensure that the MPS element is removed from both the current total AMS and the bound AMS. A third and potentially important reform canvassed by Hart and Beghin is to phase out the de minimis and Blue Box measures in favor of a (perhaps temporarily) expanded Green Box.

To provide negotiators with some insights into the prospective effects of these changes, we consider how various levels of cuts in the total bound AMS would affect the total distorting assistance that could be provided. How much would actual distorting support be reduced under various degrees of reduction in each country's total *bound* AMS? To answer this question, we assume that countries would take advantage of the loophole allowing them to reduce their current AMS by abolishing the administered domestic price, while retaining its effects in their bound AMS (a change already made by Japan in the case of rice).

A striking feature of the findings is that extraordinarily large reductions in bound AMS are required before any reductions in actual support would occur—an outcome required by paragraph 9 of the July Framework Agreement. Results for a tiered formula in which all countries with AMS notifications above 20 percent of the value of production cut their bound protection by 75 percent, and all others by 60 percent, are given in table 12.1. These results highlight just how deep cuts in bound levels of domestic support must be to bring about reductions in applied rates. Clearly, the offer of an initial reduction of 20 percent in bound AMS, contained in Paragraph 7 of Annex A of the July framework, is likely to have no direct impact.

**<<table 12.1 near here>>**

The very limited actual reductions required from such a large reduction in bound rates are a consequence in part of the high level of the bindings, which in turn reflect the choice of a period of very depressed world prices—1986–88—for the base. A cynical way of thinking about this is that WTO members can avoid disciplines by exploiting the ability to "abolish" their MPS without abolishing the actual support to which it is related. This problem is serious for the AMS but should be kept in perspective if there are strong reforms of market access and export competition, since reductions in these trade measures will reduce market price support.

Finally, there is the issue of cotton subsidies, addressed by Sumner (2005). Almost no cut is likely to be required under the July Framework Agreement, but the United States might agree to larger (phased) cuts of its cotton subsidies as part of complying at some future date with the WTO's dispute settlement outcome (see Sumner 2005). In that case, less could be needed in the way of U.S. cuts in its other domestic support programs.

***<<B>>Agricultural Export Subsidies<<end>>***

As Hoekman and Messerlin (2005) make clear, farm export subsidies are inconsistent with GATT (General Agreement on Tariffs and Trade) rules, so for that reason alone they deserve to be eliminated. The empirical analysis summarized in Hertel and Keeney (2005) shows that export subsidies are now only a small part of agricultural support programs—even when implicit subsidies in the form of food aid and export credits are included. A gradual phasing out over the next decade of both explicit and implicit forms of farm export subsidies should therefore be a politically feasible component of a comprehensive Doha agreement. Their elimination in isolation could harm a few food-importing and aid-dependent developing countries, but the poor net buyers of food in those countries can be assisted in far more efficient ways than through these measures.

***<<B>>Nonagricultural Market Access<<end>>***

Negotiations in the area of nonagricultural tariffs have been lagging those on farm products. Developing countries have clearly indicated that they wish to make smaller tariff cuts than developed countries do, and least developed countries expect not to have to make any cut commitments. A Doha Round is unlikely to require that all nonagricultural bound tariffs be cut by more than half, so in our analysis we assume a 50 percent cut in these tariffs by developed countries and a 33 percent cut by developing countries other than least developed ones (from whom no cuts are being demanded). Since those reductions in bound tariffs could lead to very little reform by developing countries, given their high tariff bindings relative to their applied tariffs, a more ambitious scenario may see them prepared to commit to more reform in order to entice deeper cuts in developed countries' agricultural and textile tariffs. Perhaps the most optimistic possibility is that developing countries would agree to cut nonagricultural bound tariffs as much as developed countries (that is, by the 50 percent we assume). Especially if that were coupled by more ambitious cuts in agricultural tariffs on the part of developing countries, developed countries could well respond with larger commitments themselves not only in trade but also with development aid. Indeed the experience of earlier multilateral trade negotiations showed that developing countries tended to receive only to the extent they were willing to give “concessions” themselves, such is the reciprocal nature of these negotiations.[4]

***<<B>>Services Trade<<end>>***

To date WTO members have been slow in coming forward during the Doha negotiations with proposals to reform trade in services. At this stage it seems likely that, as with the Uruguay Round, countries will make few meaningful commitments to open up their services sectors during the Doha Round. For that reason, and because services trade is less adequately represented in trade models than is goods trade, we have chosen to assume no reductions in barriers to services trade resulting from the Doha Round, even though, as Hertel and Keeney (2005) and Winters and others (2003) indicate, gains from services reform could well be enormous, even for developing countries.

***<<B>>Trade Facilitation Measures<<end>>***

Trade facilitation is a key to enlarging the opportunities for developing countries to benefit from market opening at home and abroad. The poorest of countries in particular could well be able to turn any losses from others’ trade liberalization into gains with a bit of investment in trade facilitation, as they could with some other domestic reforms that would help to make their internal factor and product markets work more efficiently. Funding agencies are showing an increasing interest in lending for such purposes, but it is impossible to know how much influence such moves would have on the outcome of the Doha negotiations. Therefore we do not consider them further here except indirectly in the sense that the Armington trade elasticities used in the LINKAGE model are set a little above those in the GTAP model in part to capture some elements of trade facilitation such as harmonization of standards that tend to occur over the longer term as countries open up.

## <<A>>The Global LINKAGE Model for Assessing Effects of Future Trade Reform

The model used for this analysis is the World Bank's global, dynamic computable general equilibrium (CGE) model, known as LINKAGE (van der Mensbrugghe 2004b). It is a relatively straightforward CGE model but with some characteristics that distinguish it from standard comparative static models such as the GTAP model. A key difference is that it is recursive dynamic, so it begins with 2001 as its base year and can be solved annually through to 2015. The dynamics are driven by exogenous population and labor supply growth, savings-driven capital accumulation, and labor-augmenting technological progress (as assumed for the World Bank's *Global Economic Prospects* exercise in 2004).[5] In any given year, factor stocks are fixed. Producers minimize costs subject to constant returns to scale in production technology; consumers maximize utility; and all markets, including the market for labor, are cleared with flexible prices. There are three types of production structures. Crop sectors reflect the substitution possibility between extensive and intensive farming. Livestock sectors reflect the substitution possibility between pasture and intensive feeding. All other sectors reflect the standard capital-labor substitution (with two types of labor, skilled and unskilled). There is a single representative household for each modeled region, allocating income to consumption using the extended linear expenditure system. Trade is modeled using a nested Armington structure in which aggregate import demand is the outcome of allocating domestic absorption between domestic goods and aggregate imports, and then aggregate import demand is allocated across source countries to determine the bilateral trade flows.

The model covers six sources of protection. The most important involves the bilateral tariffs. There are also bilateral export subsidies. Domestically, there are subsidies only in agriculture, where they apply to intermediate goods, outputs, and payments to capital and land.

Three closure rules are used. First, government fiscal balances are fixed in any given year.[6] The fiscal objective is met by changing the level of lump-sum taxes on households. This implies that losses of tariff revenues are replaced by higher direct taxes on households. Second, the current account balance is fixed. Given that other external financial flows are fixed, this implies that ex ante changes to the trade balance are reflected in ex post changes to the real exchange rate. For example, if import tariffs are reduced, the propensity to import increases. Additional imports are financed by increasing export revenues, which is typically achieved by a real exchange rate depreciation. Finally, investment is driven by savings. With fixed public and foreign saving, investment is driven by two factors: changes in the savings behavior of households, and changes in the unit cost of investment. The latter can play an important role in a dynamic model if imported capital goods are taxed. Because the capital account is exogenous, rates of return across countries can differ over time and across simulations. The model solves only for relative prices. The numéraire, or price anchor, in the model is given by the export price index of manufactured exports from high-income countries. This price is fixed at unity in the base year and throughout the projection period to 2015.

The newest version of the LINKAGE model is based on the latest release of the GTAP database, Release 6.05. Compared with Version 5 of the GTAP database, Version 6.05 has a 2001 base year instead of 1997, updated national and trade data and, importantly, a new source for the protection data. The detailed database on bilateral protection integrates, at the tariff level, trade preferences, specific tariffs, and a partial evaluation of nontariff barriers such as tariff rate quotas. Tariffs are lower in the new GTAP database than they were in the previous version (see appendix table A12.1) because of the inclusion of bilateral trade preferences and of major trade reforms between 1997 and 2001. These included the continued implementation of the Uruguay Round Agreement, especially the elimination of quotas on textile and clothing trade**<AU query: they weren't totally eliminated until 2004, were they?>>**, and China's progress toward WTO accession. Together, these reforms boosted trade's share of world GDP (gross domestic product) from 44 to 46 percent during those four years.

The version of the LINKAGE model used for this study is a 27-region, 25-sector aggregation of the GTAP database (see appendix table A12.2). There is a heavy emphasis on agriculture and food, which account for 13 of the 25 sectors, and a focus on the largest commodity exporters and importers.

## <<A>>The Subsidies and Import Protection Database<<end>>

The main source of protection resides in tariffs or border barriers, although some countries—notably, high-income countries—also have significant agricultural production and export subsidies. The average import tariff for agriculture and food is 16.0 percent for high-income countries and 17.7 percent for developing countries, while for manufactures other than textiles and clothing, it is 8.3 percent for developing countries and just 1.3 percent for high-income countries (table 12.2). The averages of course obscure large variations across countries and commodities. For example, if high-income countries put tariffs on temperate zone farm products at a prohibitive 100 percent but set tariffs on tropical products such as coffee at zero, the import-weighted average agricultural tariff could be quite low. Commodity averages also obscure bilateral differences. India, for example, has an average tariff on agriculture and food of 82 percent on imports from East Asia, but only 20 percent on imports from Sub-Saharan Africa. For high-income countries agricultural tariffs on goods from low-income countries are lower than on imports from high- and middle-income countries. In other sectors, however, there is less evidence of preferences at this level of aggregation. Imports of textiles and clothing—indeed, of all merchandise—from low-income countries face a higher average tariff in high-income countries than do imports from middle- or high-income countries.

**<<table 12.2 near here>>**

## <<A>>Welfare Impact of Current Protection Policies<<end>>

The LINKAGE model provides a baseline projection of the world economy first from 2001 to the start of 2005, following accession to the WTO by China and Taiwan (China), the EU expansion eastward in 2004 that added 10 more countries to the EU15, and completion of Uruguay Round implementation including the phaseout of the textile and clothing quotas under the Multifibre Arrangement.[7] The model then provides a baseline projection to 2015 assuming no other policy changes. The projected tariffs as of 2005, and hence in the baseline in 2015, are summarized in table 12.3. Deviations from that baseline in 2015, attributable to phased partial or total liberalization from 2005, are examined next.

**<<table 12.3 near here>>**

One benchmark against which to measure the results of Doha is that which would come if merchandise trade were completely freed over the 2005–10 period. That would lead to global gains by 2015 of $287 billion a year, according to the LINKAGE model. Another benchmark involves the internationally agreed reforms incorporated in the presimulation experiment for the 2001–5 period: had those reforms not been implemented, the dynamic gains in 2015 from freeing global merchandise trade would have been $341 billion instead of $287 billion, or another $54 billion (that calculation indicates the benefits of those recent reforms). The removal of the MFA quotas accounts for nearly half of that difference and thus should be considered part of the Uruguay Round's legacy (assuming safeguards by high-income countries or export taxes by China do not replace textile and clothing quotas).[8]

Table 12.4 reports the distribution of the standard economic welfare, or real income (equivalent variation) effects, of removing all merchandise trade barriers and agricultural subsidies globally. Two-thirds of the $287 billion annual gain in 2015 and after would accrue to the high-income countries. As a share of income, however, developing countries (as self-defined by WTO members) do twice as well, with an average increase of 1.2 percent compared with 0.6 percent for high-income countries. The results vary widely across developing countries, ranging from little impact in the case of Bangladesh and Mexico to increases of 4–5 percent in parts of East Asia. The second column of numbers in that table shows the amount of that welfare gain resulting from changes in the international terms of trade for each country. For developing countries as a group, the terms-of-trade effect is negative, reducing somewhat the gains from improved efficiency of domestic resource use (especially in China and India). That effect would dissipate over time, however, as developing countries diversify their exports in the course of their industrialization. Other macroeconomic effects, including on real exports, imports, exchange rates, and terms of trade, are summarized in table 12.5.

**<<tables 12.4 and 12.5 near here>>**

There are several ways to decompose the real income gains from global trade reform so as to better understand the sources of the gains. One way is to assess the impacts of developing-country liberalization versus industrial-country liberalization in different economic sectors; another is to decompose by policy instrument.[9] The latter gave results very similar to those reported in Hertel and Keeney (2005), namely, that barriers to market access explain almost all the welfare effects of agricultural policies, with removal of domestic support and export subsidy programs playing only a very minor role and in fact slightly harming developing countries as a group (since some food-importing developing countries gain from farm export subsidies in industrial countries). In our case, all but about 1 percent of the global welfare gains from full removal of all merchandise trade barriers and agricultural subsidies is accounted for by cuts in import tariffs, which is also what Hoekman, Ng, and Olarreaga (2004) estimate would result from halving all agricultural distortions (in their case using partial equilibrium analysis). Hertel and Keeney's estimate from full liberalization of all merchandise markets was only slightly higher, at 7 percent (see their table 2.7).

Our results decomposed by sector are provided in table 12.6. They suggest that global liberalization of agriculture and food yields 63 percent of the total global gains (similar to Hertel and Keeney's 66 percent). This finding is consistent with the high tariffs in agriculture and food (17 percent global average) versus other sectors, but it is nonetheless remarkable given the low shares of agriculture in global GDP (4 percent) and global merchandise trade (9 percent). The elimination of trade-distorting farm policies in high-income countries accounts for three-fourths of those gains. Notice too that as much of the gain to developing countries from farm reform results from South-South agricultural liberalization as from developing countries' unrestricted access to markets in high-income countries. That is almost equally true in manufacturing in aggregate, despite the big gains from textiles and clothing reform ($13 billion from market access in high-income countries compared with $9 billion attributable to South-South textiles trade growth). In other words, reform by developing countries is as important for economic welfare gains to the South as reform by high-income countries. It is clear that reforming agricultural policies in both sets of countries is crucial for developing countries, with reform by high-income countries in textiles only half as important as is their agricultural reform.

**<<table 12.6 near here>>**

Politicians also have an eye on what happens to their country's volume of output and exports in sectors whose protection is cut, and on earnings of constituents. Contrary to much rhetoric from protectionist groups, the full liberalization results suggest little change in the high-income countries' shares of global output and exports of processed food, beverages and tobacco, and "other manufactures." Only for primary agriculture are the changes noticeable: the export share falls by more than one-quarter, from 53 percent to 38 percent (including trade within the EU), but the output share falls by only one-sixth, from 30 to 25 percent The converse of these share changes are shown for developing countries in table 12.7. In absolute terms, agricultural and food output in high-income countries would decline but only by 0.1 percent a year over the projection period to 2015 following a move to free trade in all merchandise, instead of rising by a projected 1.6 percent a year in our baseline.

**<<table 12.7 near here>>**

The impact of full reform on agricultural and food output and trade is shown for each country or region in table 12.8; the table also shows clearly that exports are enhanced much more than output. As a consequence, the global share of agricultural and food production exported rises, from 9.5 to 13.2 percent (or from 6.6 to 11.6 percent when trade within the EU is excluded). Developing countries would earn an additional $192 billion each year from these increased exports. Latin America accounts for a large part of that increase, but exports expand in all regions, and even low-income countries would sell an additional $36 billion worth of such goods each year (an increase of 52 percent). The situation with food imports is also noteworthy. Middle-income countries as a group would see food imports grow less rapidly than farm exports, while imports and export would grow at the same pace in low-income countries, leaving their food and agricultural self-sufficiency ratio unchanged. Even for high-income countries, that ratio would fall only five percentage points, although it is concentrated in primary agricultural products (table 12.9). Self-sufficiency ratios improve for Sub-Saharan Africa and Latin America, while China and India maintain their agricultural self-sufficiency levels, despite their expansion of exports in labor-intensive manufactures.

**<<table 12.8 and 12.9 near here>>**

Cotton trade distortions and subsidies raise producer prices by more than 50 percent in the United States and even more in the EU. What effect would their removal have in this context of freeing all merchandise trade and agricultural subsidies? The price of cotton in international markets is estimated to be considerably higher in 2015 than it would be without reform, including for U.S. exports because its subsidies no longer depress that price. However, the volume of U.S. cotton exports shrinks when those subsidies are removed, raising the price for other countries' exports. The price rise would not apply equally to all exporters, however, because of product differentiation as captured in the Armington elasticities. For Australia and Brazil, the rise is 8 percent, while for Sub-Saharan Africa, it averages less than 2 percent (relative to the numéraire, which is the average price of exports of manufactures by developed countries). However, cotton exports from Sub-Saharan Africa would be 73 percent greater under this reform scenario. Indeed developing country output and exports of cotton would expand by about the same amounts as the U.S. levels would shrink, with Sub-Saharan Africa enjoying more of that gain than any other region —and cotton is so important in Sub-Saharan Africa (minus South Africa) that it contributes one-quarter of that region's net gain in agricultural value added from full global trade liberalization (Anderson, Martin, and van der Mensbrughe 2005a, table 14). In 2015 the share of all developing countries in global cotton exports would be 85 percent instead of 56 percent, vindicating their efforts to ensure that cotton receives specific attention in the Doha negotiations (Sumner 2005; Baffes 2005).

The relatively small percentage changes in net national economic welfare hide the fact that redistributions of welfare among groups within each country following trade reform can be much larger. This is clear from the effects on real rewards to labor, capital, and land that are reported in table 12.10. The results also strongly support the expectation from trade theory that returns to unskilled labor rise substantially in developing countries, and by more than wages of skilled workers, which in turn rise more than earnings of capitalists. Trade reform therefore would be likely to improve equity and reduce poverty in those countries, given that the vast majority of the poor are unskilled laborers (and farmers). For high-income countries, again consistent with standard trade theory, skilled workers gain more than unskilled workers. Those farmers in Europe and northeast Asia who rent agricultural land would benefit from a large fall in rental costs, more or less offsetting the fall in prices for their output, while owners of land in those countries would lose if uncompensated.

**<<table 12.10 near here>**

Those changes in factor rewards assume labor is mobile between sectors. In the most densely populated developing countries, full liberalization would encourage more farm workers to take up now-more-rewarding work in labor-intensive manufacturing and service activities, so value-added in agriculture would fall not only in economies where it has been highly protected (Europe, northeast Asia, and the United States) but also in South Asia. All other developing-country regions would see a rise in net farm income. That is true even of China, because it has already reduced much of its agricultural protection as part of its reforms associated with its accession to WTO at the end of 2001 (table 12.11).

**<<Table 12.11 near here>>**

These results are for full trade liberalization. Smaller changes can be expected to result from partial reforms of the sort being negotiated currently under the Doha Development Agenda. It is to those that we now turn our attention.

**<<A>>Some Prospective Doha Scenarios: Estimating Their Consequences<<end>>**

What will the Doha package ultimately contain? To focus on the agricultural component in particular, we make simplifying assumptions about nonagricultural components, namely, we assume no reform in services and no new trade facilitation measures. We also assume that agricultural export subsidies are eliminated and that domestic support for agriculture is cut in just the four economies noted earlier in the discussion of table 12.1.

More difficult to determine are the likely nature and extent of reductions in market access barriers, so several scenarios are considered initially for agricultural and food products in isolation from nonagricultural tariff cuts, before incorporating some cuts in nonagricultural market access barriers. A total of eight simulations are designed to evaluate the consequences of different approaches to liberalization; the simulations focus on different degrees of top-down progressivity in the tariff cuts, and on different levels of developing-country participation in the reforms (for a summary list, see table 12.12) As suggested in the Girard text (WTO 2003a), the bound tariff on a good for which no bound tariff has been set is assumed to be double the applied MFN rate. Throughout this section, the WTO usage of the term *developing countries* applies when allocating special and differential treatment in the form of lesser commitments to reform. As a result Hong Kong (China), Korea, Singapore, and Taiwan (China) are all subjected to the same tariff cuts as other developing economies despite their high-income status.

**<<Table 12.12 near here>>**

The experiments begin with scenario 1, which assumes a tiered reduction formula with marginal agricultural tariff rate reductions of 45, 70, and 75 percent within each of the three bands defined by the Harbinson (WTO 2003b) inflection points of tariff rates of 15 percent and 90 percent for developed countries (that is, for low agricultural tariffs the marginal rate of reduction is 45 percent, for medium-level tariffs it is 70 percent, and for the highest tariffs it is 75 percent). For developing countries, the reductions are 35, 40, 50, and 60 percent within each of their four bands. Least developed countries are not required to undertake any reduction commitments. These cuts are greater than those proposed in the Harbinson draft because we found its cuts were too light to have much impact (providing only two-thirds of the global welfare gain of Scenario 1 and leading to zero gain in Scenario 2).

Scenarios 2 and 3 examine the consequences of including the sensitive farm products allowed for in the framework, with developed countries allowed to treat 2 percent (in scenario 2) and 5 percent (in scenario 3) of their HS6 agricultural tariff lines as sensitive and thereby subject to a tariff cut of only 15 percent (as a substitute for the TRQ expansion mentioned in the framework agreement); those proportions are doubled for developing and least developed countries, in part to incorporate their special farm products demand.[10]

Scenario 4 considers the impact of a proportional cut formula that brings about the same reduction in average agricultural tariffs in developed countries as a group (44 percent), and developing countries as a group (21 percent), as the tiered formulas used in scenario 1.

Scenario 5 uses the same proportional cut formula as scenario 4 but allows 2 percent of tariff lines in developed countries to be treated as sensitive products, and 4 percent in developing countries, to cover sensitive and special products. This approach reduces the average tariff cut to 16 percent for developed countries and 9 percent for developing countries.

Scenario 6 considers the effects of adding to Scenario 5 a tariff cap of 200 percent so that any product with a bound tariff in excess of that limit will be reduced to that cap rate. This scenario leads to average cuts in food and agricultural tariffs of 18 percent for both developed and developing countries.

Scenario 7 adds to Scenario 1 the cuts in nonagricultural tariff bindings of 50 percent in developed countries, 33 percent in developing countries, and zero in least developed countries.

Finally, scenario 8 makes developing (including least developed) countries full participants in the Doha Round, undertaking the same reductions in bound (but not necessarily applied) tariffs as the developed countries in Scenario 7.

The average tariffs resulting from all these scenarios are summarized for each region in table 12.13, along with the original projected baseline tariffs if there were to be no Doha reform.

**<<Table 12.13 near here>>**

***<<B>>Estimated Welfare and Trade Effects of Scenarios in 2015***

The welfare consequences of implementing these various reforms over the 2005–10 period and allowing the global economy to adjust to 2015 are summarized in table 12.14, in dollar terms and as percentage changes in real income. The first column suggests that agricultural liberalization using the harmonizing formula (scenario 1) would generate a global gain of $75 billion even without the inclusion of nonagricultural tariff reform. But almost all those benefits accrue to the reforming high-income countries; developing countries would gain only $9 billion because their bound tariffs are so high as to lead to almost no reform by them.[11] Were the high-income countries allowed to exclude from cuts even just 2 percent of their sensitive farm products (and developing countries 4 percent), those global gains would shrink to just $18 billion. If that tolerance is raised to 5 percent (10 percent for developing countries), the gain would drop to $13 billion. In both cases developing countries as a group would be lose (scenarios 2 and 3).

**<<table 12.14 near here>>**

Should the tiered formula be replaced by a straightforward proportional cut that brings about the same average agricultural tariff reduction as the tiered formulas used in Scenario 1, the global gains are lower but not by much ($66 billion, compared with scenario 1's $75 billion). And the developing countries' share of that is larger than in scenario 1. Even if sensitive and special farm products are allowed with the harmonized formula, as in scenario 5, the global gains would be no lower than under the tiered formula, and they could be raised substantially, as in scenario 6, simply by putting a cap of 200 percent on bound tariffs. Together these six scenarios suggest that the complexity of negotiating a tiered formula may simply not be worth the effort, especially if it leads high-income countries to insist on exceptional treatment for their sensitive farm products.

The final two scenarios add nonagricultural tariff cuts to the agricultural reforms in the preceding scenarios. In scenario 7, special and differential treatment is provided for developing countries' nonagricultural cuts, as is the case for all the preceding agricultural cut scenarios. Even so, the gain to developing countries by adding these nonfarm reforms doubles relative to scenario 1 where only agriculture tariffs are cut, contributing one-third of the extra boost to global welfare ($7 billion out of the $22 billion difference in global gains between scenarios 1 and 7). In scenario 8, the developing countries (including least developed) fully engage in the reform process, forgoing the special and differential treatment provided under in scenarios 1 and 7. That approach substantially boosts their welfare as well as global welfare, because it ensures that their cuts in bound tariffs lead to considerably larger cuts in applied tariffs (shown in table 12.13). Nonetheless, agricultural reform along hardly changes the global average tariff for goods, whereas that average falls by almost one-third, or 1.5 percentage point, when manufacturing is included (see table 12.13d).

Retaining special and differential treatment as in scenario 7 would yield a global gain of $96 billion from Doha merchandise liberalization, which is one-third of the potential welfare gain from full liberalization of $287 billion. But for developing countries the gain would be only $16 billion, which is less than one-fifth of that group's potential gain shown in table 12.2 of $86 billion. Forgoing special and differential treatment (scenario 8) raises their gain by 42 percent, or an extra $7 billion. Much of those gains go to the largest developing economies, but note that in percentage terms

Sub-Saharan Africa also gains substantially if it liberalizes more, contrary to the presumptions of many commentators. By contrast, under scenario 7 those Sub-Saharan African countries simply are not liberalizing enough to get sufficient efficiency gains to offset the terms-of-trade losses they suffer as net food importers, as recipients of tariff preferences that have eroded with the decline in high-income countries' MFN tariffs, or as a result of the combined export growth from reforming economies with similar export compositions.

The aggregate global welfare consequences of scenario 7 are hardly altered if agricultural domestic and export subsidies are not reduced at the same time. The welfare effects on reforming countries and their significant trading partners are altered, however. Table 12.15 shows the changes to the national welfare effects for scenario 7 first if export subsidies are not cut and then if domestic subsidies also remain uncut. Not surprisingly, continuation of export subsidies reduces the welfare gain most for the European Union, while for the United States, it is the continuation of domestic support programs. Recall that changes in a country's welfare effects result not only from efficiency of resource use but also from changes in terms of trade, which are affected by reforms in other countries as well as the county itself. Unprotected Latin America, and Australia and New Zealand gain most from the progressive addition of subsidy cuts to the scenario (apart from the subsidy-cutting countries themselves).

**<<table 12.15 near here>>**

Trade negotiators often think more in terms of the boost to the value of trade than to the increase in economic welfare. Would freeing global merchandise trade lead to greater trade gain for developing countries than for high-income countries, given the latter's high protection rates in agriculture and textiles? Table 12.16 suggests any imbalance of that sort is not likely to be a major problem, even with complete trade liberalization. Certainly in those two protected sectors, exports would increase more for developing than for high-income countries, but for other manufactures the trade growth for the two regions would have the opposite bias. Also, much of the developing countries' trade growth is with other developing countries. Hence for merchandise trade as a whole, developing countries would sell an additional $318 billion to high-income countries under free trade whereas high-income countries would sell an additional $290 billion to developing countries. A small amount of services trade liberalization by developing countries would be sufficient to close that gap, if full reciprocity was sought.

**<<table 12.16 near here>>**

The trade consequences of scenario 7 also are summarized in table 12.16. The fourth column shows that by 2015, annual exports from developing countries would increase by $41 billion for agricultural products, $25 billion for textiles and clothing, and $12 billion for other manufactures. The total increase of $78 billion is somewhat smaller than that for high-income countries ($135 billion), but that difference is less when expressed in percentage terms (2.6 percent, compared with 3.1 percent for high-income countries). This takes the world economy one-fifth of the way toward where it would be if the world moved to completely free trade in merchandise (compare the first and fourth columns of table 12.16). Of more interest to trade negotiators are the changes in *bilateral* trade: they want to see how balanced any exchange of market access would be. Not surprisingly, developing countries expand their exports of agricultural and textile products to high-income countries more than they expand their imports of those products from high-income countries. But the opposite is true of other manufactures, so for merchandise trade in total the difference is not great: developing countries in 2015 would sell $62 billion more to high-income countries and would buy $55 billion in return under scenario 7 (see fifth and sixth columns of table 12.16). This small gap might be tolerated by high-income countries as a concession to development, but otherwise it could be narrowed if developing countries demanded less special and differential treatment or gave more than they got from high-income countries in terms of opening up services trade.

How big would be the consequences of reform for farm output and employment growth over the implementation period post-2004? Table 12.17 shows what that annual growth would be in the baseline (no policy changes after 2004), what it would be if all distortions to merchandise trade were removed, and what it would be under scenario 7. If trade was completely freed, farm output would decline (instead of growing slightly) only in the EU and Japan while growing slower in a few other highly protective countries. But for most of the world, farming activities would expand. Scenario 7 would involve much less reform than a move to free trade, and so would involve a much slower loss of farm output for the EU and Japan and less output growth for the vast majority of countries that would gain. A comparison of the first and third columns of table 12.17 reveals that for most of the protective economies, scenario 7 would simply slow the growth of farm output a little over the coming decade. This contrasts with the rhetoric suggesting that cuts in farm protection would cause a major collapse of protected sectors.

**<<table 12.17 near here>>**

The farm employment picture is somewhat different. Typically, economic growth leads to declines not only in the relative importance of agriculture (for reasons explained in Anderson 1987 and Martin and Warr 1993) but also in absolute numbers employed in farming once a country reaches middle-income status. Thus it is not surprising that numerous middle- and high-income countries are projected to lose farm jobs over the next decade, as the baseline scenario of table 12.17 shows. For the most protected farm sectors, that rate of farm employment decline would more than double if the world were to move to completely free trade; but it would decline only slightly under scenario 7. For other economies, though, farm employment would grow a little faster under that scenario, allowing developing countries to absorb more workers on their farms.[12]

Scenario 7 also raises the share of agricultural and food production that is exported globally, from 9.5 to 10.0 percent, which is one-seventh the13.2 percent share farm and food exports hold under the free merchandise trade scenario. Table 12.18 shows that even in the protected countries this ratio rises a little or, in the case of Europe, falls only very slightly. That change is small because farm resources would move within the sector from import-competing to more-competitive farming activities.

**<<Table 12.18 near here>>**

What about poverty alleviation? In a separate paper (Anderson, Martin, and van der Mensbrugghe 2005b), we estimate that under the full merchandise trade liberalization scenario, the number of people in extreme poverty in developing countries (those earning no more than $1 a day) would drop by 32 million in 2015 relative to the baseline level of 622 million, a reduction of 5 percent. By 2015 a majority of the poor are projected to be in Sub-Saharan Africa, where the reduction would be 6 percent. [13] Under the Doha scenarios shown in table 12.19, the poverty impacts are far more modest. The number of poor living on $1 a day or less is estimated to fall by 2.5 million under scenario 7, (of which 0.5 million are in Sub-Saharan Africa) and by 6.3 million under scenario 8 (of which 2.2 million are in Sub-Saharan Africa). These estimates correspond to the relatively modest ambitions of the merchandise trade reforms as captured in these two scenarios. If only agriculture was reformed (scenario 1), there would be much less poverty alleviation globally and none at all in Sub-Saharan Africa. That result underscores the importance for poverty of including manufactured products in the Doha negotiations.

**<<table 12.19 near here>>**

**<<A>>Caveats<<end>>**

Results such as those presented here are always dependent on the assumptions, data, and parameters underlying them and so are subject to numerous qualifications. A particularly important caveat has to do with the way preferences are treated in the GTAP Version 6.05 database. In previous versions of that database, only key *reciprocal* preferences were included (notably between members within the EU, NAFTA, ASEAN, and Australia-New Zealand Closer Economic Relationship), whereas the new version added *nonreciprocal* tariff preferences provided by developed countries for their imports from developing countries under numerous arrangements such as the Generalized System of Preferences, the EU's provisions for former colonies under the Africa, Caribbean, and Pacific program and more recently for least developed countries under the Everything But Arms agreement, and the U.S. Africa Growth and Opportunity Act and the Caribbean Basin Initiative. We assume that there are no rules of origin or similar restrictions that discourage developing countries from taking full advantage of those preferences (even though we know rules of origin often lead to underutilization). We further assume perfect competition between traders in the two sets of countries, which determines how rents from those preferences are shared between the exporting and importing countries (even though we know the developed-country importers often have more market power than the developing-country exporters of standard commodities so that the latter receives a smaller share of the rents than our analysis generates).[14] We therefore overstate the extent of preference erosion that would occur, especially for least developed countries, and so understate their gains from trade reform. If instead those nonreciprocal preferences were excluded from the database, we would overestimate the preference-receiving countries' gains from developed-country trade reform. So until we have a better way to incorporate these real-world aspects of preference schemes, the reader should simply be aware that the welfare gains would be higher (or losses less) for least developed countries than indicated above.[15] The difference would not be great for Rest of Sub-Saharan Africa, however, according to the results presented in Bouët, Fontagné, and Jean (2005, table 6.9).

Imports of agricultural products subject to tariff rate quotas are handled less than perfectly in the World Bank's LINKAGE model and the GTAP database, in two respects. First, in the GTAP Version 6.05 database, the treatment of tariffs applied on TRQ commodities depends on the extent to which the quota is filled: if the quota is less than 90 percent filled, the in-quota tariff is assumed to apply on these commodities; if the quota is between 90 and 99 percent filled, the effective tariff is assumed to be the average of the in- and the out-of-quota tariffs; and if the quota is more than 99 percent filled, then the out-of-quota tariff is applied. Second, where TRQs are nonbinding and hence the in-quota tariff is used, and preferences are provided to developing countries, such a preference may well be illusory. If imports increased, for example, the out-of-quota tariff might kick in. Furthermore, de Gorter and Kliauga (2005) identify cases where the out-of-quota tariff has been applied at the margin even though the quota was not filled. This provides additional reasons to expect that we have overstated the benefits of preferences or the costs of preference erosion.

Another important caveat is that our results do not incorporate the fact that trade reform typically boosts factor productivity.[16] If instead we were to assume productivity is positively related to changes in sectoral openness, as specified in World Bank (2002) and Anderson, Martin, and van der Mensbrugghe (2005a), then the estimated global gains from freeing merchandise trade increase by one-third.[17] More important, they increase by two-thirds for developing countries, because the initial protection rates are so much higher there (table 12.20). For this reason even more than because of our treatment of preferences, the welfare effects presented in this paper should be taken as very much lower-bound estimates.

**<<table 12.20 near here>>**

The above analysis does not include costs of adjustment to reform, but these are typically far less than is commonly assumed.[18] Indeed, the structural changes that take place over time in the normal course of economic growth are shown above to be typically very much larger than the small changes that would accompany gradual and partial trade liberalization. Furthermore, adjustment assistance schemes (financed by foreign aid in the case of low-income countries) are a way to help fund adjustment to tariff and subsidy cuts, and they are just one-time payments, whereas the benefits of reform continue into the future.

**<<A>>Lessons and Implications<<end>>**

In summary, we provide the following as the key messages that emerge from our analysis:

- The potential gains from further global trade reform are large
- Developing countries could gain disproportionately from further global trade reform
- Benefits could be as much from South-South as from South-North trade reform
- Agriculture is where reform is needed most
- Large cuts in both agricultural tariffs and domestic support commitments are needed to erase binding overhang
- A complex tiered formula may offer only a slightly greater gain than a proportional cut with a cap on farm tariffs
- Even large cuts in agricultural tariffs do little if exceptions are made for sensitive products, again unless a cap applies
- Cuts in cotton subsidies would help cotton-exporting developing countries
- Expanding nonagricultural market access would add substantially to the gains from agricultural reform and help balance the exchange of concessions
- Some poor countries may lose slightly, although that is less likely the more they reform themselves
- Farm output and employment would not decline in developing countries under Doha

The good news is that a great deal can be gained from liberalizing merchandise—especially agricultural—trade under Doha, with a disproportionately high share of that potential gain available for developing countries (relative to their share of the global economy). Moreover, it is the poorest people, namely, farmers and unskilled nonfarm laborers, who appear to be most likely to gain from global trade liberalization, in developing countries. To realize that potential gain, it is in agriculture that by far the greatest cuts in bound tariffs and subsidies are required. However, the political sensitivity of farm support programs, coupled with the complexities of the measures introduced in the Uruguay Round Agreement on Agriculture and of the modalities set out in the Doha framework agreement of July 2004, ensure that the devil will be in the details of the final Doha agreement. It is for that reason that ex ante empirical analysis of the sort provided here is a prerequisite for countries engaged in the Doha round of negotiations.

Among the numerous policy implications that can be drawn from our analysis, several are worth highlighting. First, with gains on the order of $300 billion a year at stake from implementing the July Framework Agreement, even if no reforms are forthcoming in services, and even if the counterfactual would be the status quo rather than protectionist backsliding, the political will needs to be found to bring the round to a successful conclusion, and the sooner the better. Multilateral cuts in MFN bindings are also helpful because they can lock in previous unilateral trade liberalizations that otherwise would remain unbound and hence vulnerable to backsliding; they can also be used as an opportunity to multilateralize previously agreed preferential trade agreements and thereby reduce the risk of trade diversion from those bilateral or regional arrangements.

Second, agricultural reforms need to be significant if the Doha agreement is to be pro-development and pro-poor. Outlawing agricultural export subsidies is the obvious first step. That will bring agriculture into line with the basic GATT rule against such measures, and in the process help to limit the extent to which governments encourage agricultural production by other means (since the cost of surplus disposal will be higher without access to export subsidies). Concurrently, domestic support bindings must be cut very substantially to reduce binding overhang. In so doing, the highest-subsidizing countries, namely the European Union, Norway, and the United States, need to reduce their support, not just for the sake of their own economies but also to encourage developing countries to reciprocate by opening their markets as a quid pro quo. An initial installment of a 20 percent cut is nothing more than a start toward getting rid of that overhang. Even more important, agricultural tariff bindings must be cut deeply so that some genuine market opening can occur. Exempting even just a few sensitive and special farm products is undesirable because such exemptions would drastically reduce the gains from reform. If such exemptions prove politically impossible to avoid, then a cap should be imposed so that no bound tariff for any product could exceed, say, 200 percent. Should it prove to be too difficult or time-consuming to negotiate a complex tiered formula for cutting farm tariffs, our results suggest a proportional cut of the same average magnitude plus a cap to bring down the very highest bound tariffs could be nearly as effective in raising welfare.

Third, expanding nonagricultural market access at the same time as reforming agricultural trade is essential. A balanced exchange of concessions is impossible without adding other sectors, and the sectors cannot be limited to textiles and clothing (which also benefit developing countries disproportionately) even though they make up the other highly distorted sector. With other merchandise included, the trade expansion would be many times greater for both rich and poor countries.

Fourth, South-South concessions also are needed, which means reconsidering the extent to which developing countries liberalize. Since developing countries are trading so much more with each other now, they are the major beneficiaries of reforms within their own regions. Even least developed countries should consider reducing their tariff binding overhang, since doing so in the context of Doha gives them more scope to demand concessions (or compensation for preference erosion or other contributors to terms-of-trade deterioration) from richer countries than if they hang on to their opportunity not to engage in reform.

What emerges from our analysis is that developing countries would not *have* to reform very much under Doha, because of the large gaps between their tariff bindings and applied rates. But to realize more of their potential gains from trade, they would need to forgo some of the special and differential treatment they have previously demanded, and perhaps also commit to additional unilateral trade (and complementary domestic) reforms, and to invest more in trade facilitation. High-income countries could encourage them to do so by being willing to open up their own markets more to developing-country exports and by providing more targeted aid. To that end, a new proposal has been put forward to reward developing-country commitments to greater trade reform with an expansion of trade-facilitating aid, to be provided by a major expansion of the current Integrated Framework, which is operated by a consortium of international agencies for least developed countries (Hoekman and Prowse 2005). This proposal may well provide an attractive path for developing countries seeking to trade their way out of poverty, not least because it would help offset the tendency for an expanded aid flow to cause a real exchange rate appreciation (Commission for Africa 2005, 296–97). As well, it is potentially a far more efficient way for developed countries to assist people in low-income countries than is the current systems of tariff preferences.

In conclusion, the July Framework Agreement does not guarantee major gains from the Doha Development Agenda. On the one hand, even if an agreement is ultimately reached, it may be very modest. How modest depends on, among other things, the nature of the agricultural tariff-cutting formula, the size of the cuts, the extent to which exceptions for sensitive and special farm products are allowed, whether a tariff cap is introduced, and the extent to which developing countries commit to participating in market access reforms. What is equally clear, on the other hand, is that major gains are possible, but only if the political will to reform protectionist policies—especially in agriculture—can be mustered.

## Appendix 12A: Comparison of Versions 5 and 6.05 of the GTAP Protection Database and of LINKAGE Model Results with Those from the GTAP-AGR Model

The newest version of the LINKAGE model, Version 6.0, is based on the latest release of the GTAP database, Release 6.05.[19] That version has a 2001 base year, updated national and trade data, and, importantly, a new source for the protection data. (The base year in the previous release, Version 5, was 1997.) The new protection data set provides a tariff level detailed database on bilateral protection that integrates trade preferences, specific tariffs, and a partial evaluation of nontariff barriers such as tariff rate quotas.[20] The tariffs are lower in GTAP Version 6.05 than they were in the previous database because of the inclusion of bilateral trade preferences and of major reforms between 1997 and 2001 (table A12.1). These reforms included the continued implementation of the Uruguay Round Agreement, especially the elimination of quotas on textile and clothing trade, and China's accession to the World Trade Organization. The version of the LINKAGE model used for this study is made up of a 27-region, 25-sector aggregation of the GTAP data set.

**<<put A12.1 here>>**

Using the GTAP Version 6.05 database for 2001 and the newest LINKAGE model, our analysis finds considerably larger welfare gains from full trade liberalization than the gains generated by Hertel and Keeney (2005) using a variant on the standard GTAP model called GTAP-AGR. To understand the reasons behind this difference, we altered the LINKAGE model for this appendix exercise so that it mimics the comparative static GTAP-AGR model as of 2001, and we also altered assumptions about elasticities (see the differences in table A12.2) and factor mobility to make them similar to those used by Hertel and Keeney.

**<<Put table A12.2 near here>>**

Obtaining a comparative static version of the LINKAGE model involves only a few modifications to the recursive dynamic version used in our Doha Scenarios. Specifically, the "new" elasticities of substitution in production are imposed to mimic the long-term properties of the dynamic model, capital is assumed to be perfectly mobile, and adjustment costs are ignored. But the big difference between the comparative static and dynamic version results is the change in the structure of the global economy by 2015. This change is attributable to growth in factor stocks and to changes in the relative weights of countries and sectors in the global economy over those 14 years.

Table A12.3 reports the results from the LINKAGE model on the welfare cost of global trade barriers and agricultural subsidies in 2001 under various assumptions, compared with their cost in 2015. First, we scale the 2015 dynamic results back to 2001 by assuming the percentage effect on income in each region is the same in 2001 as in 2015. This exercise reduces the real global cost from $287 billion to $156 billion simply because each regional economy is smaller. Second, when the dynamic effects themselves are removed, the global comparative static cost shrinks to $127 billion. Third, if the long-run Armington elasticities[21] used in the LINKAGE model (which we believe are more appropriate for the long-run analysis being undertaken in the current study) are replaced be the medium-term ones used in Hertel and Keeney’s GTAP-AGR model,[22] the real global cost shrinks further to $89 billion. One other difference between the LINKAGE and GTAP models has to do with agricultural land: GTAP assumes a fixed supply of farm land and limited land mobility between farm sectors, whereas the LINKAGE model assumes farm land supply in the long run is somewhat responsive to farm product prices and that land is completely mobile among farming enterprises in the long run.[23] The final column of table A12.3 shows that replacing those two assumptions with the ones adopted in the GTAP-AGR model further reduces the global cost of trade-distorting policies, to $78 billion. In short, these differences between the two models fully explain the different aggregate results, since $78 billion is very close to Hertel and Keeney’s $84 billion comparative static estimate of the gains from freeing merchandise trade globally.

**<<Put table A 12.3 near here>>**

**<<A>>Endnotes<<end>>**

1. Centre d’ Etudes Prospectives et d’Informations Internationales,, at www.cepii.org

2. This approach provides cuts in average tariffs without the discontinuities created by the proportional cuts involved in the Harbinson formula –but that are more or less comparable with those generated by Harbinson’s proportional reductions of 25, 30, and 60 percent, because the larger cuts on higher tariffs apply only on the portion of the tariff above 15 or 90 percent, respectively.

3. The least developed countries are a special classification of 50 developing countries defined by the U.N. (http://www.unctad.org/Templates/WebFlyer.asp?intItemID=2161&lang=1).

4. See Finger (1974, 1976) for results from the Dillon and Kennedy Rounds, and Finger and Schuknecht (2001) for Uruguay Round results.

5. In the appendix to this chapter the results are compared with those from a comparative static version similar to the GTAP model, to show how key model specifications can affect the results.

6. For the sake of simplicity, government fiscal balances are fixed in US$ at their base-year level, minimizing potential sustainability problems, but this approach implies they decrease as a percentage of GDP (gross domestic product) for expanding economies.

7. These are the key internationally agreed and bound policy changes. We do not include unilateral and unbound policy changes such as recent reforms in EU and U.S. farm programs.

8. To get a sense of the effect of preferences on developing country and global welfare, we reran the model for 2001, [prior to the pre-simulation experiment,] without those preferences in place. The estimated global welfare gains from reform are then $382 billion instead of $341 billion, and the developing country gains are $150 billion instead of $113 billion. That is, the inclusion of preferences in the database reduces the estimated gains to global, developing country, and high-income country welfare by 11, 25, and 2 percent, respectively. Much of the difference is attributable to Sub-Saharan Africa, whose estimated gains from further reform are cut almost in half when preferences are included. The reductions for developing countries are overstated for two reasons, however. One is that we assume there are no rules of origin or other impediments that prevent developing countries from fully using their preferences. The second is that we also assume importers in the preference-providing rich countries do not use their power to gain a disproportionate share of the rent from that preferential access. In practice, neither of these assumptions holds, according to recent case studies (for example, Olarreaga and Özden 2005; Özden and Sharma 2004).

9. The technique for doing this using Gempack software was developed by Harrison, Horridge, and Pearson (2000).

10. As described in Jean, Laborde, and Martin (2005),each country presumably chooses its sensitive farm products by taking into account the importance of the product, the height of its existing tariff, and the gap between its bound and applied tariffs in that country.

11. In this and subsequent tables, Hong Kong (China), the republic of Korea, Singapore and Taiwan (China) are included in the high-income country category even though they are self-categorized in the WTO as developing countries (and so are assumed to cut their tariffs only to the same extent as other developing countries). In the tables, where the WTO-define developing country group is also shown, the High-income country group results still include those four economies.

12. This finding of only small intersectoral labor movements in response to partial trade reform is consistent with econometric evidence of adjustments to past trade reforms (see, for example, Wacziarg and Wallack 2004).

13. The approach here has been to take the change in the average per capita consumption of the poor, apply an estimated income-to-poverty elasticity, and assess the impacts on the poverty headcount index. We have done this by calculating the change in the wage of unskilled workers, and deflating it by the food and clothing consumer price index change, which is more relevant for the poor than the total price index. That real wage grows, over all developing countries, by 3.6 percent, or more than four times the overall average income increase. We are assuming that the change in unskilled wages is fully passed through to households. Also, while the model closure has the loss in tariff revenues replaced by a change in direct household taxation, the poverty calculation assumes—realistically for many developing countries—that these tax increases only affect skilled workers and high-income households. While these simple calculations are not a substitute for more detailed individual country case study analysis using detailed household surveys as in, for example, Hertel and Winters (2005), they are able to give a broad regionwide indication of the poverty impact.

14. Evidence that the preference margin is often eroded by complex rules of origin, and that the rent is shared between importing and exporting countries with the latter getting less the more trade is concentrated on standard commodities, can be found in Olarreaga and Özden (2005) and Özden and Sharma (2004). A recent partial equilibrium study found that in practice export revenue losses from preference erosion are likely to be limited to a small subset of countries, primarily small island economies dependent on exports of sugar, bananas and, to a far lesser extent, textiles (Alexandraki and Lankes 2004).

15. A further complication is that the Africa, Caribbean, Pacific nonreciprocal preference scheme is to be replaced in 2008 with reciprocal Economic Partnership Agreements between the least developed countries in those regions and the EU.

16. For recent reviews of the literature on the links between trade liberalization , economic growth, and poverty alleviation, see, for example, Winters (2002, 2004), Winters, McCulloch and McKay (2004), and Dollar and Kraay (2004).

17. The trade-related productivity increase is limited to the manufacturing sectors in this simulation, unlike World Bank (2002) where agricultural productivity was also allowed to respond to changes in openness.

18. For a review of the empirical literature supporting this view, see Anderson (2004, 560–62).

19. The Global Trade Analysis Project, known as GTAP, is an international consortium of trade researchers from universities, research institutions, and national and international agencies. It is based at Purdue University. The GTAP Center provides four key resources to the trade community. First and foremost is an integrated and consistent international database for trade policy analysis. The current version is composed of 87 country and regional groupings and 57 economic sectors. The second resource is a publicly available global trade model, also known as the GTAP model. (The LINKAGE model is distinct from the GTAP model although it uses the same underlying database.) The third resource is an annual course in applied trade modeling. And finally, GTAP organizes and cohosts an annual Conference on Global Economic Analysis. More information on the GTAP Center and project can be found at http://www.gtap.agecon.purdue.edu.

20. More information on the MAcMaps database is available in Bouët and others (2004) and at http://www.cepii.fr/anglaisgraph/bdd/macmap.htm.

21. These elasticities represent the top-level Armington elasticity, that is, the elasticity between domestic demand and aggregate import demand. The second-level Armington elasticity, that is, across trading partners, is set at twice the top-level elasticity.

22. The new GTAP elasticities are the outcome of significant econometric work and are higher than the standard Armington elasticities used in previous releases of

GTAP. While we recognize the extensive work behind the new elasticities, we also note that the controversy underlying these key parameters continues. The new GTAP elasticities reflect a move toward mid-range Armington elasticities,but are still much lower than those used by some, notably Tarr and Rutherford and their associates.<<Give a reference for these people or ID them more completely?>> The LINKAGE model elasticities are above those in GTAP but still in the mid-range; they are the outcome of literature surveys, best guesses, and adjustments that have been undertaken over a 15-year period since the inception of the LINKAGE model and its predecessors. The difference between the LINKAGE and the GTAP elasticities averages about one-third (table 12A.2).

23. In the standard LINKAGE model, an upward-sloping supply function is implemented for land, with supply elasticities higher for land-abundant countries than for land-scarce countries. There is also perfect land mobility across farm enterprises. In the final simulation the supply elasticity is set to 0, and the land transformation elasticity is set to 1.

**<<A>>References<<end>>**


Alexandraki, K., and H. P. Lankes 2004. “The Impact of Preference Erosion on Middle-Income Countries.” IMF Working Paper 04/169, International Monetary Fund, Washington, DC, September.

Anderson, K. 1987. “On Why Agriculture Declines With Economic Growth.” *Agricultural Economics* 1 (3, June): 195–207.

______. 2004. “Subsidies and Trade Barriers.” In *Global Crises, Global Solutions*, ed. B. Lomborg. New York: Cambridge University Press.

Anderson, K., W. Martin and D. van der Mensbrugghe. 2005a. “Distortions to World Trade: Impacts on Agricultural Markets and Farm Incomes.” World Bank, Washington, DC, July.

______. 2005b. “Long-Run Global Impacts of Doha Reform on Poverty.” In *Putting Development Back into the Doha Agenda: Poverty Impacts of a WTO Agreement*, ed. T. Hertel and L. A. Winters. New York: Palgrave Macmillan (forthcoming).

Baffes, J. 2005. “The ‘Cotton Problem.’” *World Bank Research Observer* 20 (1, Spring): 109–43.

Bouët, A., Y. Decreux, L. Fontagné, S. Jean, and D. Laborde. 2004. “A Consistent, *ad Valorem* Equivalent Measure of Applied Protection across the World: The MAcMap-HS6 Database.” Centre d’Etudes Prospectives et d’Informations Internationales, Paris, December 20.

Bouët, A., L. Fontagné, and S. Jean. 2005. “Is Erosion of Preferences a Serious Concern?” *In Agricultural Trade Reform and the Doha Development Agenda*, ed. K. Anderson and W. Martin. Washington, DC: World Bank.

Commission for Africa. 2005. *Our Common Interest.* London: UK Department for International Development.

de Gorter, H., and E. Kliauga. 2005. “Consequences of TRQ Expansions and In-Quota Tariff Reductions.” In *Agricultural Trade Reform and the Doha Development Agenda*, ed. K. Anderson and W. Martin. Washington, DC: World Bank.

Dollar, D., and A. Kraay. 2004. “Trade, Growth, and Poverty.” *Economic Journal* 114 (February): F22–F49.

Finger, J. M. 1974. “GATT Tariff Concessions and the Exports of Developing Countries: United States Concessions at the Dillon Round.” *Economic Journal* 84 (335, September): 566–75.

______. 1976. “Effects of Kennedy Round Tariff Concessions on the Exports of Developing Countries.” *Economic Journal* 86 (341, March): 87–95.

Finger, J. M., and L. Schuknecht. 2001. “Market Access Advances and Retreats: The Uruguay Round and Beyond.” In *Developing Countries and the WTO: A Pro-Active Agenda*, ed. B. Hoekman and W. Martin. Oxford: Blackwell Publishers.

Harrison, W. J., J. M. Horridge, and K.R. Pearson. 2000. “Decomposing Simulation Results with Respect to Exogenous Shocks.” *Computational Economics* 15: 227–49.

Hart, C. E., and J. C. Beghin. 2005. “Rethinking Agricultural Domestic Support under the Wworld Trade Organization.” In *Agricultural Trade Reform and the Doha Development Agenda*, ed. K. Anderson and W. Martin. Washington, DC: World Bank.

Hertel, T. W., and R. Keeney. 2005. “What Is at Stake: The Relative Importance of Import Barriers, Export Subsidies, and Domestic Support.” *In Agricultural Trade Reform and the Doha Development Agenda,* ed. K. Anderson and W. Martin. Washington, DC: World Bank.

Hertel, T. W., and L. A. Winters, eds. 2005. *Putting Development Back into the Doha Agenda: Poverty Impacts of a WTO Agreement.* New York: Palgrave Macmillan (forthcoming).

Hoekman, B., and P. Messerlin. 2005. “Removing the Exception of Agricultural Export Subsidies.” In *Agricultural Trade Reform and the Doha Development Agenda,* ed. K. Anderson and W. Martin. Washington, DC: World Bank.

Hoekman, B., F. Ng, and M. Olarreaga. 2004. “Agricultural Tariffs versus Subsidies: What’s More Important for Developing Countries?” *World Bank Economic Review* 18 (2): 175–204.

Hoekman, B., and C. Özden. 2005. “Trade Preferences and Differential Treatment of Developing Countries: A Selective Survey.” Policy Research Working Paper 3566, World Bank, Washington, DC, June.

Hoekman, B., and S. Prowse. 2005. “Policy Responses to Preference Erosion: From Trade as Aid to Aid for Trade.” Paper presented at the World Bank Conference on Preference Erosion: Impacts and Potential Policy Responses, June 13–14, Geneva.

Jean, S., D. Laborde, and W. Martin. 2005. “Consequences of Alternative Formulas for Agricultural Tariff Cuts.” In *Agricultural Trade Reform and the Doha Development Agenda,* ed. K. Anderson and W. Martin. Washington, DC: World Bank.

Jensen, H. G., and H. Zobbe. 2005. “Consequences of Reducing AMS Limits.” In *Agricultural Trade Reform and the Doha Development Agenda,* ed. K. Anderson and W. Martin. Washington, DC: World Bank.

Josling, T. 2005. “Special and Differential Treatment for Developing Countries.” In *Agricultural Trade Reform and the Doha Development Agenda,* ed. K. Anderson and W. Martin. Washington, DC: World Bank.

Keeney, R., and T. W. Hertel. 2005. “GTAP-AGR: A Framework for Assessing the Implications of Multilateral Changes in Agricultural Policies.” GTAP Technical

Paper 24, Center for Global Trade Analysis, Purdue University, West Lafayette, IN.

Martin, W., and P. G. Warr. 1993. "Explaining the Relative Decline of Agriculture: A Supply-Side Analysis for Indonesia." *World Bank Economic Review* 7 (3, September): 381–401.

Olarreaga, M., and C. Özden. 2005. "AGOA and Apparel: Who Captures the Tariff Rent in the Presence of Preferential Market Access?" *World Economy* 2 (1, January): 63–87.

Özden, C., and G. Sharma. 2004. "Price Effects of Preferential Market Access: The CBI and the Apparel Sector." Policy Research Working Paper 3244, World Bank, Washington, DC, March.

Sumner, D. A. 2005. "Reducing Cotton Subsidies: The DDA Cotton Initiative." In *Agricultural Trade Reform and the Doha Development Agenda,* ed. K. Anderson and W. Martin. Washington, DC: World Bank.

van der Mensbrugghe, D. 2004a. "Comparison of GTAP Release 5.4 and GTAP Release 6.05." World Bank, Development Prospects Group, Washington, DC.

______. 2004b. "LINKAGE Technical Reference Document: Version 6.0." World Bank, Development Prospects Group, Washington, DC.

Wacziarg, R., and J. S. Wallack. 2004. "Trade Liberalization and Intersectoral Labor Movements." *Journal of International Economics* 64 (2, December): 411–39.

Winters, L.A. 2002. "Trade Liberalisation and Poverty: What Are the Links?" *World Economy* 25 (9, September): 1339–68.

______. 2004. "Trade Liberalization and Economic Performance: An Overview." *Economic Journal* 114 (February): F4-F21.

Winters, L. A., N. McCulloch, and A. McKay. 2004. "Trade Liberalization and Poverty: The Empirical Evidence." *Journal of Economic Literature* 62 (1, March): 72–115.

Winters, L. A., T. Walmsley, Z. K. Wang, and R. Grynberg. 2003. "Liberalizing Temporary Movement of Natural Persons: An Agenda for the Development Round." *World Economy* 26 (8, August): 1137–61.

World Bank. 2002. *Global Economic Prospects and the Developing Countries 2002: Making Trade Work for the Poor*. Washington, DC: World Bank.

______. 2004. *Global Economic Prospects 2005: Realizing the Development Promise of the Doha Agenda*. Washington, DC: World Bank.

WTO (World Trade Organization). 2003a. "Negotiating Group on Market Access: Report by the Chairman." TN/MA/12 (Girard Text), WTO, Geneva, September 1.

______. 2003b. "Negotiations on Agriculture: First Draft of Modalities for the Further Commitments." TN/AG/W/1/Rev.1 (Harbinson Draft), WTO, Geneva, March 19.

______. 2004. "Decision Adopted by the General Council on 1 August 2004." WT/L/579 (July Framework Agreement), WTO, Geneva, August 2.