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What Is at Stake: The Relative Importance of Import Barriers, Export Subsidies, and Domestic Support

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This chapter provides an estimate of the potential welfare gains from various agricultural and trade policy reforms under the Doha Development Agenda of the World Trade Organization (WTO). Specifically, it explores the differential impacts on trade and economic welfare in developing and other countries of current restrictions on imports of agricultural and other merchandise (and services) by both rich and poor countries, as well as of farm export subsidies and domestic support in high-income countries.

There are two main channels through which developing countries would be affected by the removal of current trade distortions. The first is the efficiency gain achieved when a country's own trade distortions are removed, or when it interacts favorably with trade shocks abroad that increase its export prices or reduce its import prices. The efficiency effect stemming from global agricultural trade liberalization is typically positive for participating countries.

The second channel is through a change in a country's international terms of trade. Agricultural trade liberalization generally raises food prices in international markets, particularly for those temperate-zone products that are heavily protected in the high-income countries. This means that the terms of trade improve for countries that are net exporters of protected farm products (unless they are currently

enjoying duty-free access to protected markets where domestic prices fall), while net food-importing countries are expected to lose (unless they become sufficient net exporters in the course of adjusting to the new conditions). Long-term subsidies for agricultural program commodities in high-income countries, coupled with agricultural disincentives in many developing countries, have left the latter increasingly dependent on imports of these subsidized products (Dimaranan, Hertel, and Keeney 2004). Thus we expect numerous developing countries would experience terms of trade losses if agricultural tariffs, domestic supports, and export subsidies were to be eliminated by high-income countries.

After examining the welfare effects on developing countries of high-income country liberalization in agriculture under the three agricultural pillars, we also examine the incidence for developing countries of increasing market access for agricultural products in other developing countries. Beyond agriculture, we then look at the additional welfare impacts of nonagricultural market access. Finally, we speculate on the relative contribution of liberalization of direct trade in services as well as trade facilitation measures in enhancing gains to developing countries from the Doha Round.

<<A>>The Model Used<<end>>

The predicted incidence of any economic reform depends on the relative supply and demand elasticities in the market being reformed. For example, removal of an agricultural producer subsidy in a market in which demand is elastic and supply is inelastic results in the loss being borne largely by producers of that farm product. Therefore, it is critical to use an analytical framework that pays close attention to the supply and demand characteristics in the markets to be reformed. For purposes of this study, we employ the recently developed model known as the Global Trade Analysis Project-Agriculture, or GTAP-AGR.

This is a special-purpose variant of the widely used GTAP model of global trade (Hertel 1997), which has been tailored to analysis of global agricultural trade policy issues (Keeney and Hertel 2005).

As documented on the GTAP web site, the standard GTAP model includes demand for goods for final consumption, intermediate use and government consumption; demands for factor inputs; supplies of factors and goods; and international trade in goods and services. [1] The model employs the simplistic but robust assumptions of perfect competition and constant returns to scale in production activities. Bilateral international trade flows are handled using the Armington assumption by which products are exogenously differentiated by origin.

From this standard framework, GTAP-AGR incorporates some alternative representations to bring focus on the intricacies of agricultural production and markets. Several structural features have been highlighted in the agricultural economics literature for their importance in analyzing agricultural policy changes: factor mobility and substitution in production; crop-livestock sector interactions; consumer food demand; and trade elasticities. The manner in which each of these features is introduced into the model is detailed in Keeney and Hertel (2005) and is discussed briefly below.

Recent work by the Organisation for Economic Co-operation and Development (OECD 2001) on the cost and world market impacts of agricultural support highlights the role of factor market issues in an empirical, partial equilibrium model. This work focuses on the segmentation that occurs in land, labor, and capital markets between the agricultural and nonagricultural economies, and provides the region-specific factor supply elasticities used to calibrate our model's constant elasticity-of-transformation function that allocates factors between agricultural and nonagricultural uses. We also follow the OECD's factor substitution regime for primary agriculture, focusing on substitution

possibilities among farm-owned and purchased inputs, as well as between the two. We calibrate the constant elasticity-of-substitution-cost functions for farm-level sectors to the region-specific Allen elasticities of substitution provided by the OECD.

Interaction between livestock and crop sectors received considerable attention in the literature following reform of the European Common Agricultural Policy (CAP) in 1992 and has continued to be an area of concern (Peeters and Surry, 1997). We follow the approach of Rae and Hertel (2000) in modeling the substitution possibilities for feedstuffs in livestock production as an additional CES (constant elasticity-of substitution) nest in the livestock sector cost function. We calibrate this region-generic parameter to an average substitution elasticity calculated from Surry's (1992) three-stage model describing the behavior of European livestock producers, composite feed mixers, and grain producers.

The importance of consumer demand for final goods is prominent in the agricultural economics literature. Estimated consumer demand systems are examined to address a variety of issues including the potential impacts from world price changes accompanying trade liberalization. The unique role of food in the consumer budget has been emphasized in much of this work, especially as it relates to the distribution of incomes (Cranfield 2002; Seale, Regmi, and Bernstein 2003). We employ a recent set of estimates from a cross-country study of demand, keying on own-price and income elasticities of demand for food. We calibrate the parameters of the constant difference elasticity demand system in GTAP to the elasticities for the eight food aggregates and an additional nonfood aggregate derived from the econometric work of Seale, Regmi, and Bernstein (2003).

International trade elasticities that describe the substitution possibilities between goods differentiated by origin have received considerable attention for the important role they play in

simulation models determining the effects of liberalization on terms of trade. Hertel and others (2003) provide recent estimates of this substitution relationship at the same level of disaggregation as the sectors in the GTAP model. Those authors also show how the estimated gains from trade liberalization hinge critically on the value of these parameters. We make use of their region-generic estimates of the elasticity of substitution among imported goods from different sources, which is modeled using the Armington/CES structure.[2]

<A>Current Patterns of Merchandise Trade Distortions<<end>>

In any global economic analysis, some aggregation is required to avoid being overwhelmed by results. Therefore, for reporting summary results we group countries and regions in the GTAP 6 database into three broad sets: high-income countries, transition economies, and developing countries. Table 2.1 provides a listing of all modeled regions and the organization of these regions into the three aggregates. The high-income regions are most of the OECD countries plus the four newly industrialized East Asian "tigers." Transition economies comprise the central and eastern European nations as well as the nations of the former Soviet Union still in the process of becoming market economies and democratic. The level of disaggregation among developing countries represents a mix of focus countries in each region of the world plus composite groupings of remaining countries so that together with high-income and transition economies, they exhaust global economic activity.

<Table 2.1 near here>

The choice of base period is important. For many of the Doha negotiations, 2001 is the relevant reference period. This is convenient, as the newly available GTAP 6 database is also benchmarked to the

year 2001. However, some important trade policy commitments are in place that logically precede any Doha agreement, yet that were still not in place in 2001. Perhaps the most important of these is the phaseout of export quotas on textiles and apparel shipped to the United States and the European Union, as agreed to in the Uruguay Round. These quotas were abolished at the end of 2004, and their elimination has begun a substantial restructuring of the world textiles and apparel trade. Conducting an analysis of textiles and apparel trade liberalization from a 2001 base could yield very misleading results if it did not take into account the changes to take place by the end of 2004. Similarly, a number of newly acceding WTO members, most notably China, have made commitments that will be implemented only in the coming years. Thus we begin by conducting a "presimulation" that involves implementing those preexisting WTO commitments not implemented as of 2001. We then take the resulting data set from that presimulation as the base for our analysis.

Table 2.2 provides summary of the levels of domestic support for agriculture in a selection of OECD countries, as measured by the OECD's producer support estimates (PSE) database and incorporated in the GTAP database (Dimaranan and McDougall 2002).[3] The first column of table 2.2 gives the total PSE inclusive of border measures; the second column gives the amount of that total that is explicitly attributable to domestic support. The remaining columns give the fraction of domestic support distinguished by the payment's attribution in the GTAP 6 database. For Japan and the Republic of Korea, we see that in 2001 the majority of protection was still at the border so that domestic support for these countries is minimal. In contrast, the entire PSE in Australia and New Zealand, which is very modest, is based on domestic programs. Of the remaining countries, between one- and two-thirds of assistance is domestic support. In these regions we see that the majority of payments are attached to land

and capital usage, reflecting the push for decoupling in the wake of the Uruguay Round Agreement on Agriculture. Keep in mind that this aggregate measure could mask considerable domestic protection for specific products, such as sugar, that are important for developing-country welfare impacts.

<Table 2.2 near here>

Export subsidies reported to the WTO for the 2001 base period, are taken from the GTAP 6 data base, as assembled by Aziz Elbehri of the U.S. Department of Agriculture's Economic Research Service. The EU is the main user of export subsidies. Indeed, among the GTAP farm and food products grouped together for this study, only cattle and vegetable oils are not supported by an export subsidy from the EU. The United States makes little use of export subsidies in trade promotion, preferring to use export credits, the impact of which is explored here as a sensitivity analysis, since the export subsidy equivalent of such credits, as well as state trading and food aid, are rather speculative and so are not included in the GATP database.

Import tariffs for the 2001 base period in the GTAP 6 database are sourced from the MAcMap database maintained in Paris by the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). MAcMap is the most comprehensive tariff database currently available. It is maintained at the HS-6 digit level and encompasses preferential tariffs, specific tariffs, and tariff rate quotas.[4] Table 2.3 summarizes the average (trade-weighted) tariff rates applied by high-income countries, transition economies, and developing countries (the three columns of this table) on imports from one another, by four broad product categories (table rows): agricultural and processed food products, other primary products, textiles and apparel, and other manufactured products.

<Table 2.3 near here>

The easiest way to understand the entries in table 2.3 is to walk through some specific examples. Consider the numbers in the upper left-hand cell of the table. These report that the average tariff on agricultural imports by high-income countries from other high-income countries is 8.4 percent. By contrast, the average tariff on developing-country exports to high-income markets is nearly twice as high at 15.9 percent. Since the MAcMap database includes preferences for developing countries, this result is particularly surprising. Two factors explain it, however. First, developing countries tend to export products (such as sugar) that face relatively high tariffs in high-income countries. Therefore, when we aggregate across all products within agriculture, the developing countries face higher trade-weighted average tariffs. The second reason for higher tariffs on developing-country exports is the prevalence of specific tariffs in agriculture. These tariffs are specified in dollars per unit of product rather than as a percent of the value of imports. Since developing countries tend to export lower-value products within any given tariff category, the ad valorem tariff equivalent associated with any given specific tariff tends to be a larger share of the unit value of imports from developing countries.

Moving across the top of table 2.3, we come next to the average tariffs levied on agricultural imports into the transition economies. Here, imports from high-income and developing countries face similar tariffs of about 17 percent, with a lower rate on intraregional trade within this group of countries—presumably attributable to trade agreements. The overall level of agriculture tariffs in the transition economies in 2001 is higher than that in the high-income economies, and nearly as high as that in developing countries (final column). In the developing countries the overall average tariffs are quite similar across export sources.

Other primary products face low tariffs worldwide, while textile and apparel products face high average tariffs. Once again, as for the heavily protected agricultural sector, we see the pattern of much higher average tariffs levied by the high-income countries against developing countries (8.4 percent) than they impose on other high-income countries (3.4 percent). The same applies for the transition economies' tariffs on textiles and apparel. Developing-country tariffs on these products are much higher still, reaching an average of 30 percent in the case of imports from transition economies. For other manufactures, the OECD average tariff is roughly one-third of the transition economies' tariff average, which is in turn about one-third of the tariff applied by developing countries (around 9 percent).

Table 2.4 disaggregates developing-country tariffs by individual country or region in the model we are using for this study. Note the relatively high average rate of protection for agriculture in Vietnam, India, Other South Asia, Morocco, and Other Southern Africa countries. In textiles and apparel, Vietnam, India, Bangladesh, Morocco, Other North Africa and Middle East (ONAM), Mozambique, and Other Sub-Saharan Africa (OSSA) all have average import barriers in excess of 20 percent. In other merchandise trade, India stands out with a 2001 average tariff rate of 25 percent, a full 10 percentage points above the other regions in this database. Removal of these import barriers would generate very substantial import flows, which in turn would require significant export increases to pay for them.

<Table 2.4 near here>

<B>Implications of Merchandise Trade Liberalization for Developing Countries' Trade<<end>>

We now combine the database discussed in the previous section with the GTAP-AGR modeling framework discussed earlier to project the impact of full merchandise trade and subsidy reform on developing-country trade flows. Table 2.5 reports the predicted percentage change in imports, by region and broad commodity category (with changes in trade volumes reported in parentheses). As expected, Vietnam, India, Other South Asia, Morocco, and Other Southern Africa top the list, with import increases in excess of 40 percent following full global merchandise trade reform. The percentage increases in textiles and apparel imports are even higher, reaching a maximum of 119 percent in India. This results from a higher degree of substitutability of imports sourced from different suppliers than is the case for food. Also, there is a great deal of intermediate input trade in this relatively "footloose" industry, and so when export opportunities open up elsewhere, imports must rise in order to fuel the increased production for sale overseas. Note that India also tops the list in the total rise in imports.

<Table 2.5 near here>

Table 2.6 reports the export volume changes. Unlike for imports, gross exports of some composite commodities fall. These declines include agriculture and food in Vietnam, textiles and apparel in much of Latin America as well as Other Southern Africa, and other merchandise trade in Indonesia and Brazil. China's agricultural exports rise by nearly 50 percent as trade barriers in China's trading partners in East Asia fall. However, the resulting volume change is no larger than that for other merchandise trade, which rises by only 3 percent. That is because the base level of exports is much lower for agriculture. Agriculture and food exports of South Asia rise by a similar rate as imports into that region, with the largest increase in India, followed by Other South Asia and finally Bangladesh.

There are also strong export increases in Brazil and North Africa (particularly Morocco) as well as in Southern Africa.

<table 2.6 near here>

Textiles and apparel exports rise strongly for countries in South and Southeast Asia—particularly Vietnam, the Philippines, and Bangladesh. The ONAM region and parts of Sub-Saharan Africa also experience large percentage increases, although the export base in the latter countries is quite small (for example, Mozambique, where the 80 percent rise accounts for only about one-tenth of the total export volume increase in the region following global liberalization. Outside of South Asia, the export increases for other merchandise trade are quite modest.

Trade volume changes are not a reliable indicator of the resulting changes in national welfare, which also depend on the prices at which trade is taking place (the terms of trade) and the way in which these trade flows are interacting with each countries' own policies (efficiency effects). Accordingly, we now turn to the welfare effects of global trade reform, starting with agricultural reforms and then moving on to nonagricultural trade liberalization.

<A>Welfare Effects of Agricultural Trade Reforms

What is the distribution of gains and losses from each of the three pillars of agricultural protection in the high-income economies? The first three rows of table 2.7 report the impacts on the high-income, transition, developing-country groupings, and on the world, of full liberalization of agricultural tariffs (market access), export subsidies, and domestic support by high-income countries.[5] Note from the final column that market access is the dominant source of gains for the world as a whole. Of the total $44

billion gain from freeing agricultural market access, about one-quarter accrues to the developing countries, which is well above those countries' one-sixth share of global gross domestic produce (GDP) in 2001.

<Table 2.7 near here>

Not surprisingly, elimination of export subsidies in the high-income economies hurts the other regions, as numerous countries in those regions have come to depend on cheap food imports and are now net importers of the subsidized products (particularly grains and dairy). Thus, of the $2.55 billion gain to high-income economies from eliminating their export subsidies, about $1.5 billion is a transfer from transition economies and developing countries. Removal of high-income economies' domestic farm support, in contrast, benefits all regional groupings (although, as we see below, not all individual developing countries).

Agricultural trade liberalization in the transition economies and in developing countries would generate $1.8 billion and $6.2 billion, respectively, for the world as a whole. Developing countries retain about 26–30 percent of these global gains.

In sum, the aggregate distribution of global welfare gains from agricultural liberalization is roughly 75 percent for high-income economies and 21 percent for the developing countries, the rest going to transition economies.

A more disaggregated view of global agricultural reform, shown for our 17 countries or regions in table 2.8, exposes the heterogeneity of impacts. In the case of tariff removal by high-income economies (first column), the results suggest that Indonesia, Vietnam, Bangladesh, and Mozambique would lose slightly, due to the dominance of preference erosion over increased export demand for their

agricultural products. The only developing countries or regions to gain from elimination of farm export subsidies are Argentina, Brazil, and India, but the overall loss to developing countries is just $1 billion.[6] Numerous East and South Asian countries lose from cuts to domestic support, as does the Middle East and North Africa region, with the lion's share of the gains again accruing to Argentina and Brazil.

<table 2.8 near here>

Columns 4 and 5 of table 2.8 report the welfare impact on developing countries of removing agricultural distortions in the transition economies and in the developing countries themselves. The developing-country impacts of transition economy reforms, including both tariff cuts and the elimination of some domestic support and export subsidies, are generally positive but modest compared with the impacts of developing countries' own reforms. While not all developing countries gain in the latter case, in all but two regions where a loss appears (Vietnam and Sub-Saharan Africa), it is offset by gains in the other columns of table 2.8.

In aggregate, six developing countries or regions experience an overall loss following agricultural liberalization: the Philippines, Vietnam, Bangladesh, ONAM, Mozambique, and OSSA. The losses to ONAM and OSSA are clearly driven by the elimination of export subsidies. In the other regions, however, the sources of loss are more varied. Because some of these economies are expected to have a comparative advantage in nonagricultural products, it is important to see whether adding nonagricultural trade reform will reverse those negative outcomes.

<A>Welfare Impacts of Freeing Nonagricultural Market Access <<end>>

Table 2.9 provides an overview of the impacts of full liberalization of nonagricultural tariffs on the three broad country groups. Because of the vastly higher average tariff levels in textiles and apparel (recall tables 2.3 and 2.4), we separate out these effects from other nonagricultural merchandise trade. As can be seen by comparing the world totals in the last three rows of table 2.9, adding nonagricultural market access boosts the comparative static global welfare gains by nearly $29 billion. Unlike the case of agricultural reform, however, the majority of the aggregate gains (nearly $15 billion) are generated as a result of reform in the developing countries themselves.

<Table 2.9 near here>

The distribution of these global welfare effects varies considerably by type of reform: nonagricultural merchandise trade liberalization by high-income economies benefits largely the developing countries, whereas developing-country cuts benefit the high-income economies. Overall, the move from agriculture-only to full merchandise trade reform nearly doubles the estimated benefits to developing countries, with most of the additional benefit coming from textiles and apparel reform.[7] By contrast, the increases in benefits accruing to the high-income and transition economies are proportionately much less.

Table 2.10 provides the 17-region breakout of the developing-country aggregate considered in table 2.9. The first column in this table reports the agricultural total from table 2.8, while the other columns show the impact of nonagriculture market access opening. In China and India, the opening of nonagricultural markets boosts gains by a factor of ten. In the case of China, most of these gains are from textiles and apparel, while for Indonesia the additional gains come from a broader range of merchandise trade. Vietnam experiences a dramatic turn of events, with its small loss becoming a large

gain, illustrating the virtue of an economywide trade agreement: countries that lose in one sector may well gain in others. Countries in the Middle East and North Africa also experience a strong turnaround, with their loss becoming a gain in the wake of nonagricultural reform. However, OSSA experiences a larger loss, and Other Latin America (outside of Argentina and Brazil) sees an elimination of its agricultural gain.

<Table 2.10 near here>

Further insight into the sources of losses for the five regions that show a negative total in table 2.10 can be obtained by referring to table 2.11, which decomposes the welfare impact of each type of reform into its efficiency and terms-of-trade components. With minor exceptions, the efficiency contributions are nearly always positive. So it is the terms-of-trade component that is causing the loss of welfare for individual regions. Of course, one region's terms-of-trade loss is another's terms-of-trade gain and, as a group, the terms of trade for developing countries improve slightly as a result of merchandise trade reform. There is considerable variation across countries, however. Among the losers from merchandise trade reform, Bangladesh and OSSA lose across the board. The Philippines loses from agriculture and apparel, as does Mozambique, while Latin America's terms-of-trade loss is dominated by textiles and apparel liberalization.

<Table 2.11 near here>

The persistent losses to this group of developing countries in the face of merchandise trade reform raises the question of whether some other parts of a trade liberalization package might provide an offsetting gain. Towards this end, we now turn to the potential liberalization of services trade, as well as measures to facilitate trade flows in and out of developing countries.

<A>Services Trade Liberalization and Merchandise Trade Facilitation<<end>>

Thus far we have only discussed liberalization of merchandise trade. Because of the growing importance of services trade to the world economy, however, the Uruguay Round delivered the General Agreement on Trade in Services (GATS) to facilitate liberalization in this sector. Negotiations in this area have proven difficult, particularly with respect to foreign direct investment (commercial presence for the provision of services) and temporary labor migration (the "movement of natural persons" to provide services). Leaving those two areas aside, Francois, van Meijl, and van Tongeren (2003) estimate the tariff equivalent of barriers to direct trade in services (such as transportation services and business services). From these estimates it is clear that some markets are highly restrictive across the board, most notably India and South Africa, while others appear to restrict services trade only in selected sectors (for example, China's imports of business services or North America's imports of transport services).

Even though these estimates are highly speculative, it is worth exploring the potential impact of their removal on global trade and welfare. We find that adding services trade liberalization boosts the global gains by 80 percent, from the $84 billion shown in table 2.9 to more than $150 billion. The distribution of these gains is rather uneven, however, with the lion's share going to high-income economies. Figure 2.1 contrasts the developing-country impact of standard merchandise trade and subsidies reform with the combination of services liberalization and merchandise reform. As can be seen from this comparison, India, which currently has extremely high barriers to services trade, shows a large gain from adding services, as does the Southern African Customs Union. The gains to other regions are quite a bit smaller, but they are positive for all the developing countries or regions. And they are

sufficient to reverse the aggregate losses for Latin America, but not the losses for the Philippines, Bangladesh, Mozambique, and Other Sub-Saharan Africa.

One of the main reasons for the absence of welfare gains in parts of Sub-Saharan Africa, following trade liberalization, is the region's relatively low level of current participation in the global trading system. Many of the countries in the region are landlocked, and nearly all of them have very high trade costs associated with both imports and exports. This naturally brings up the issue of trade facilitation, which is the one "Singapore issue" on the Doha agenda. Our final posed question, which we now address, is: What is the possibility of the addition of trade facilitation reversing the negative welfare outcomes for parts of Sub-Saharan Africa?

To explore this question, we draw on the recent work of Wilson, Mann, and Otsuki (2004). Hertel (2004) has incorporated their estimates into a global general equilibrium modeling framework, and it is this work that we draw on in this chapter.[8] In particular, we lower the trading costs for developing countries in line with the Wilson, Mann, and Otsuki scenario in which developing countries are brought halfway to the global average level in indexes relating to port facilities, customs and regulatory procedures, and e-commerce. Based on the trade volume changes from this scenario, Hertel (2004) estimates reductions in c.i.f. (cost, insurance, and freight) prices for exports from several broad regions, which we apply as reduced trade costs for imports in these regions. The percentage cost reductions introduced to the model for this final experiment are as follows: East Asia, 9.6; South Asia, 13.2; Latin America, 3.4; Central Europe, 4.17; North Africa, 0.5; and Sub-Saharan Africa, 1.6. Wilson, Mann, and Otsuki (2004) and Hertel (2004) report estimates only for manufactures, but for purposes of this study we adopt their estimates for agricultural products as well.

The welfare impacts are displayed in figure 2.1. The combined liberalization of merchandise and services trade of $150 billion is boosted by $110 billion a year with the addition of trade facilitation. However, unlike trade policy reform, which has few direct economic costs, trade facilitation requires substantial investments in infrastructure, ports, and customs personnel. As such, that gross flow of benefits must be weighed against the potential up-front costs. But note that the distribution of benefits from trade facilitation is much more heavily skewed toward developing countries than are those from trade barrier reductions. Indeed, these gains are sufficient to reverse the losses for the Philippines, Bangladesh, Mozambique, and Other Sub-Saharan Africa.

<A>Summary and Conclusions<<end>>

This chapter is intended to provide an overview of the potential gains that are available from further liberalization of the multilateral trading system as we enter the next multilateral trade negotiations. It provides an upper limit on what developing (and other) countries can expect to achieve from the negotiations—leaving aside dynamic and pro-competitive gains from trade, which we do not attempt to measure.

Our results show that the effects on developing countries from multilateral trade liberalization exhibit a great deal of diversity. In terms of agricultural reforms, the vast majority of potential gains to developing countries derive from improved market access. This is reinforced by the finding that only three developing countries sustain a net loss from improved market access. The other two agricultural pillars offer much smaller prospects for gains to the developing world, and the individual country welfare changes are split between winners and losers. This is because removal of domestic support and

export subsidies tend to raise world food prices and reduce domestic prices in high-income economies, thereby reducing welfare in regions that have become dependent on importing farm products or on preferential markets for their exports, while net exporters of farm products less dependent on preferences gain.

While much of the Doha debate has focused on agricultural disciplines, our full liberalization experiment indicates that other merchandise liberalization also is important, providing nearly half of the total welfare gain for the developing-country aggregate. Of equal importance is the role of merchandise liberalization in reversing or offsetting welfare losses in regions dependent on low international food prices or preferential access to protected agricultural markets. Much of the potential welfare enhancement from liberalization of nonfarm product markets comes from textiles and apparel—even after accounting for the pending removal of import quotas on these goods in the presimulation. Furthermore, services liberalization and trade facilitation appear to offer significant scope not only for improving the aggregate developing-country outcome but also for reducing the number of individual countries that may experience a welfare loss after reform.

<<A>> Endnotes<<end>>

[[typesetter: Please correct numbering of endnotes 5–8]]

1. http://www.gtap.agecon.purdue.edu/products/models/.

2. Unfortunately, because of a lack of data on domestic purchases and prices, those authors are unable to estimate the elasticity of substitution between domestic goods and imports. As with the standard GTAP model, these parameters are still obtained using the “rule of two” (that is, the import-

import elasticities are assumed to be twice as large as the import-domestic elasticities). These model modifications are justified by evidence in the literature, but when used in combination in a CGE (computable general equilibrium) setting the question remains: how valid is the GTAP-AGR model when compared to the historical record? Hertel, Keeney, and Valenzuela (2004) address this question in a validation exercise to investigate how well it performs in reproducing price volatility in world markets for agricultural products. The validation experiment makes use of historical output trends in wheat-producing regions to obtain a measure of the variability of output that cannot be attributed to either technical advancements or year-to-year market signals. The validation criterion is the observed variability in wheat prices for each particular region, as compared with that generated by solving the model with respect to the variability in production. These authors find that with the exception of Argentina and Brazil (where significant macroeconomic events and stabilization schemes persisted over the period evaluated), the model prediction and observed price variability are relatively close for the case of wheat. We take this as a positive indication that GTAP-AGR is a valid framework for analyzing impacts of global agricultural liberalization on world markets.

3. These estimates are different from the WTO aggregate measure of support used to measure domestic support commitments for agriculture, discussed by Jensen and Zobbe (2005).

4. For more discussion of this database, see Bouët and others (2004) and Jean, Laborde, and Martin (2005).

[1] The decomposition of individual sources of liberalization and their impacts on regional welfare is done using the technique of Harrison, Horridge, and Pearson (2000).

[1] In supplementary simulations, we added speculative export subsidy equivalents for export credits, state trading, and food aid, but they did not significantly alter the impacts shown in table 2.8.

[1] This may be an understatement of potential gains attributable to textiles and apparel reform, since we have assumed the nontariff trade barriers present under the Uruguay Round Agreement on Textiles and Clothing are completely eliminated before our analysis and are not replaced by an export tax in China or by safeguards.

[1] These estimates are speculative, as there are significant problems in integrating the Wilson, Mann, and Otsuki econometric-based estimates into a CGE model, including inconsistency of predictions for global imports and exports, inconsistency in the responsiveness of trade volumes to prices, and incomplete coverage of merchandise trade in their 2004 study.

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