Integration into the world economy has accelerated economic growth in many developing countries, providing an essential impetus to poverty reduction (IMF 2001). Continuing growth and integration of world markets, however, has reduced the distinction between domestic and international policies and provoked criticism of the trade-restricting measures of developed countries. The highly protected agricultural sectors of the European Union, Japan, and the United States are often criticized by developing countries and by competitive producers such as Australia and Canada. Protectionism is expensive for the governments that provide it and damaging to the developing countries whose farmers do not enjoy the same level of government support and may therefore face unfair competition.

Agricultural protection includes economic regulations (quotas, contingent protection measures, domestic content requirements), social regulations (food safety measures, environmental trade measures, quality standards), and administrative regulations (customs valuation, classification, and clearance procedures; licensing requirements). While social measures were initially intended to protect consumers against products that did not meet health, quality, safety, or
environmental standards (Roberts, Josling, and Orden 1999), these policies often came to be used as covert protection of domestic producers.

It seems undeniable that protectionism in industrial countries has discriminated against agricultural production and exports from developing countries (Diaz-Bonilla, Thomas, and Robinson 2002). And while open trade policies and related reforms are a key to economic growth in developing countries (Sachs and Warner 1995 cited in Diaz-Bonilla and others 2002), there is also concern that trade liberalization may reduce food security, impede poverty reduction, increase the food bill for poor developing countries that are net food importers, and erode developing country trade preferences (Diaz-Bonilla, Thomas, and Robinson 2002).

This study uses a partial equilibrium agricultural sector model to assess the effect of four trade liberalization scenarios. It reports regional results for cereal and meat trade, the impact on world prices, and net economic benefits.

**MODELING FRAMEWORK**

Four alternative agricultural trade liberalization scenarios were projected to 2020 using the International Food Policy Research Institute’s International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT). IMPACT is a partial equilibrium model, specified as a set of country-level supply and demand equations that are linked to the rest of the world through trade. It includes 16 agricultural commodities and divides the world into 36 countries and regions. For each commodity in each country, area planted is a function of crop prices and investments, and yield is a function of crop price, input price, irrigation investment, and rate of productivity growth. Future productivity growth is estimated by its component sources, including crop management research, conventional plant breeding, wide-crossing and hybridization breeding, and biotechnology and transgenic breeding. Food demand is a function of commodity prices, income, and population, and feed demand is a function of livestock production, feed prices, and feeding efficiency. Interdependence across commodities, including complementarities and substitutability, is captured through cross-price elasticities of area planted and demand.

World and domestic prices of agricultural commodities are endogenous. World prices are determined annually at levels that clear world markets. Domestic prices are a function of world prices, adjusted by the domestic marketing margin and by the effect of trade and price policies, expressed as trade-distorting price wedges on producer and consumer subsidy prices. Marketing margins and trade-distorting price wedges are expressed as percentages of the world price. Marketing margins reflect factors such as transport and marketing costs. Trade-distorting price wedges measure the implicit level of taxation or subsidy of producers and consumers relative to world prices and account for the wedge between domestic and world prices.
Comprehensive estimates of trade-distorting price wedges are not available from a single source. For Organisation for Economic Co-operation and Development (OECD) countries the wedges were estimated as the trade-distorting portion of producer and consumer subsidy equivalents (OECD 1999). For developing countries the wedges were estimated from various studies of nominal or effective rates of protection. The impacts of changes in trade policy are thus simulated by changes in the trade wedges, which in turn alter the commodity prices that consumers and producers face. (For a more detailed description of the model see Rosegrant, Meijer, and Cline 2002 and Rosegrant and others 2001.)

**SPECIFICATION OF AGRICULTURAL TRADE LIBERALIZATION SCENARIOS**

Four scenarios were run to assess different levels of trade liberalization:

- Full multilateral liberalization of agricultural trade that completely removes trade-distorting price wedges between domestic and world prices in all countries between 2005 and 2006.
- Removal of all price wedges in developed countries while retaining baseline protection levels in developing countries.
- Removal of all price wedges in developing countries only while retaining baseline protection levels in developed countries.
- Partial multilateral liberalization of agricultural trade that reduces price wedges in all countries by 50 percent.

Because IMPACT is a partial equilibrium model, it does not account for the cross-sectoral links that would accompany widespread trade liberalization. A general equilibrium model is needed for that (see, for example, Diao, Somwaru, and Roe 2001). Nevertheless, the direction and relative magnitude of the changes that result from the four scenarios are instructive in assessing the importance of the agricultural trade liberalization agenda.

**TRADE LIBERALIZATION IMPACTS ON CEREAL AND LIVESTOCK TRADE**

Under full trade liberalization trade shifts for cereals vary in the developing world, but they are not particularly large overall (table 4.1). The direction and magnitude of the trade response to liberalization depends on the relative degree of protection in a country or region compared with others and on supply and demand elasticities. Net cereal imports rise by 27 percent over the baseline in Southeast Asia, 8 percent in West Asia and North Africa, and 3 percent in Sub-Saharan Africa; decline by 1 percent in East Asia; and remain virtually
unchanged in Latin America. Net cereal exports rise by 4 percent in developed countries, with increased exports from the United States, Australia, the former Soviet Union, Eastern Europe, and other developed countries\(^2\) offsetting a decline in exports by the European Union and an increase in imports by Japan.

Under the scenario of developed country only liberalization, trade balances change only slightly, with Latin America and West Asia and North Africa importing slightly more cereals compared with the baseline and the rest of the developing world importing slightly less. Developed countries as a whole experience a negligible decrease in their exports, the result of an increase in imports in Japan and a decline in EU exports balanced by small increases in exports in other developed countries, Eastern Europe, and the former Soviet Union.

Under the scenario of developing country trade liberalization almost all developing countries import more cereals compared with the baseline—even more than under the full trade liberalization scenario. Imports decline only in Latin America, because imports decrease by a greater amount in the rest of Latin America than exports increase in Argentina and Brazil. Overall, developing countries increase imports by 9 million metric tons (mmt), a 5 percent rise.

As expected, the partial multilateral trade liberalization scenario results lie between the baseline and full trade liberalization projections. Only South Asia and Sub-Saharan Africa have slightly higher net cereal imports under this scenario than under full multilateral liberalization of agricultural trade.

Full trade liberalization has a relatively greater effect on meat trade, production, and demand than on cereals because protection levels are generally higher for livestock products. Of the major livestock exporting regions, Latin

<table>
<thead>
<tr>
<th>Region</th>
<th>Baseline</th>
<th>Full multilateral liberalization</th>
<th>Developed countries only liberalize</th>
<th>Developing countries only liberalize</th>
<th>Partial (50 percent) multilateral liberalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Asia and North Africa</td>
<td>−74.3</td>
<td>−80.1</td>
<td>−76.2</td>
<td>−78.2</td>
<td>−77.0</td>
</tr>
<tr>
<td>Latin America</td>
<td>−3.7</td>
<td>−3.7</td>
<td>−4.9</td>
<td>−2.5</td>
<td>−3.7</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>−23.7</td>
<td>−24.5</td>
<td>−22.7</td>
<td>−25.4</td>
<td>−23.9</td>
</tr>
<tr>
<td>East Asia</td>
<td>−62.8</td>
<td>−62.2</td>
<td>−61.0</td>
<td>−64.0</td>
<td>−62.7</td>
</tr>
<tr>
<td>South Asia</td>
<td>−19.5</td>
<td>−19.7</td>
<td>−19.4</td>
<td>−19.8</td>
<td>−19.9</td>
</tr>
<tr>
<td>Southeast Asia</td>
<td>−8.2</td>
<td>−10.4</td>
<td>−7.7</td>
<td>−10.9</td>
<td>−9.2</td>
</tr>
<tr>
<td>Asia</td>
<td>−90.5</td>
<td>−92.3</td>
<td>−88.1</td>
<td>−94.6</td>
<td>−91.8</td>
</tr>
<tr>
<td>Developed countries</td>
<td>193.3</td>
<td>201.7</td>
<td>193.0</td>
<td>202.9</td>
<td>197.5</td>
</tr>
</tbody>
</table>

Source: Authors’ estimation using IMPACT.
America sees a substantial increase in meat exports from the opening of both developed and developing country markets, with a large part of the increase coming from Argentina and Brazil. However, meat exports from developed countries remain about the same, with the increase in meat imports caused by the reduction in Asian and other developing countries’ protection offsetting the increase in Latin American meat exports (figure 4.1). The net meat trade projections under the partial multilateral trade liberalization (not shown in figure 4.1) are between the baseline and full trade liberalization results, except for West Asia and North Africa, East Asia, and developed country regions, where trade hardly changes.

The most dramatic impacts on meat trade arise from the developed and developing country only scenarios. Developed country trade liberalization causes Asian imports to drop dramatically, with the largest decline in East Asia, where imports plunge from 5.9 mmt to 0.3 mmt compared with the baseline. Sub-Saharan Africa shifts from being a net importer to being a net exporter of meat products, while Latin American exports increase over the baseline. These outcomes in developing countries reduce developed countries’ exports to a sixth of their baseline levels.

If only developing countries eliminate trade barriers and subsidies, meat imports into developing countries increase sharply. Only Latin America has higher imports than in the baseline because Argentina and Brazil improve their competitiveness relative to other developing countries. Compared with results under the other two scenarios, however, Latin America’s trade position worsens. With the elimination of trade protection and subsidies, Asian meat imports nearly double from 7 mmt to 13 mmt compared with the baseline, while West Asia and North Africa’s meat imports rise by about 25 percent.

**Figure 4.1  Net Meat Trade in 2020 under Baseline and Three Agricultural Trade Liberalization Scenarios**

Source: Authors’ estimates using IMPACT.
Milk is also substantially affected by changes in trade policy (figure 4.2). While all major developing regions are net importers under the baseline scenario, most become net exporters under the full and developed country only agricultural trade liberalization scenarios. Only West Asia and North Africa remains a net importer under the full multilateral liberalization scenario, but its imports fall from 6.6 mmt to 5.1 mmt.

Under the developing country–only liberalization scenario, only Sub-Saharan Africa becomes a net exporter, while all other developing regions at least double their milk imports compared with the baseline as they remove protection while the developed world does not. The partial liberalization scenario (not shown in figure 4.2) again generates results that fall between the baseline and the full trade liberalization scenario. This means that Latin America, West Asia and North Africa, and Asia remain net importers, and Sub-Saharan Africa becomes a net exporter.

**IMPEACTS ON COMMODITY PRICES**

Removing trade barriers in all countries could substantially boost cereal prices in 2020, with increases of 8–13 percent above the projected baseline levels (table 4.2). Rice prices increase 13 percent, followed by maize, wheat, and other coarse grains. Meat and milk prices respond to full trade liberalization with even sharper price increases above baseline levels because price distortions under the baseline scenario are greater than for cereals. For meat the smallest price increase is for pork, at 10 percent. Poultry prices rise 12 percent, beef 18 percent, and lamb and mutton prices rise 15 percent.

*Source: Author’s estimation using IMPACT.*
percent, and sheep and goat meat 19 percent. Milk prices increase at a steep 33 percent. The removal of the price distortions therefore has a greater impact on livestock producers and consumers than on cereal producers and consumers.\(^3\)

As expected, full trade liberalization has bigger impacts on world prices than the other scenarios do. When only developing countries liberalize, rice changes average about two-thirds of those under full trade liberalization. Price impacts are even smaller under the developing countries only and partial trade liberalization scenarios.

### ECONOMIC BENEFITS OF TRADE LIBERALIZATION

Although trade and prices are important indicators for evaluating the effects of the various trade liberalization scenarios, most important are the net economic benefits under each scenario. In the partial equilibrium analysis undertaken here, the net economic benefits from full trade liberalization are estimated as the net benefits to producers (change in producer surplus) plus the net benefits to consumers (change in consumer surplus) plus the tax savings from removal of subsidies compared with the baseline results in 2020.

Full multilateral liberalization of trade for the 16 commodities in the model would generate estimated annual global benefits of $24.4 billion in 2020 (table 4.3). Both developed regions and developing regions benefit. Developed regions gain $10 billion, and developing regions gain $14.4 billion. Latin America is the

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**Table 4.2 World Prices in 2020 under Baseline and Four Trade Liberalization Scenarios (Percentage change from baseline)**

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Baseline (US$ per metric ton)</th>
<th>Full multilateral liberalization</th>
<th>Developed countries only liberalize</th>
<th>Developing countries only liberalize</th>
<th>Partial (50 percent) multilateral liberalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>1,748</td>
<td>18.0</td>
<td>5.2</td>
<td>12.4</td>
<td>8.1</td>
</tr>
<tr>
<td>Pork</td>
<td>2,245</td>
<td>9.5</td>
<td>0.4</td>
<td>7.2</td>
<td>3.5</td>
</tr>
<tr>
<td>Poultry</td>
<td>716</td>
<td>11.9</td>
<td>3.8</td>
<td>8.1</td>
<td>5.6</td>
</tr>
<tr>
<td>Sheep and goat</td>
<td>2,841</td>
<td>18.9</td>
<td>5.2</td>
<td>13.2</td>
<td>8.6</td>
</tr>
<tr>
<td>Milk</td>
<td>292</td>
<td>32.5</td>
<td>19.2</td>
<td>11.6</td>
<td>14.0</td>
</tr>
<tr>
<td>Wheat</td>
<td>123</td>
<td>8.1</td>
<td>0.8</td>
<td>8.1</td>
<td>4.1</td>
</tr>
<tr>
<td>Rice</td>
<td>252</td>
<td>13.1</td>
<td>1.6</td>
<td>11.5</td>
<td>6.0</td>
</tr>
<tr>
<td>Maize</td>
<td>104</td>
<td>9.6</td>
<td>2.9</td>
<td>6.7</td>
<td>4.8</td>
</tr>
<tr>
<td>Other coarse grains</td>
<td>89</td>
<td>7.9</td>
<td>1.1</td>
<td>7.9</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Source: Authors’ estimation using IMPACT.
biggest single gainer at $3.7 billion, followed by Sub-Saharan Africa at $3.3 billion. Latin America’s benefits come primarily from the beef and milk sectors. Sub-Saharan Africa gains broadly through meat, milk, and cereal commodities. Amounting to nearly 8 percent of the 2020 annual production value of the commodities assessed here, the high benefits are due to reduced competition from subsidized exports from developed countries and to the removal of the costly subsidies and taxes imposed on food production and consumption in many African countries.4

Under developed country only trade liberalization, the global gains, at $16.7 billion, are not as high as those under full trade liberalization, but the developing country share is 72 percent, substantially higher than under full trade liberalization. West Asia and North Africa is the only region to experience negative net economic benefits under this scenario, reflecting large losses for consumers in the cereal sector. South Asia is the only region that gains more than under full liberalization ($4.9 billion more), while the other developing regions experience lower benefits than under the full trade liberalization scenario.

Similarly, under developing country only trade liberalization, developed countries are the big winners, with projected annual benefits in 2020 of $13.3 billion, compared with $4.9 billion for developing countries. South Asia (predominantly India) is the only region experiencing net economic losses ($2.1 billion), again mainly because of losses to consumers, although in the livestock and milk sectors rather than the cereal sector. The partial trade liberalization scenario generates net economic benefits that are between a fourth and a half of those under full trade liberalization.

### Table 4.3 Net Economic Benefits in 2020 under Baseline and Trade Liberalization Scenarios (US$ billions)

<table>
<thead>
<tr>
<th></th>
<th>Full multilateral liberalization</th>
<th>Developed countries only liberalize</th>
<th>Developing countries only liberalize</th>
<th>Partial (50 percent) multilateral liberalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Asia and North Africa</td>
<td>1.9</td>
<td>0.2</td>
<td>2.4</td>
<td>0.9</td>
</tr>
<tr>
<td>Latin America</td>
<td>3.7</td>
<td>2.9</td>
<td>1.2</td>
<td>1.6</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>3.3</td>
<td>0.8</td>
<td>2.2</td>
<td>1.3</td>
</tr>
<tr>
<td>East Asia</td>
<td>3.0</td>
<td>1.3</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>South Asia</td>
<td>2.0</td>
<td>6.9</td>
<td>2.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Southeast Asia</td>
<td>0.4</td>
<td>0.3</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Developing countries</td>
<td>14.4</td>
<td>12.0</td>
<td>4.9</td>
<td>6.3</td>
</tr>
<tr>
<td>Developed countries</td>
<td>10.0</td>
<td>4.7</td>
<td>13.3</td>
<td>4.8</td>
</tr>
<tr>
<td>World</td>
<td>24.4</td>
<td>16.7</td>
<td>18.2</td>
<td>11.1</td>
</tr>
</tbody>
</table>

Source: Authors’ estimation using IMPACT.
CONCLUSION

This partial equilibrium analysis of four agricultural trade liberalization scenarios finds little change in cereal trade under the four scenarios but substantial change in livestock trade. Agricultural commodity prices increase under all scenarios, with the largest increase under full multilateral trade liberalization. The analysis of net economic benefits shows that both developing and developed countries are harmed by trade protection and that full agricultural trade liberalization would generate significant economic benefits. Global net economic benefits are highest under the full multilateral trade liberalization scenario, and developing and developed countries broadly share these benefits. Sub-Saharan Africa, the world’s poorest region, is among the biggest winners from agricultural trade liberalization.

An important finding is that the net economic benefits for developing countries from liberalizing their own agricultural economies without comparable trade liberalization by the developed countries are far lower than gains for developed countries and far lower than developing country gains under full liberalization. The same is true for developed countries, which benefit far less than developing countries from developed country only liberalization and far less than under full liberalization. The asymmetrical benefits of unilateral trade liberalization show the importance of the WTO in facilitating mutually beneficial trade liberalization. As a negotiating, coordinating, and monitoring institution, the WTO can alleviate concerns over unequal benefits from unequal implementation of agricultural trade liberalization and facilitate mutually beneficial reciprocal liberalization.

NOTES

1. These sources include Ingco and Ng (1998); Fan and Tuan (1998); Finger, Ingco, and Reincke (1996); McDougall, Elbehri, and Truong (1998); UNCTAD (various years); Valdés (1996); and Valdés and Schaeffer (1995a, b, c, d).
2. Other developed countries include Canada, Iceland, Israel, Malta, New Zealand, Norway, South Africa, and Switzerland.
3. The net effect on consumers of an increase in prices due to full multilateral trade liberalization depends on the distortions consumers face under the current trading regime. While international cereal and livestock prices will increase under trade liberalization, consumers living in countries that heavily tax agriculture will pay lower prices overall.
4. The estimated world price and global net benefits are similar to those estimated by Diao, Somwaru, and Roe (2001) using a general equilibrium model for full agricultural trade liberalization and including a few additional commodities such as sugar and fruits and vegetables. Diao, Somwaru, and Roe estimate static welfare net benefits of $31.1 billion and an 11.6 percent increase in the index of world agricultural prices. However, the results here show a considerably larger share of benefits accruing to developing countries—59 percent compared with 8 percent for Diao, Somwaru, and Roe.
BIBLIOGRAPHY


